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Preliminary Geotechnical Assessment , Rev. 1

Saanich Transit Centre

Saanich, BC

Submitted to: BC Transit

Prepared by McElhanney Ltd.

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Contents

1. Introduction

As requested, McElhanney Ltd. (McElhanney) has prepared this geotechnical assessment which summarizes our preliminary geotechnical recommendations in support of the site preparation. Geotechnical assessment results and recommendations for the proposed development are reported herein.

2. Background

It is understood from BC Transit that BC Transit is a Crown Corporation of the province of British Columbia responsible for coordinating the delivery of transit services in the province outside the Metro Vancouver area. Its mandate includes planning, constructing and operating, either directly or indirectly, in over 130 communities throughout the province.

BC Transit is completing the necessary work to prepare a five-acre site of BC Transit owned properties for potential future development. These five properties are located between Glanford Avenue and Commerce Circle in Saanich, BC, and site preparation activities are the first step in a long-term plan to maximize the industrially-zoned properties for a conventional operations and maintenance facility which will be the future Saanich Transit Centre.

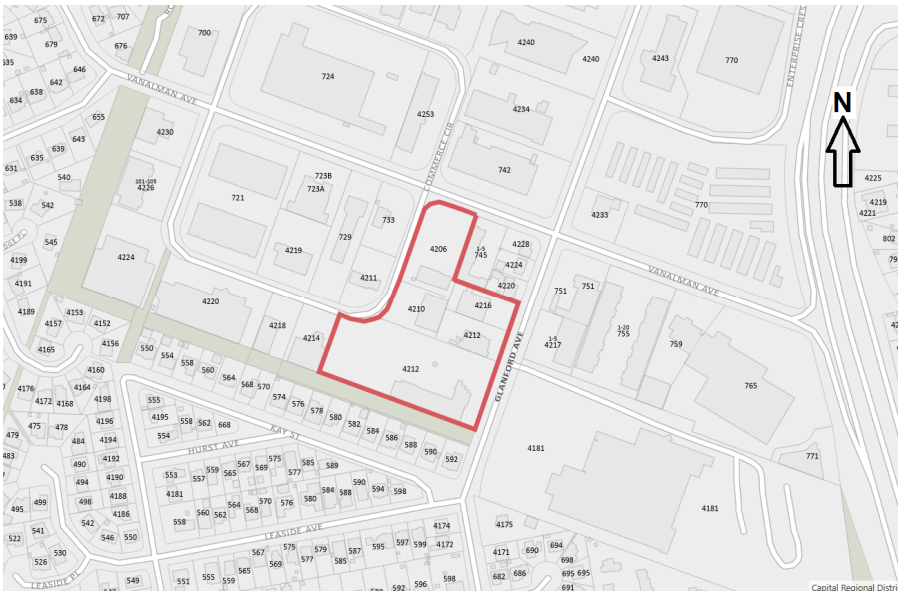


***Figure 1**- Image of the Study Area with boundary outlined in red. (Sourced from the Capital Regional District GIS Mapping, accessed on 2025-05-08)*

With Greater Victoria's population growing daily and transportation trips expected to increase by 40 percent, an additional operations and maintenance facility is needed. This will allow BC Transit to expand their fleet, keep buses running smoothly, and ensure customers get the quality transit service they depend on.

Initial site assessments began in March 2025 and site preparation activities will include geotechnical, archeological and environmental assessment, followed by the demolition of buildings.

3. Scope of Work

The scope of work for this geotechnical assessment includes the following:

- Complete soil characterizations and reviews to determine the appropriate setbacks, side slopes, excavation requirements prior to development
- Review the local soil conditions and profiles to further understand soil subsurface stratigraphy
- Discuss potential settlement of compressible soils and potential ground improvement methodologies
- Evaluate groundwater conditions and impacts relative to the subject site.
- Review site seismic hazard values required to perform the seismic design corresponding to "high importance" buildings as outlined in BC Building Code
- Provide preliminary geotechnical recommendations to inform design concepts and development planning
- Discuss erosion and sediment control

4. Approach and Methodology

4.1. DESKTOP REVIEW

The following background information was reviewed when preparing this report:

- BC Ministry of Energy and Mines, *Quaternary Geological Map of Greater Victoria*, Geoscience Map 2000-2
- Canada Department of Mines, Geological Survey, *Superficial Geology, Victoria Sheet*, Map 71A,1915.
- Capital Regional District Online Mapping (accessed on March 3, 2025).
- EXP, *Geotechnical Assessment Report, 4210 Commerce Circle*, File No. VAN-21025704-A0, June 13, 2022.
- SNC Lavalin, *Limited Soil and Groundwater Investigation, Underground Storage Tank, 4206 Commerce Circle, Saanich, BC*, File No. 503207 A010, June 25, 2010.

4.2. GEOTECHNICAL FIELD INVESTIGATION

McElhanney prepared for the drilling investigation by reviewing available geotechnical reports, completing a BC One Call, and reviewing available information on existing utilities. A utility locating subcontractor was then engaged to scan and clear proposed borehole locations.

Boreholes were advanced on March 24 to 28, 2025, with a truck mounted sonic drilling rig owned and operated by Terratech Drilling. Sixteen holes were drilled to maximum depths ranging from 1.2m to 13.5m. Monitoring wells were nested with soil vapour probes in six of the boreholes (BH25-05, 07, 09, 11, 13, 14). Soil vapour probes were also installed in two additional boreholes (BH25-10 & 12). Dynamic Cone Penetration Tests (DCPTs) were completed in four of the test holes (BH25-01, 02, 03, 04) to evaluate relative soil density and delineate soil deposits.

The soil conditions were logged in the field by a McElhanney geotechnical personnel and representative soil samples were returned for further visual classification and laboratory testing. Boreholes were backfilled to surface level with the drill cuttings following completion of the investigation, unless monitoring wells or soil vapour probes were installed. The approximate borehole locations are shown on the location plan provided in **Appendix B**. Borehole information, depths of observed soil units, schematics of monitoring well and soil vapour probe installations, and groundwater levels are shown on the borehole logs provided in **Appendix C**.

4.3. LABORATORY TESTING SUMMARY

Geotechnical laboratory soil testing completed for this phase, is summarized in **Table 4-1**, with test results presented in **Appendix D**.

Table 4-1: *Summary of laboratory soil testing completed. (See Appendix D for results.)*

SAMPLE SOURCE	DEPTH	TEST COMPLETED	ASTM STANDARD
BH25-01	3.2m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
	6.8m	Soil Moisture Content Wash Sieve Analysis Atterberg Limits	D2216 C117 & C136 D4318
	12.5m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
BH25-02	2.8m	Soil Moisture Content	D2216

		Wash Sieve Analysis	C117 & C136
BH25-04	2.8m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
	4.3m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
BH25-05	2.2m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
	4.0m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
BH25-08	2.3m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
	3.9m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
BH25-10	3.0m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
BH25-13	1.7m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
	3.0m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
	4.2m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
BH25-14	2.4m	Soil Moisture Content Wash Sieve Analysis	D2216 C117 & C136
	4.1m	Soil Moisture Content Wash Sieve Analysis Atterberg Limits	D2216 C117 & C136 D4318

4.4. ANALYSIS

Following the field investigation and laboratory testing, representative soil units were roughly delineated to understand the approximate extents of soft deposits and bedrock topography, to inform the preliminary geotechnical recommendations. The following analysis work was completed before preparing the report:

- Soil strength parameters were correlated from representative blow count data, laboratory testing results, and from field testing data provided in previous reports.
- Ultimate bearing capacities for strip footings were estimated using representative conditions and applying Vesic's (1973) ultimate bearing capacity relationship.
- Preliminary settlement estimates were based on borehole profiles with the most significant deposits of soft fine-grained soil observed during the investigation. Janbu methodology was applied using Settle 3D software (v.4.023). Field testing to collect data for comprehensive settlement analysis was beyond the current scope of work. Soil parameters were either based on field data correlations or estimated based on typical values for the soils encountered. Results were compared to the EXP analysis results.
- Lateral earth pressure factors for representative soil units were estimated for active, passive, and at-rest conditions for static and seismic loading conditions.
- Temporary excavation side slope angles were evaluated for silty clay slopes using blow count data correlations and undrained shear strength testing from previous site investigations. Geostudios Slope/W software was used to evaluate slope stability factors of safety for a range for soil strengths.

5. Site Conditions

5.1. SITE DESCRIPTION

The subject site is located in central Saanich, 600m west of Patricial Bay Highway. The Study Area covers the following civic addresses:

- 4206, 4210 & 4212 Commerce Circle
- 4216 & 4212 Glanford Avenue

The Study Area comprises light industrial and commercial lots covering an area of approximately 2.07 Ha, that is bounded by Commerce Circle to the west, Vanalman Avenue to the north, and single family residential lots fronting Glanford Avenue to the east. The south extents of the Study Area are bordered by a small park that acts as a buffer zone for single family residential properties fronting Kay Street. At the time of the field investigation the Study Area contained commercial and light industrial buildings and facilities that were in use.

5.2. GEOLOGICAL SETTING

Available surficial geological mapping indicates that the Site is underlain by the following units:

Thick Soft Clay – This unit may include more than 3 m of soft to firm, grey clay facies of Victoria Clay, a glacio-marine clayey silt, overlain by stiffer brown facies of Victoria Clay. These clays often transition to coarser, sandier gradations in shallower horizons. Mapping indicates that the northeast quarter of the Site is underlain by this unit.

Thin Soil Cover with Scattered Bedrock Outcrop – This unit comprises shallow soils over bedrock. These shallow soils might include up to 5m of brown Victoria clay. Topography in these areas is controlled by the irregular bedrock surface.

Mapping indicates that the Site transitions from the thick soft clay unit to bedrock with thin soil cover, from north to south. This transition zone covers the majority of the Study Area. The mapping notes also indicate that bedrock may be overlain with glacial till deposits.

5.3. SUBSURFACE CONDITIONS

5.3.1. Soil Unit Descriptions

The soil units encountered during the drilling investigation generally corresponded with soil unit descriptions from surficial geology mapping of the area. Observed soil conditions have been grouped into general categories for descriptive purposes below. However, gradations and thicknesses of each unit varied across the site and in some cases transitions between soil units could not be clearly delineated in the field. The soil units encountered in the boreholes are summarized below in order from surface to depth.

Concrete/ Asphalt: The majority of the Study Area was either paved with asphalt or covered with concrete slabs. Asphalt and concrete wearing surfaces observed during drilling were not all supported by crushed base gravel as would be typical in pavement structures.

- **Fill:** Shallower horizons up to 0.9m deep appeared to comprise imported sand and gravel fill. Some of this material may be suitable for reuse if it meets gradation specifications. Some areas contained what appeared to be imported sand and gravel mixed with siltier material.

- **Sand and Silt:** This unit contained varying gradations of silt and sand with traces of clay and/ or gravel. It was typically non plastic and varied in thickness from 0.5 m to 3 m. These deposits are inferred to be Capilano Sediments.

- **Silt:** This finer grained unit was observed in nearly every borehole and often contained some to trace clay and gravel. Brown coloured silt units generally appeared to be firm to hard. Grey to brown grey silt deposits varied from soft to hard. The grey silt units encountered in the northwest quarter of the site (BH25-05, 06, 07, 08, 09) became increasingly soft and wet below 3m.

Shallower horizons of this unit were mottled orange-brown which may be an indicator of oxidation from intermittent groundwater seepage.

- **Sand and Gravel:** Coarser gradations were observed below the silt unit in several holes (BH25-01, 02, 04). These deposits ranged from compact to very dense and were very wet. It's inferred that these units were glacial till overlaying bedrock.

- **Bedrock:** Inferred depth to bedrock varied from 1.2m to 5.2m in BH25-02, 03, 11, 14,15. Bedrock geology could not be verified due to poor sample recovery. It's inferred that bedrock generally dips to the north east based on surface topography. However, based on drilling refusal depths the bedrock surface topography is irregular and may vary in grade from 2% to 10% in various directions.

Subsurface conditions appeared to transition from units C2 (Thick Soft Clay) in the north part of the Study Area, to R2 (Thin Soil Cover with Scattered Bedrock Outcrop) towards the south. (See **Appendix B**.) These conditions are described in the context of the existing lots below:

- **4206 Commerce Circle** (BH25-01, 05, 06, 07, 08, 09) – This lot typically contained compact/ firm sand and silt underlain with soft silt, some clay below 3 to 4m of depth below surface. The soft silt with some clay ranged in thickness from approximately 1 m to 2 m.

- **4210 Commerce Circle and 4212, 4216 Glanford Avenue** (BH25-02, 03, 04) – Boreholes observations indicated the presence of shallower horizons of firm to hard silt and sand, or sandy silt. Dense, gravelly sand and silt layers were typically observed below 3m, over bedrock, with the exception of BH25-03 that met refusal on bedrock at 1.2m of depth.

- **4212 Commerce Circle** (BH25-10,11,12, 13, 14, 14) – Observed subsurface conditions generally comprised silty sand over firm to hard silt with some clay. Drilling refusal on bedrock was assumed for most boreholes within this lot. Refusal depths ranged from approximately 3 to 5m.

5.4. GROUNDWATER

Groundwater seepage was typically very shallow and was observed at depths ranging from 0.2m to 4.4m during the investigation. Monitoring well readings following the drilling investigation were shallower in the 6 weeks following the field investigation. These readings ranged from just below the surface grade to 3 m below grounds surface. Groundwater levels generally appeared to be within coarser grained materials with sand and gravel components. It was inferred that groundwater perches on the bedrock surface, based on the higher moisture contents and increasingly soft consistency of soil samples immediately above bedrock refusal depth. Intermittent water bearing sand and gravel lenses may be present.

Groundwater conditions at other times and locations may differ from those observed within the test hole locations at the time of the investigation and can be expected to fluctuate seasonally and with cycles of precipitation. McElhanney should be contacted if there is a significant change in groundwater conditions encountered during construction.

6. General Discussion and Recommendations

The following discussion provides preliminary geotechnical guidelines in support of site preparation works, as well as preliminary recommendations to inform future site development design concepts and planning. Geotechnical design parameters provided in this report are preliminary and meant to inform planning and conceptual design phases. The provision of detailed geotechnical design parameters, such as anticipated foundation settlement and subgrade bearing capacities, is dependant on design details such as foundation siting, sizing, and depth. These detailed parameters can be calculated once the recommended additional work is completed and design details are provided to the Geotechnical Engineer of Record (EOR).

Erosion and sediment control and temporary excavation works are relevant to site preparation phase. Preliminary recommendations for building foundation design are provided as well. Geotechnical recommendations presented in this report are based on on-site observations, field and laboratory testing results, information available regarding the proposed development, and McElhanney's experience with similar projects. Considering the inherent nature of soil variations, soil and groundwater conditions between and beyond boreholes can differ from those encountered during the investigation. In such instances, adjustments to design and construction may be necessary.

6.1. EROSION AND SEDIMENT CONTROL

An erosion and sediment control plan should be prepared and implemented before onsite demolition and excavation works begin. Demolition and site preparation works may expose fine grained soils such as silt and clay. Fine grained soil exposed to wet conditions such as precipitation and surface run off, may create sediment laden flows that could reach municipal stormwater system or natural water courses.

Erosion and sediment control plans should minimize exposure of the fine-grained soils to wet conditions. As a secondary measure, surface flows should be prevented from leaving site if they might be contaminated with sediment.

Due to the presence of clay, settling ponds may not be an effective or efficient method to treat run off. Settling tanks with deflocculant should be considered where surface run off is exposed to clay and cannot be effectively contained onsite.

Excavation side slopes should be covered with anchored poly sheets to protect slopes from precipitation that could trigger erosion. Working surfaces should be capped with at least 100mm of either clear crush gravel and possibly non-woven geotextile, or well graded crush gravel.

6.2. TEMPORARY EXCAVATIONS

All excavations should be in accordance with the BC Occupational Health and Safety Regulation. Where excavation scenarios are not clearly defined under this regulation, a geotechnical engineer should be consulted to assess potential hazards and provide recommendations.

For preliminary excavation planning, 1H:1V excavation side slopes should be suitable for finer grained soils encountered during excavation. Where excavations expose firm to hard or compact to dense soils, steeper cut slopes might be suitable, pending review by a qualified geotechnical engineer. All excavations not in accordance with the Occupational Health and Safety Regulation should be reviewed and approved in writing by a suitably qualified geotechnical engineer prior to workers entering the excavation.

Excavation planning should consider impacts on adjacent buildings and other infrastructure. Excavations should be offset from existing infrastructure to allow for 45° side slopes and at least a 1 m horizontal offset between the crest of the side slopes slope to the structure. Where these recommendations cannot be satisfied due to site constraints, a geotechnical engineer should be consulted to provide alternative excavation methods or shoring design.

Excavation planning must consider significant seepage and dewatering measures. Groundwater seepage or surface water runoff may result in a loss of bearing strength and reduction in excavation sidewall stability. Therefore, ingress of groundwater into any excavation should be controlled by grading, perimeter ditching or a combination of sumps and pumps. Any water or snow that collects on road or building subgrades should be removed before allowing the subgrade to drain prior to placement of engineered fill or installing load bearing elements such as pavement or foundations.

We recommend that the Geotechnical EOR be consulted during site preparation and demolition planning.

6.3. LATERAL EARTH PRESSURES

It's understood that temporary and permanent soil retention structures may be included in future development works. It is assumed that retaining structures will be founded on a crushed granular base layer overlying approved compact or better naturally deposited soils or engineered fill, and that backfill material will comprise engineered fill as described in the **Section 6.6**.

The pressure profiles provided assume:

- The wall is vertical and frictionless with respect to the backfill – which is the conservative assumption,
- The ground surface immediately behind the wall (the high side) is essentially level,
- Walls subject to lateral earth pressures, that are anchored at the top to the rest of the structure are assumed to be unyielding and *at rest* coefficients are applicable (K_o, K_{oe})
- Where wall can deflect at least 0.5% of their height, active coefficients should be applied (K_a, K_{ae})
- The walls will not be able to rotate or slide. (These failure modes will need to be checked by a geotechnical engineer.)
- Lateral earth pressure coefficients have been estimated for two representative soil units observed in shallower horizons: Sand & Silt (or Silty Sand), and Silt & Clay
- A horizontal Peak Ground Acceleration (PGA) of:

- 0.78g for the 1 in 2,475-year event.

(From 2020 National Building Code of Canada Seismic Hazard Tool (nrcan.gc.ca))

For walls designed under the above assumptions, the lateral earth coefficients and soil parameters provided in **Table 6-1** can be adopted. Approximate pressure distributions and calculation methods are provided in **Appendix E**. Coefficients have been calculated for *at rest*, *active, passive* earth pressures under static conditions (Jaky and Rankine Methods) and the *at rest*, *active cases* under pseudo static loading (ie. seismic loading) per the Wood Method and Mononobe Okabe method, as set out in the Canadian Foundation Engineering Manual, 5th Edition 2023, and Geotechnical Earthquake Engineering (Kramer, 2007).

The lateral earth pressures may be calculated using the formulae provided in **Appendix E** (per Section 18.7.3, CFEM, 2023). Note that the height of the pressure distribution will act at a different height above the base of the wall than in the simple static case (i.e. higher) resulting in a larger over-turning moment.

McElhanney's geotechnical team should be given the opportunity to review final development plans, which could affect these recommendations.

***Table 6-1:** Parameters for Lateral Earth Pressure Calculations[1]*

PARAMETER[3]	SEISMIC SCENARIO (1 IN 2475 YEAR EVENT)	
	SAND & SILT/ SILTY SAND	SILT & CLAY
Friction Angle (Φ')	30°	28°
Unit Weight (ϒ)	18 kN/m^3	17 kN/m^3
Seismic Coefficient (K_h)	½ (0.79) [2]	½ (0.79) [2]
***At Rest* Earth Pressure Coefficient (K_o)**	0.50	0.53
***Active* Earth Pressure Coefficient (K_a)**	0.30	0.32
***Passive* Earth Pressure Coefficient (K_p)**	3.0	2.76
Incremental Dynamic *Active* Earth Pressure Coefficient (ΔK_{ae})	0.44	0.47
Incremental Dynamic *At Rest* Earth Pressure Coefficient (ΔK_{oe})	0.79	0.79

Notes:

1. *See Appendix E for further information.*
2. *Typical ground shaking records (acceleration vs. time) indicate that peak ground accelerations are relatively brief and that it may be overly conservative to apply full PGA for this scenario. M-O Method does not accommodate higher PGAs. Therefore 0.5PGA applied to parameter calculations for 1 in 2475yr event.*
3. *Based on Canadian Foundation Engineering Manual 4th Edition, Canadian Geotechnical Society, Sections 18.7 & 20, Seismic Design of Retaining Walls.*

6.4. PRELIMINARY FOUNDATION RECOMMENDATIONS

Soft and potentially compressible soils were observed during the drilling investigation, primarily in 4206 Commerce Circle. Additional field testing such as cone penetration testing (CPT) is recommended to provide reliable soil settlement parameters for analysis once building foundation siting, and preliminary foundation designs are established. The provision of geotechnical design parameters will require additional design details such as proposed building siting, foundation dimensions and foundation depths.

Preliminary settlement estimates based on the soil profile in BH25-01 and BH25-05 indicate potential settlements in the order of a 100 mm under strip footing loads of 150 kPa. This preliminary estimate was completed with Settle 3D (v. 4.023), applying the Janbu method and estimated soil parameters.

The EXP report also discusses potential settlements up to 100mm following fill placement on lot 4210 Commerce Circle. That previous report considers preloading as a solution.

Settlement from compressible soils may be mitigated by either replacing marginal subgrade soil with engineered fill, supporting buildings with deep foundation (ie. piles) or by preloading proposed building footprints. These options are discussed in greater detail below, in addition to general foundation considerations for preliminary design purposes.

Detailed geotechnical design of the selected foundation and/or site preparation methods will be required. Due to high groundwater levels, design of below grade levels will require careful consideration of groundwater management.

6.4.1. Subgrade Replacement with Engineered Fill

This method comprises the removal of compressible or otherwise unsuitable soils within proposed load bearing footprints and replacing them with engineered fill bearing on competent subgrade. In some cases, a variation of this method may be feasible without excavating the full depth to competent bearing grade. This typically applies to lighter weight structures that are settlement tolerant, such as accessory buildings where enough marginal subsurface material can be removed to offset the weight of the proposed structure.

These methods may require additional testing to evaluate excavation stability and in situ soil unit weights, but they can be economical compared to other methods. These methods are typically best suited for shallower excavation works (less than approximately 3 m) and where the excavations works will not compromise existing structures nearby.

6.4.2. Deep Foundations

Deep foundations transfer structural loads from the surface directly to competent bearing surfaces via steel and/ or concrete piles, below the marginal soil conditions. The test holes indicate the Study Area is underlain with either bedrock or dense glacial till deposits overlaying bedrock at depths ranging from 1.2 m to 5.2 m. Due to the irregular surface of the bedrock, depth to bedrock may vary beyond this observed range. However, observed conditions generally appear to be suitable for deep foundations and could accommodate larger building loads.

Advantages of deep foundations include:

- Shorter development and construction timelines compared to pre loading methods.
- Minimal site disturbance during installation.
- Bearing and uplift capacity, as installed, can be verified through standard testing methods.
- Installation contractors and materials are locally available.

Disadvantages of this type of foundation might include:

- Potential disturbance to adjacent structure if piles are installed with hammers or vibrators that cause excessive vibration. This can be mitigated with alternate installation methods such as auguring or jetting piles into place.

- Steeply dipping bedrock surfaces may not be conducive to end bearing piles or may require socketing into the rock for pile tip stability and bearing.

For preliminary design consideration, end bearing steel or concrete piles can typical support factored ultimate (ULS) loads in the order of 1000kN per pile, dependent on the actual pile type, size and bearing condition. Mapping of the upper bedrock surface topography, using geophysical methods, is recommended to inform pile layout and design.

6.4.3. Preloading

Preloading involves the placement of a load, such as fill or concrete blocks, onto a proposed building footprint to consolidate subsurface soils before the building is constructed. Preloading installations are typically 1.5 to 2 times the design load of the proposed building. Once settlement from the preload has completed the preload is removed and the building constructed. This mitigates settlement when the building is constructed and allows for conventional shallow foundation design (ie. cast in place strip footings or pad footings). Settlement gauges are installed and monitored to track settlement rates and confirm adequate consolidation during the preload process.

Advantages of this method include:

- Cost effectiveness. Preloading could be installed during the site preparation phase while equipment is already mobilised to site.

- Materials and contractors are locally available and relatively economical.

Disadvantages of preloading may include the following:

- Required timelines for adequate settlement are difficult to accurately predict, especially where subsurface conditions are variable. This is not conducive to time sensitive projects.

- Sloping surface topography and/or sloping bedrock surface topography may preclude application of this method.

- Preloading may adversely affect existing adjacent structures.

6.4.4. General Foundation Recommendations

Where marginal materials are removed and replaced with engineered fill, per section 6.4.1, It is recommended that the proposed buildings be founded on undisturbed soil in a stiff/dense or better condition, or engineered fill placed under the recommendation of a geotechnical engineer, to a suitable depth placed overlying the naturally deposited, undisturbed soil. Where these conditions cannot be met,

alternative foundation designs or subgrade preparation methods should be applied (per Sections 6.4.2 & 6.4.3). For strip or pad footings, suitable bearing capacities for compact to dense soils observed onsite or engineered fill materials are provided in **Table 6-2.**

Table 6-2: *Summary of ultimate bearing capacity estimates for representative conditions*

SUBGRADE SOIL	BEARING CAPACITY		TYPICAL SOIL PARAMETERS	
	ULTIMATE LIMIT STATE[1] (KPA)	SERVICEABILITY LIMIT STATE[1,2] (KPA)	FRICTION ANGLE (°)	UNIT WEIGHT (KN/M^3)
Firm Silty Sand	100	75	30	18
Compacted Engineered Fill[4]	150	100	34	21

Notes:

1. Canadian Foundation Engineering Manual, 5th Edition, 2023, Canadian Geotechnical Society, Bitech Publishing Ltd., Richmond, BC.
2. Based on structural tolerance to differential settlement of 25mm or less across column spacing for typical wood- framed construction. Note that settlement potential will need to be verified once foundation depths, dimensions, and layout has been established.
3. For footings with minimum width of 0.6m and embedment depth of 0.6m.
4. Engineered fill placed per Section 6.6, on competent bearing grade.

McElhanney should be given the opportunity to review the final development plan, which could affect bearing capacity recommendations.

The following additional recommendations are provided for building foundation construction:

1) Building foundations and / or engineered fill for the proposed building should be founded on undisturbed, unfrozen, inorganic subgrade, in a compact or better condition, free from unsuitable fill and organic soil and loose / soft or wet soil including weathered till. All subgrades should be reviewed and verified by qualified geotechnical personnel prior to foundation construction.

2) If loose or soft soils are encountered within the development area at the subgrade level, it is recommended that these materials should be sub-excavated and replaced with engineered fill.

3) If engineered fill is required to raise grades, as design requires, to support building foundations, slab on grade or pavement structures, the recommendations in **Section 6.6** should be followed.

4) To reduce the potential for frost heave during cold weather conditions, shallow foundations should be provided with a minimum soil cover of 0.45m.

5) Concrete foundations are not to be placed on frozen soil, nor should soil beneath the foundation be allowed to freeze during or after construction.

6) Additional reinforcing steel should be placed in the strip footing where the structure crosses over any planned utility (water / sewer) service trenches. Refer to structural engineering recommendations for reinforcement details.

6.4.5. Seismic Hazards and Data

The Site is situated within an earthquake region of high seismic activity, as defined by the National Building Code seismic hazard calculation for the site (NBCC, 2020). No significant deposits of liquefiable soils were identified during the geotechnical field investigations.

The parameters for Site Classification for the Seismic Site Response are based on the average soil properties in the top 30 m of the subsurface as per Section 4.1.8.4 of the 2024 British Columbia Building Code. As McElhanney was only able to confirm soils in the top portions of the Site. Based on observed conditions the Site Classification for seismic site response as per the BC Building Code (BCBC 2024), Section 4.1.8.4, is classified as Site Class “E” for seismic design purposes. However, if foundations are founded on bedrock (ie. deep foundations), suitable dense glacial till subgrades, or engineered fill overlying dense subgrades a Site Class “D” may be applied for seismic design purposes

Seismic data for the Site was obtained from Natural Resources Canada and the 2020 National Building Code of Canada, as shown below in **Table 6-2.** The estimated peak ground acceleration (PGA) due to a seismic event with a 2% in the 50-year probability of exceedance (1 in the 2475-year event)[1] is 0.793g for Site Class C.

Table 6-2: *Summary of Seismic Data for the Site*

2020 NATIONAL BUILDING CODE OF CANADA GROUND MOTIONS[1]				
PROBABILITY OF EXCEEDANCE IN 50 YEARS (AEP)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA(g)
2% (1 in 2475 year Event)	1.62	0.946	0.558	0.793
5% (1 in 1000 year Event)	1.11	0.628	0.341	0.575
10% (1 in 475 year Event)	0.794	0.428	0.213	0.432

Notes:

1. The design earthquake of 2% in 50-year probability of exceedance (1 in 2475 event) as defined by the 2020 National Building Code and the 2024 British Columbia Building Code in accordance with Article 4.1.8.4B of the NBC 2020.

The preliminary designated Site Class provided here should be reviewed by a geotechnical engineer once building details and foundation systems become known.

6.5. REUSE OF NATURAL SITE MATERIALS

Existing imported sand and gravel may be stripped and stockpiled for re use on the site. This material was typically observed just below concrete slabs and asphalt pavement. Stockpiled material should be sampled and evaluated to verify suitable gradation. It may also need to be tested for contamination.

Samples of naturally deposited soils onsite typically contained a significant fine grained component and were moisture sensitive. These materials would be suitable for general grading or landscaping fill materials but would not be considered suitable for re-use as engineered fill, unless reviewed and approved by the Geotechnical EOR during construction.

6.6. ENGINEERED FILL

Engineered fill should be used if needed to raise and level approved subgrades, as design requires, that will support building foundations, slab-on-grade or pavement structures. Recommendations for Engineered fill are summarized as follows:

1) Qualified geotechnical personnel should approve the exposed subgrade prior to placement of engineered fill, to confirm that unsuitable materials have been removed.

2) It is recommended that engineered fill placement and compaction be observed and approved by qualified geotechnical personnel. This would include approval of the proposed fill materials and performing a suitable program for compaction testing.

3) Engineered fill should consist of inorganic, 75 mm minus well-graded sands and gravels (pit run) or crushed rock, unless otherwise advised. Locally sourced materials may be considered acceptable if tested and reviewed by the geotechnical engineer. If engineered fill placement is to be carried out in the wet season or during inclement weather, free draining materials with a fines content (passing the #200 sieve) of less than 5% should be used.

4) For a confined condition, the bottom of excavation should extend beyond the footing edge for a distance of at least the thickness of the engineered fill and no less than 0.5 m.

5) If engineered fill is not confined within an excavation and will form a free slope (embankment), additional geotechnical recommendations will be required at the discretion of the geotechnical engineer.

6) Engineered fill should be compacted to a minimum of 95% Modified Proctor Maximum Dry Density (MPMDD ASTM D1557) and placed at approximately the optimum moisture content in any areas that will support buildings, slabs, roads, or pavement.

7) Engineered fills should be compacted using vibratory compaction equipment and placed in lift thicknesses appropriate for the size and type of compaction equipment used. A general guideline for maximum lift thickness as measured loose is:

a. 100 mm for light hand equipment;

b. 150 mm for small walk-behind rollers or plate tampers;

c. 300 mm for large ride-on rollers or heavy (>500 kg) vibratory plate compactors, rubber-tired backhoe mounted hoe-pacs, or track-excavator mounted hoe-pacs.

7. Additional Work

This report was intended to inform site preparation works and preliminary conceptual design. Detailed site design will likely require additional geotechnical analysis to determine potential foundation settlement and foundation bearing capacities. The delivery of these geotechnical design parameters may be an iterative process and would require the following additional field testing:

- Mapping of bedrock surface topography would inform deep foundation design (ie .piles) and foundation settlement analysis by providing the bedrock depths as well as dip angles and directions. Non intrusive geophysical testing methods such as Multichannel Analysis of Surface Waves (MASW) or Ground Penetrating Radar (GPR) scanning would be indicated.

- Cone Penetration Testing (CPT) would provide the required input data for soil settlement analysis, liquefaction screening, and bearing capacity estimates. CPTs would be advanced within proposed building footprints or other facilities that are sensitive to settlement, where soft soil conditions or liquefiable soil is anticipated.

Once preliminary building siting, initial foundation dimensions, and foundation depths are provided, the Geotechnical EOR can provide a detailed scope and cost estimate to complete additional field testing and geotechnical analysis.

8. Acknowledgements

This report has been prepared in accordance with standard geotechnical engineering practices, and at the expense of the Client. McElhanney has not acted for or as an agent of the local government in the preparation of this report.

9. Closure

We trust this geotechnical assessment information is sufficient for your present needs. Please do not hesitate to contact us with any questions or additional information.

Respectfully submitted,

McElhanney Ltd.

Prepared by:

Johannes Fischer, P.Eng.
Geotechnical Engineer

Reviewed by:

Richard Simpson, P.Eng.
Senior Geotechnical Engineer

Date	Status	Revision	Author
May 15, 2025	Draft	A	Johannes Fischer
June 9, 2025	Draft	B	Johannes Fischer
September 19, 2025	Final	C	Johannes Fischer

APPENDIX A

Statement of Limitations

Statement of Limitations – Geotechnical Services

Use of this Report. This report was prepared by McElhanney Ltd. ("**McElhanney**") for the particular site, design objective, development and purpose (the "**Project**") described in this report and for the exclusive use of the client identified in this report (the "**Client**"). The data, interpretations and recommendations pertain to the Project and are not applicable to any other project or site location and this report may not be reproduced, used or relied upon, in whole or in part, by a party other than the Client and Building Authority, without the prior written consent of McElhanney. The Client may provide copies of this report to its affiliates, contractors, subcontractors and regulatory authorities for use in relation to and in connection with the Project provided that any reliance, unauthorized use, and/or decisions made based on the information contained within this report are at the sole risk of such parties. McElhanney will not be responsible for the use of this report on projects other than the Project, where this report or the contents hereof have been modified without McElhanney's consent, to the extent that the content is in the nature of an opinion, and if the report is preliminary or draft. This is a technical report and is not a legal representation or interpretation of laws, rules, regulations, or policies of governmental agencies. The professional services retained for this Project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in this report. In particular, environmental conditions such as surface and subsurface contamination are outside the scope of this report.

Standard of Care and Disclaimer of Warranties. This study and report have been prepared in accordance with generally accepted engineering and scientific judgments, principles and practices. McElhanney expressly disclaims any and all warranties in connection with this report including, without limitation, any warranty that this report and the associated site review work has uncovered all potential geotechnical liabilities associated with the subject property.

Effect of Changes. All evaluations and conclusions stated in this report are based on facts, observations, site-specific details, legislation and regulations as they existed at the time of the site assessment. Some conditions are subject to change over time and the Client recognizes that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site may substantially alter such evaluations and conclusions. Construction activities can significantly alter soil, rock and other geologic conditions on the site. McElhanney should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein upon any of the following events: a) any changes (or possible changes) as to the site, purpose, or development plans upon which this report was based, b) any changes to applicable laws subsequent to the issuance of the report, c) new information is discovered in the future during site excavations, construction, building demolition or other activities, or d) additional subsurface assessments or testing conducted by others.

Subsurface Risks. Soil, rock and groundwater data were collected in general accordance with the standards and methods described in the document. The classification and identification of soils, rocks and geologic formations was based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Interpretations of groundwater levels and flow direction are based on water level observations at selected test hole locations and are expected to fluctuate. Observations at test holes indicate the approximate subsurface conditions at those locations only. Subsurface conditions between test holes were based, by necessity, on judgement and assumptions of what exists between the actual locations sampled, and may vary significantly from actual site conditions and all persons making use of this report should be aware of, and accept, this risk. Even a comprehensive sampling and testing program, implemented in accordance with appropriate equipment by experienced personnel, may fail to detect all or certain conditions.

Information from Client and Third Parties. McElhanney has relied in good faith on information provided by the Client and third parties noted in this report and has assumed such information to be accurate, complete, reliable, non-fringing, and fit for the intended purpose without independent verification. McElhanney accepts no responsibility for any deficiency, misstatements or inaccuracy contained in this report as a result of omissions or errors in information provided by third parties or for omissions, misstatements or fraudulent acts of persons interviewed.

Underground Utilities and Damages. In the performance of the services, McElhanney has taken reasonable precautions to avoid damage or injury to subterranean structures or utilities. Subsurface sampling may result in unavoidable contamination of certain subsurface areas not known to be previously contaminated such as, but not limited to, a geologic formation, the groundwater or other hydrous body. McElhanney will adhere to an appropriate standard of care during the conduct of any subsurface sampling.

Independent Judgments. McElhanney will not be responsible for the independent conclusions, interpretations, interpolations and/or decisions of the Client, or others, who may come into possession of this report, or any part thereof. This restriction of liability includes decisions made to purchase, finance or sell land or with respect to public offerings for the sale of securities.

Construction. The subsurface information contained in this report were obtained for the owner's information and design. The extent and detail of assessments necessary to determine all relevant conditions that may affect construction costs would normally be greater than the assessments carried out for this report. Accordingly, a contingency fund to allow for the possibility of variations of subsurface conditions should be included in the construction budget to cover costs associated with modifications of the design and construction procedures resulting from conditions that vary from the assumptions in this report. If during construction, subsurface conditions are found to be other than those described in this report, McElhanney is to be notified and may alter or modify the geotechnical report recommendations. If McElhanney is not retained to provide services during construction, then McElhanney is not responsible for confirming or recording that subsurface conditions do not materially differ from those interpreted conditions contained in this report or for confirming or recording that construction activities have not adversely affected subsurface conditions or the recommendations contained in this report.

APPENDIX B

Site Plan

FILE: X:\2241\Projects\22412413800 Site Preparation - Saanich Transit Centre\07_DRAWINGS\02_Sketches\22412413800-BOREHOLE LOCATION PLAN-B1.0

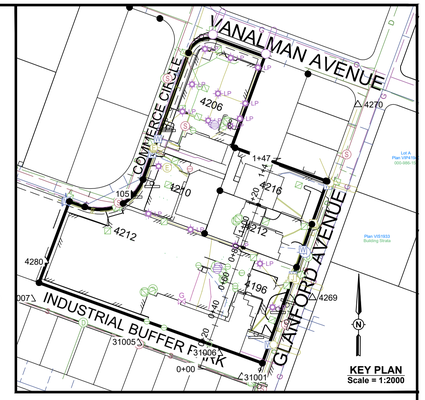
GEOTECHNICAL AND ENVIRONMENTAL BOREHOLE, MONITORING WELL AND SOIL VAPOUR PROBE LOCATIONS

PROPERTY	LOCATION ID	DESC	NORTHING	EASTING	GROUND ELEVATION	TOP OF PIPE ELEVATION
4206 Commerce Circle (Handydart)	BH25-01	BH	5372069.229	471235.397	21.86	-
	MW25-05	MW/ SVP	5372038.079	471238.310	23.61	23.44
	BH25-06	BH	5372041.476	471244.294	23.41	-
	MW25-07	MW/ SVP	5372026.689	471243.498	23.92	23.78
	BH25-08	BH	5372021.577	471241.143	24.12	-
	MW25-09	MW/ SVP	5372021.559	471234.870	24.05	23.97
	AH/MW22-01	MW	5372067.522	471257.383	22.25	22.12
	MW13-3	MW	5372024.510	471239.772	24.02	23.92
	MW13-4	MW	5372035.764	471240.629	23.71	23.63
4210 Commerce Circle (former BCT Training)	BH25-02	BH	5371988.396	471200.796	27.63	-
	AH/MW22-03	MW	5371992.516	471197.275	27.61	27.53
4216 Glanford Avenue (Belfor)	BH25-03	BH	5371985.036	471287.294	23.59	-
4212 Glanford Avenue (LE Anderson)	BH25-04	BH	5371970.243	471244.874	28.67	-

PROPERTY	LOCATION ID	DESC	NORTHING	EASTING	GROUND ELEVATION	TOP OF PIPE ELEVATION
4212 Commerce Circle / 4196 Glanford Avenue (former Wilsons)	SVP25-10	SVP	5371947.146	471238.692	30.05	-
	MW25-11	MW	5371947.603	471191.495	30.98	30.91
	SVP25-11	SVP	5371948.669	471192.197	30.90	-
	SVP25-12	SVP	5371926.862	471189.350	31.54	-
	MW25-13	MW/ SVP	5371949.744	471133.684	33.49	33.27
	MW25-14	MW/ SVP	5371913.301	471204.113	30.51	30.43
	SVP25-15	SVP	5371901.618	471231.691	30.51	-
	BH25-16	BH	5371910.302	471191.159	31.70	-
	MW4	MW	5371924.710	471235.628	30.14	30.04
	MW5	MW	5371922.939	471191.764	31.38	31.31
	MW6	MW	5371974.144	471174.936	29.67	29.57
	MW10-9	MW	5371939.214	471248.663	30.05	29.97
	MW10-10	MW	5371945.188	471231.125	30.08	29.97
	AH/MW22-07	MW	5371935.004	471265.914	29.54	29.46
	AH/MW22-12	MW	5371918.856	471232.082	30.26	30.17
	AH/MW22-13	MW	5371929.322	471136.363	33.45	33.36

NOTES

1. Parcel ID: 000-293-458, 000-244-929, 000-278-718, 000-278-700 and 013-296-736.
2. Property Titles Subject to: Statutory Rights of Way S84179, EG7113, S62746, EH7122, EC105392, EG118971, and L6608.
3. Conformance with charges affecting the subject title has not been verified by McElhanney.
4. Unregistered interests have not been included or considered.
5. This document shall not be used to define property lines or property corners.
6. Distances are in metres and decimals thereof.
7. Parcel dimensions are derived from field survey.
8. This plan represents field surveys conducted between March 10 and April 22, 2025.
9. Contour Interval is 0.5m.
10. Underground utilities verified on site located by Kelly's 1st Call Locating (1083919 BC Ltd.). Additional buried utility information shown is approximate and derived from existing records provided by BC Hydro, FortisBC, Rogers Communications, Telus Communications, and the District of Saanich, BC One Call ticket 20250910317. Contact BC One Call at least 10 days prior to construction.
11. Tree information is based on McElhanney field survey data and the Demolition Impact Assessment & Tree Management Plan (March 20, 2025) prepared by Talmack Urban Forestry Consultants Limited.



LEGEND

- 360 Panoramic Photo
- Survey Monuments and Control
  - Standard Iron Post found
  - Traverse Hub found
  - Traverse Hub placed
- Unknown Utility Symbols
  - Manhole Unknown
- Water
  - Fire Hydrant
  - Manhole Water
  - Manhole Water
  - Water Meter
  - Stand Pipe
  - Water Valve
  - Irrigation Valve
- Lighting
  - Lamp Standard
  - Yard Lamp
- Sign Symbols (Plan View)
  - Sign (Steel Post)
- Vegetation
  - Tree Deciduous
  - Tree Coniferous
  - Vegetation Change
- Sanitary Sewer - Septic
  - Sanitary Clean Out
  - Inspection Chamber
  - Manhole Sanitary
- Storm Sewer
  - Catch Basin
  - Storm Clean Out
  - Inspection Chamber
  - Manhole Catch Basin
  - Manhole Storm Drain
- Geotechnical Existing
  - McElhanney Borehole
  - McElhanney Monitoring Well
  - McElhanney Soil Vapour Probe
  - Historic Monitoring Well by Others
  - Transition from Silty/Clayey Soil to Shallow Bedrock
  - Silty/Clayey deposits
  - Bedrock with thin soil cover
- Natural Gas
  - Gas Valve
- Power
  - Power Guy Wire
  - Power Pole
  - Pole with Light
- Building Existing
- Building Eave
- Contour Label
- Contour Major
- Contour Minor
- Fence
- Retaining Wall
- Pavement
- Bottom of Bank
- Top of Bank
- Bush
- Vegetation Change
- Tree Dripline
- Tree Line

SURVEY CONTROL TABLE

POINT	NORTHING	EASTING	ELEV
102	5372122.200	471217.489	20.483
105	5371988.068	471180.568	28.227
4269	5371918.959	471301.723	27.522
4270	5372048.245	471332.130	18.576
4280	5371943.541	471122.806	34.509
31001	5371865.903	471254.294	32.472
31005	5371888.667	471185.085	34.361
31006	5371881.684	471239.249	32.586
31007	5371918.024	471113.771	35.352

UTILITY LEGEND

- Communications Underground
- Power Underground
- Fuel Pipe Underground
- Natural Gas Service Connection
- Sanitary Sewer Service Connection
- Storm Sewer Service Connection
- Water Service Connection

COMPILED FROM AS-BUILT DRAWINGS

- Communication Cable Underground
- Natural Gas Pipe Underground
- Sanitary Sewer Pipe Underground
- Storm Drain Pipe Underground
- Water Pipe Underground

TREE TABLE

Tag #	Species	(dbh) (cm)	Drip-Line (m)	Tag #	Species	(dbh) (cm)	Drip-Line (m)	Tag #	Species	(dbh) (cm)	Drip-Line (m)
1574	Pyramidal	18, 8, 8	1	1909	Plumosa Sawara Cypress	15,13	3	1959	Austrian Pine	43	6
1575	Serbian Spruce	20	1	1910	Western Red Cedar	29	3	1960	Austrian Pine	56	6
1576	Austrian Pine	30	4	1911	Western Red Cedar	27	3	1961	Garry Oak	89	8
1577	Austrian Pine	68	6	1912	Western Red Cedar	27	3	1962	Western Red Cedar	23, 18, 26	3
1578	Austrian Pine	46	5	1913	Western Red Cedar	29	3	1963	Western Red Cedar	26	3
1579	Austrian Pine	46	4	1914	Western Red Cedar	23	3	1964	Western Red Cedar	15,18,14	3
1580	Austrian Pine	28	4	1915	Western Red Cedar	28	3	1965	Western Red Cedar	23	3
1581	Cherry Plum	multi stems	2	1916	Western Red Cedar	29	3	1966	Western Red Cedar	18	3
1615	Red Maple	16	4	1917	Western Red Cedar	27	3	1967	Western Red Cedar	16	3
1616	Western Hemlock	19	7	1918	Western Red Cedar	28	3	1968	Western Red Cedar	26	3
1617	Western Hemlock	17	6	1919	Western Red Cedar	29	3	1969	Western Red Cedar	2x12	3
1685	Western Red Cedar	25	3	1920	Western Red Cedar	22	3	1970	Western Red Cedar	17	3
1686	Western Red Cedar	20	3	1921	Western Red Cedar	29	3	1971	Garry Oak	69	8
1687	Western Red Cedar	17,18	3	1922	Western Red Cedar	29	3	1972	Western Red Cedar	16	3
1688	Western Red Cedar	16	3	1923	Western Red Cedar	27	3	1973	Western Red Cedar	14	3
1689	Western Red Cedar	28,23	4	1924	Western Red Cedar	23	3	1974	Western Red Cedar	24	3
1690	Western Red Cedar	34	4	1925	Western Red Cedar	33	3	1975	Austrian Pine	37,31	5
1691	Western Red Cedar	21,17	4	1926	Western Red Cedar	24	3	1976	Western Red Cedar	20	3
1692	Western Red Cedar	18,23	4	1927	Western Red Cedar	29	3	1977	Western Red Cedar	17	3
1693	Pyramidal Cedar	18,13,14	1	1928	Western Red Cedar	28	3	1978	Western Red Cedar	~22	3
1694	Pyramidal Cedar	6,7,12,14,15	1	1929	Western Red Cedar	28	3	1979	Western Red Cedar	20	3
1695	Pyramidal Cedar	2x11,14,	1	1930	Western Red Cedar	26	3	1980	Western Red Cedar	20, 8,	3
1696	Pyramidal Cedar	3,6,11,12,14	1	1931	Western Red Cedar	26	3	1981	Western Red Cedar	21	3
1697	Pyramidal Cedar	7,8,5,6,2x6	1	1932	Western Red Cedar	24	3	1982	Western Red Cedar	18	3
1698	Pyramidal Cedar	2x4, 2x5,2x6, 8	1	1933	Western Red Cedar	29	3	1983	Western Red Cedar	24	3
1699	Pyramidal Cedar	4,8,2x10,12	1	1934	Western Red Cedar	29	3	1984	Western Red Cedar	23	3
1700	Pyramidal Cedar	4,7,12,14	1	1935	Western Red Cedar	32	3	1985	Western Red Cedar	18	3
1701	Deodara Cedar	34	4	1936	Western Red Cedar	32	3	1986	Western Red Cedar	11, 2x16	3
1702	Black Locust Cultivar	23	5	1937	Western Red Cedar	29	3	1987	Western Red Cedar	18	3
1703	Pyramidal Cedar	3x12,14	1	1938	Western Red Cedar	30	3	1988	Western Red Cedar	17	3
1704	Pyramidal Cedar	15,3x14,8,3	1	1939	Western Red Cedar	29	3	1989	Western Red Cedar	18	3
1890	Excelsior Cedar	30	4	1940	Western Red Cedar	29	3	1990	Western Red Cedar	6,13,11	3
1891	Scarlett Oak	32	5	1941	Western Red Cedar	28	3	1991	Western Red Cedar	13	3
1892	Scarlett Oak	27	5	1942	Western Red Cedar	28	3	1992	Western Red Cedar	2x6,16	3
1893	Scarlett Oak	23	5	1943	Western Red Cedar	29	3	1993	Western Red Cedar	13,8	3
1894	Cherry	13,8	3	1944	Paper Birch	19,21	4	1994	Western Red Cedar	19	3
1895	Big Leaf Maple	17, 12, 6, 6	3	1945	Tulip tree	18,25	4,5	1995	Western Red Cedar	18	3
1896	Serbian Spruce	28	4	1946	Little Leaf linden	28	5	1996	Western Red Cedar	18	3
1897	Serbian Spruce	23	3	1947	Garry Oak	76	8	1997	Western Red Cedar	23	3
1898	Serbian Spruce	20	3	1948	Crab Apple	13, 11, 6, 11, 13,	4	1998	Western Red Cedar	17	3
1899	Deodara Cedar	50	5	1949	Crab Apple	12, 21	4	1999	Western Red Cedar	25	3
1900	Sweetgum	41	4	1950	Austrian Pine	25, 25	4	2000	Western Red Cedar	32	3
1901	Sweetgum	44	4	1951	Scarlett Oak	48	9	H1	Pyramidal Cedar hedge	11 multi-stem ~10-15cm	1x14
1902	Serbian Spruce	18	3	1952	Scarlett Oak	42	7	H2	Pyramidal Cedar	20 trees ~3-15	1x17
1903	Plumosa Sawara Cypress	15,12	3	1953	Scarlett Oak	47	7	H3	Pyramidal Cedar	20 trees ~4-14	1x8
1904	Fruiting Cherry	17,10,22	3	1954	Garry Oak	112	10	H4	Pyramidal Cedar	58 trees ~4-15cm	1x50
1905	Plumosa Sawara Cypress	13, 15	3	1955	Austrian Pine	20	2	H5	Pyramidal Cedar	14 trees ~4-14cm	1x10
1906	Plumosa Sawara Cypress	8,9,14	3	1956	Austrian Pine	39	4	H6	Pyramidal Cedar	6 trees ~4-14	1x7
1907	Plumosa Sawara Cypress	4,8,10,11	3	1957	Austrian Pine	46	6	OS1	Norway Maple	~22, 17,~18	4
1908	Plumosa Sawara Cypress	6,10	3	1958	Austrian Pine	53	5	PT4	Pyramidal Cedar	~20,~18, 12, 13, 12	2

REV	DATE	DESCRIPTION	DRAF	APRV
0	06-10-2025	ISSUED FOR GEOTECHNICAL REPORT	CG	JF

REVISIONS

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

This plan is prepared solely for a limited contractual use between McElhanney Associates and our client.
This document shows the relative location of the surveyed structures and features with respect to the boundaries of the parcel described above. This document shall not be used to define property lines or property corners.
The signatory accepts no responsibility or liability for any damages that may be suffered by a third party as a result of any decisions made, or actions taken based on this document.

BEARING, COORDINATE AND DATUM NOTES:

Grid bearings are derived from observations between Geodetic Control Monuments 79H8867 and 81H4210 and are referred to the central meridian of UTM Zone 10.

The coordinates shown are in a local ground system.
To convert to UTM Zone 10 NAD83 (CSRS) multiply the coordinates by combined scale factor 0.9996 about assumed base point (Northing = 0, Easting = 0).

This plan shows horizontal ground level distances, unless otherwise specified.

Elevations were derived from Geodetic Control Monument 79H8867, Elevation 21.242m, and referenced to CGVD28 using HT2.0 geoid.

Certified correct

DRAFT

This document is not valid unless digitally signed

8 4 0 m 4 8 16 24 32

SCALE 1:400
UNLESS OTHERWISE NOTED

Original Drawing Size: (864mm x 560mm)

PLAN ID.: 22412413800-V-SITE-001

McElhanney
500 - 3960 Quadra Street,
Victoria BC V8X 4A3
Tel. 250 370 9221

BC TRANSIT

TOPOGRAPHIC SURVEY OF SAANICH TRANSIT CENTRE PROPERTIES

4196, 4212, AND 4216 GLANFORD AVENUE, 4206, 4210 AND 4212 COMMERCE CIRCLE, DISTRICT OF SAANICH

APPENDIX C

Bore Hole Logs

MODIFIED UNIFIED CLASSIFICATION SYSTEMS FOR SOILS

MAJOR DIVISION			GROUP SYMBOL		TYPICAL SOIL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA
COARSE GRAINED SOILS (more than 50% larger than 75 µm)	GRAVELS	Clean Gravels (< 5% Fines)	GW		Well graded gravels, sandy gravels, trace or no fines	$C_u=D_{60}/D_{10}>4$, $C_C=(D_{30})^2/D_{10}D_{60}=1$ to 3
			GP		Poorly graded gravels, sandy gravels, trace or no fines	Not meeting the GW requirements.
		Dirty Gravels (> 12% Fines)	GM		Silty gravels, silty sandy gravels	Plasticity below A-Line or I_P <4
			GC		Clayey gravels, clayey sandy gravels	Plasticity above A-Line or I_P >7
	SANDS	Clean Sands (< 5% Fines)	SW		Well graded sands, gravelly sand, trace or no fines	$C_u=D_{60}/D_{10}>4$, $C_C=(D_{30})^2/D_{10}D_{60}=1$ to 3
			SP		Poorly graded sands, gravelly sand, trace or no fines	Not meeting the SW requirements.
		Dirty Sands (> 12% Fines)	SM		Silty sands, sand and silt mixtures	Plasticity below A-Line or I_P <4
			SC		Clayey sands, sand and clay mixtures	Plasticity above A-Line or I_P >7
FINE GRAINED SOILS (more than 50% smaller than 75 µm)	SILTS	W_L<50%	ML		Inorganic silts, sandy silts with slight plasticity	Classifcations are based upon Plasticity Chart.
		W_L>50%	MH		Inorganic silts of high plasticity	
	CLAYS	W_L<30%	CL		Inorganic clay, silty clays of low plasticity	
		30%<W_L<50%	CI		Inorganic clay, silty clays of intermediate plasticity	
		W_L>50%	CH		Inorganic clay, silty clays of high plasticity	
	ORGANIC SILTS AND CLAYS	W_L<50%	OL		Organic silts and silty clays of low plasticity	
		W_L>50%	OH		Organic silts and silty clays of high plasticity	
	HIGHLY ORGANIC		PT		Peat and other highly organic soils	

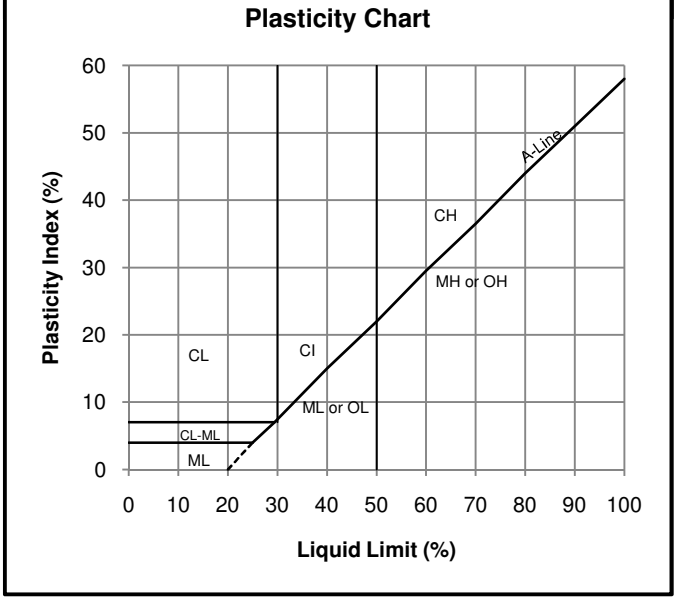
SOIL COMPONENTS

Fraction	U.S. Standard Sieve Size		Percentage (by weight)	Description
	Passing	Retained		
Gravel				
Coarse	76 mm	19 mm	35-50	AND
Fine	19 mm	4.75 mm		
Sand			20-35	Y/EY
Coarse	4.75 mm	2.00 mm		
Medium	2.00 mm	425 µm	10-20	SOME
Fine	425 µm	75 µm		
Fines (Silt or Clay)	75 µm		1-10	TRACE

Oversize Material		
	Cobbles	76 mm to 200 mm
	Boulders	> 200 mm

RELATIVE DENSITY AND CONSISTENCY

Cohesionless Soils		Cohesive Soils	
Relative Density	SPT (N) Value	Consistency	Undrained Shear Strength (kPa)
Very Loose	0-4	Very Soft	0-10
Loose	4-10	Soft	10-25
Compact	10-30	Firm	24-50
Dense	30-50	Stiff	50-100
Very Dense	>50	Very Stiff	100-200
		Hard	>200



Notes:

1. Use dual symbols for coarse grained soils with 5 to 12% fines (i.e. GP-GM)
2. All sieves are U.S. Standard ASTM E11

McElhanney

McElhanney Consulting Services Limited

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	BH25-01
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5372069.23 471235.40	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	21.86 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	N Value / Moisture Content (%) / Plastic/Liquid Limit (%) / Fines Content (%) / DCPT Blows (20 40 60 80)	WATER	REMARKS
0	21		SILT and SAND, trace gravel, low plastic, stiff, grey, moist.					
			0.20 — 21.66					
			SAND and GRAVEL, trace to some silt, round, compact, medium brown, wet.	G G1				
			0.90 — 20.96					
1			SAND and SILT, trace gravel, cohesive, non plastic, stiff, grey with brown mottles, moist.					
			1.50 — 20.36	G G2				
			SILT, sandy, low plastic, stiff, light grey with brown mottles, moist.	G G3				
2	20							
3	19			G G4				
			3.60 — 18.26					
			SILT, some sand, trace gravel, low plastic, stiff, grey, moist.	G G5				
4	18		4.20 — 17.66					
			CLAY, silty, some sand, trace gravel, medium plastic, soft to firm, grey, wet.					
				G G6				
5	17							

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LOGGED BY:	C. Gent	START DATE:	March 25, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 25, 2025
COMPLETION DEPTH:	13.50 m		Sheet 1 of 3

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	BH25-01
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5372069.23 471235.40	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	21.86 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	N Value / Moisture Content (%) / Plastic/Liquid Limit (%) / Fines Content (%) / DCPT Blows	WATER	REMARKS
6	16		CLAY, silty, some sand, trace gravel, medium plastic, soft to firm, grey, wet.			20 40 60 80		
7	15			G G7		19		
8	14							
9	13			G G8				
10	12							
				G G9				

McElhanney

LOGGED BY:	C. Gent	START DATE:	March 25, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 25, 2025
COMPLETION DEPTH:	13.50 m		Sheet 2 of 3

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	BH25-01
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5372069.23 471235.40	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	21.86 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	N Value / Moisture Content (%) / Plastic/Liquid Limit (%) / Fines Content (%) / DCPT Blows (20 40 60 80)	WATER	REMARKS
11	11		CLAY, silty, some sand, trace gravel, medium plastic, soft to firm, grey, wet.	G G10				
			11.20 10.66					
12	10		SAND and SILT, trace gravel, cohesive, non plastic, compact to very dense, grey, wet.	G G11				
13	9		13.50 8.36					
			Terminated at 13.50 m. Inferred bedrock refusal.					
14	8							
15	7							
	6							

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LOGGED BY:	C. Gent	START DATE:	March 25, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 25, 2025
COMPLETION DEPTH:	13.50 m		Sheet 3 of 3

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	BH25-02
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5371988.40 471200.80	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	27.63 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	N Value / Moisture Content (%) / Plastic/Liquid Limit (%) / Fines Content (%) / DCPT Blows (20 40 60 80)	WATER	REMARKS
0	27		SAND and GRAVEL, trace silt, well graded, compact, medium brown, moist (road base).					
			0.30 / 27.33					
			SILT and SAND, some gravel, low plastic, stiff, grey, moist.	G G12			▼	
			0.80 / 26.83					
1			SILT, sandy, trace gravel, medium plastic, stiff to hard, grey, moist.	G G13				
	26			G G14				
2								
	25		2.80 / 24.83					
			SAND and SILT, some gravel, cohesive, non plastic, stiff, grey, wet.	G G15				
3			3.00 / 24.63					
			Terminated at 3.00 m. Inferred bedrock refusal.					
	24							
4								
	23							
5								

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LOGGED BY:	C. Gent	START DATE:	March 24, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 24, 2025
COMPLETION DEPTH:	3.00 m		Sheet 1 of 1

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	BH25-03
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5371985.04 471287.29	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	23.59 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	N Value / Moisture Content (%) / Plastic/Liquid Limit (%) / Fines Content (%) / DCPT Blows (20 40 60 80)	REMARKS
0	23		SAND and GRAVEL, some silt, coarse grained, compact, medium brown, moist (parking lot fill).	G G16			
			0.50 / 23.09				
			Weathered mud stone / Blast rock fill.				
1				G G17			
			1.20 / 22.39				
			Terminated at 1.20 m. Inferred bedrock refusal.				
	22						
2							
	21						
3							
	20						
4							
	19						
5							

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LOGGED BY:	C. Gent	START DATE:	March 24, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 24, 2025
COMPLETION DEPTH:	1.20 m		Sheet 1 of 1

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	BH25-04
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5371970.24 471244.87	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	28.67 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	N Value / Moisture Content (%) / Plastic/Liquid Limit (%) / Fines Content (%) / DCPT Blows (20 40 60 80)	WATER	REMARKS
			SAND and GRAVEL, trace silt, well graded, compact, medium brown, moist (road base).					
			0.20 28.47					
			SILT and SAND, trace to some gravel, low plastic, stiff, orange brown with grey mottles, moist.	G G18				
	28							
1			1.00 27.67					
			SILT and SAND, trace gravel, low plastic, stiff, medium brown, moist.					
			1.50 27.17	G G19				
			SILT and SAND, low plastic, stiff, grey, moist.					
	27							
2								
	26			G G20				
3								
			3.30 25.37					
			SAND, silty, some gravel, cohesive, non plastic, stiff to hard, pale brown, wet.					
	25							
4								
				G G21				
	24							
5								

McElhanney	LOGGED BY:	C. Gent	START DATE: March 24, 2025
	REVIEWED BY:	J. Fischer	COMPLETION DATE: March 24, 2025
	COMPLETION DEPTH:	6.00 m	Sheet 1 of 2

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	BH25-04
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5371970.24 471244.87	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	28.67 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	N Value / Moisture Content (%) / Plastic/Liquid Limit (%) / Fines Content (%) / DCPT Blows (20 40 60 80)	WATER	REMARKS
	23		SAND, silty, some gravel, cohesive, non plastic, stiff to hard, pale brown, wet.	G G22				
6			6.00 22.67 Terminated at 6.00 m. Inferred bedrock refusal.					
	22							
7								
	21							
8								
	20							
9								
	19							
10								

McElhanney

LOGGED BY:	C. Gent	START DATE:	March 24, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 24, 2025
COMPLETION DEPTH:	6.00 m		Sheet 2 of 2

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	MW25-05
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5372038.08 471238.31	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	23.61 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	N Value / Moisture Content (%) / Plastic/Liquid Limit (%) / Fines Content (%) / DCPT Blows (20 40 60 80)	REMARKS
0			0.10 ASPHALT 23.51				
			SAND, trace gravel, trace silt, compact, brown, moist.				
	23		0.70 22.91				
			SAND and SILT, fine grained, pale brown, moist.				
1				G G23			
	22		1.70 21.91				
			1.80 SAND and SILT, gravelly, medium grain, pale brown, moist. 21.81				
			SILT, sandy, trace gravel, fine grained, soft to firm, pale brown, moist.				
2				G G24		● □	
	21						
3			3.20 20.41				
			SILT, some sand, trace gravel, soft to firm, grey, moist.				
	20						Very soft at 3.6m
4				G G25		● □	
			4.60 19.01				
	19		Terminated at 4.60 m. Desired depth reached.				
5							

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LOGGED BY:	C. Gent	START DATE:	March 25, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 25, 2025
COMPLETION DEPTH:	4.60 m		Sheet 1 of 1

WELL NUMBER BH25-06

McElhanney

CLIENT BC Transit
PROJECT NAME Stage 2 PSI - Saanich Transit Centre
PROJECT NUMBER 2241-24138-00
PROJECT LOCATION Saanich, BC
DATE STARTED 3/25/25 **COMPLETED** 3/25/25
GROUND ELEVATION 23.41 m **HOLE SIZE** 0.15 m
DRILLING CONTRACTOR Terratech Drilling
GROUND WATER LEVELS:
DRILLING METHOD Sonic
AT TIME OF DRILLING ---
LOGGED BY BV **CHECKED BY** JN
AT END OF DRILLING ---
NOTES 4206 Commerce Circle - APEC 2
AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
			0.10 Asphalt 23.31		Cold Patch
			GRAVEL, some sand, trace silt, compact, grey		
			0.46 22.95		
	GB 06a		SAND, some silt, compact/dense, brownish grey with oxidation, moist	PID = 0.1	
			0.91 22.50		
1	GB 06b		SAND and SILT, trace clay, non-plastic, hard to firm, greyish brown, occasional orange-brown oxidation, moist	PID = 0.1	
2	GB 06c			PID = 0.1	Bentonite Seal
3			3.20 20.21		
			SILT, some clay, trace sand, firm to soft, moist		
4	GB 06d		@ 3.9mbgs: becomes soft and wet	PID = 0	
			4.57 18.84		

Bottom of borehole at 4.57 meters.

WELL NUMBER MW/SVP25-07

McElhanney

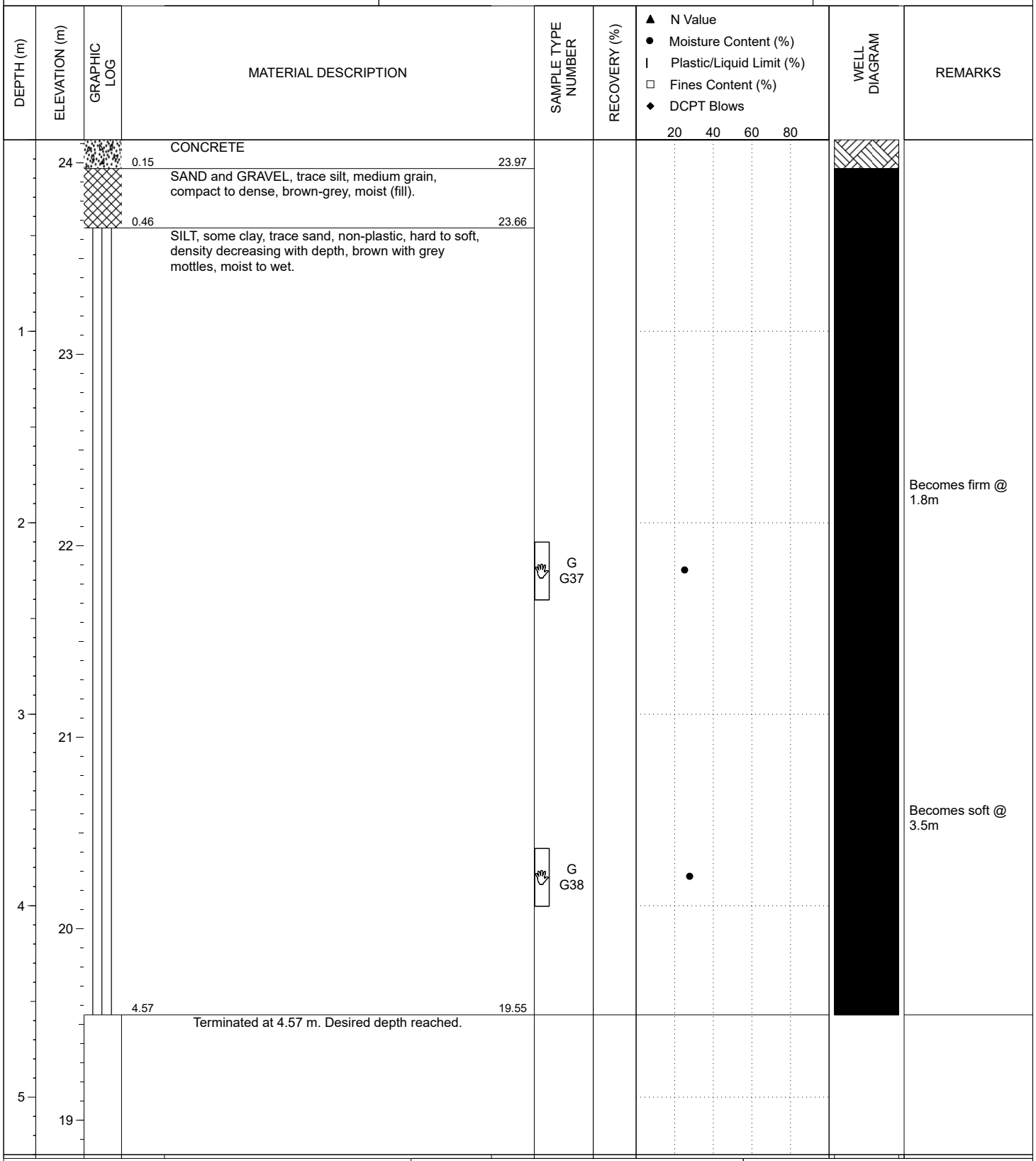
CLIENT BC Transit
PROJECT NAME Stage 2 PSI - Saanich Transit Centre
PROJECT NUMBER 2241-24138-00
PROJECT LOCATION Saanich, BC
DATE STARTED 3/26/25 **COMPLETED** 3/26/25
GROUND ELEVATION 23.92 m **HOLE SIZE** 0.15 m
DRILLING CONTRACTOR Terratech Drilling
GROUND WATER LEVELS:
DRILLING METHOD Sonic
AT TIME OF DRILLING ---
LOGGED BY BV **CHECKED BY** JN
AT END OF DRILLING ---
NOTES 4206 Commerce Circle - APEC 4
AFTER DRILLING 1.02 m / Elev 22.90 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
			0.10 Asphalt 23.82		Flush-mount roadbox, cement, j-plug
			0.30 SAND and GRAVEL (inferred Fill) 23.62		
	GB 07a		SILT and SAND, trace clay, non-plastic, firm to hard, greyish brown, occasional orange mottling, moist	PID = 0.2	Bentonite Seal
1					
	GB 07b			PID = 0.3	Filter Sand; Stainless Steel Vapour Probe (MW25-07)
			1.68 22.24		
	GB 07c		SAND, coarse- to medium-grained, some gravel, trace silt, compact, brown, moist to wet	PID = 0.6	
2			2.43 21.49		
	GB 07d		SILT and SAND, trace clay, non-plastic, firm-hard, greyish brown, occasional orange mottling, moist	PID = 0.1	Bentonite Seal
3			3.01 20.91		
			SILT, trace fine-grained sand, trace clay, low plasticity, firm, brownish grey, moist		
	GB 07e			PID = 0.1	
4					
			@ 4.2 mbgs: becomes firm to soft, moist to wet		Filter Sand; 0.25 mm Slotted PVC Well Screen
5	GB 07f			PID = 0.2	
					PVC End Cap
6			6.10 17.82		Bentonite Seal

Bottom of borehole at 6.10 meters.

GENERAL BH / TP / WELL 2241-24138-00 BH LOGS_DK.GPJ GINT STD CANADA LAB.GDT 5/6/25

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	BH25-08
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5372021.58 471241.14	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	24.12 m



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LOGGED BY:	B. Vernon	START DATE:	March 27, 2025
REVIEWED BY:	J, Fischer	COMPLETION DATE:	March 27, 2025
COMPLETION DEPTH:	4.57 m		Sheet 1 of 1

WELL NUMBER MW/SVP25-09

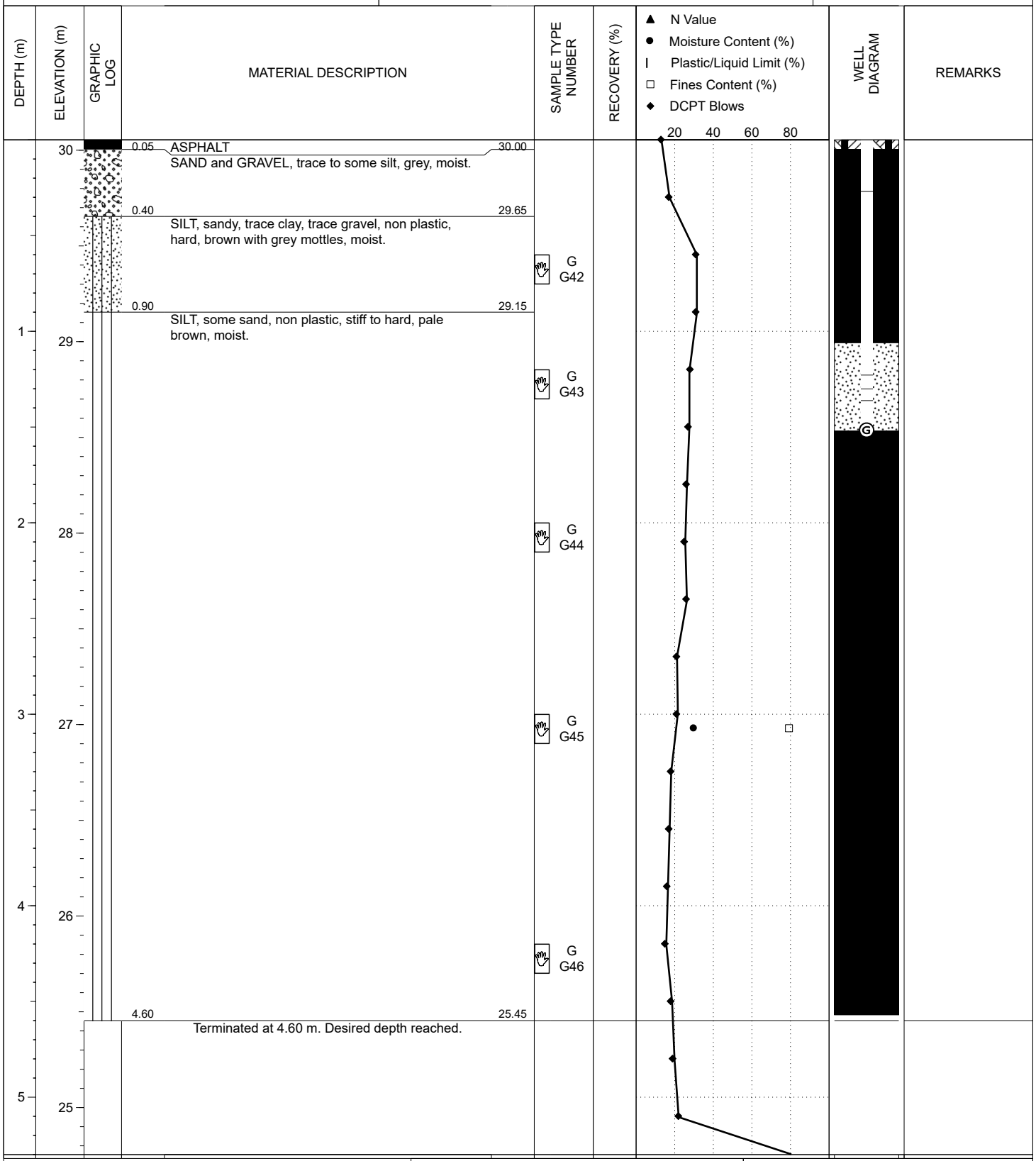
McElhanney

CLIENT BC Transit
PROJECT NAME Stage 2 PSI - Saanich Transit Centre
PROJECT NUMBER 2241-24138-00
PROJECT LOCATION Saanich, BC
DATE STARTED 3/27/25 **COMPLETED** 3/27/25
GROUND ELEVATION 24.05 m **HOLE SIZE** 0.15 m
DRILLING CONTRACTOR Terratech Drilling
GROUND WATER LEVELS:
DRILLING METHOD Sonic
AT TIME OF DRILLING ---
LOGGED BY BV **CHECKED BY** JN
AT END OF DRILLING ---
NOTES 4206 Commerce Circle - APEC 1
AFTER DRILLING 0.56 m / Elev 23.49 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
			0.15 Concrete 23.90		Flush-mount roadbox, cement, j-plug
	GB 09a		0.30 SAND, medium-grained, some gravel, trace silt, compact, brown, moist 23.75	PID = 0.1	
	GB 09b		SILT, some clay, some sand, non-plastic, firm, greyish brown, moist @ 0.3 mbgs: becomes trace sand	PID = 0.1	Bentonite Seal
1					
	GB 09c			PID = 0	Filter Sand Stainless Steel Vapour Probe (SVP25-09) SVP Screen
			@ 1.5 mbgs: becomes brown		
2					Bentonite Seal
	GB 09d			PID = 0.3	
			@ 2.7 mbgs: becomes firm to soft		
3					
			@ 3.4 mbgs: becomes soft, moist to wet, brownish grey to grey		Filter Sand 25 mm Slotted PVC Well Screen
4					
	GB 09e			PID = 0.2	
			4.57 19.48		PVC End Cap

Bottom of borehole at 4.57 meters.

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	SVP25-10
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5371947.15 471238.69	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	30.05 m



LOGGED BY:	B. Vernon	START DATE:	March 26, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 26, 2025
COMPLETION DEPTH:	4.60 m		Sheet 1 of 2

McElhanney

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	SVP25-10
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5371947.15 471238.69	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	30.05 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	▲ N Value ● Moisture Content (%) I Plastic/Liquid Limit (%) □ Fines Content (%) ◆ DCPT Blows	WELL DIAGRAM	REMARKS
						20 40 60 80		
6	24							
7	23							
8	22							
9	21							
10	20							

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LOGGED BY:	B. Vernon	START DATE:	March 26, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 26, 2025
COMPLETION DEPTH:	4.60 m		Sheet 2 of 2

WELL NUMBER MW25-11

McElhanney

CLIENT BC Transit
PROJECT NAME Stage 2 PSI - Saanich Transit Centre
PROJECT NUMBER 2241-24138-00
PROJECT LOCATION Saanich, BC
DATE STARTED 3/26/25 **COMPLETED** 3/26/25
GROUND ELEVATION 30.98 m **HOLE SIZE** 0.15 m
DRILLING CONTRACTOR Terratech Drilling
GROUND WATER LEVELS:
DRILLING METHOD Sonic
AT TIME OF DRILLING ---
LOGGED BY BV **CHECKED BY** JN
AT END OF DRILLING ---
NOTES 4196 Glanford Avenue - APEC 5
AFTER DRILLING 1.94 m / Elev 29.05 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
0.0			0.05 Asphalt 30.93		Flush-mount roadbox, cement, j-plug
	GB 11a		Sandy SILT, fine-grained, trace clay, non-plastic, hard, brown, moist to dry	PID = 0.1	
0.5					
1.0			1.07 29.91		Bentonite Seal
	GB 11b		SILT, some clay, some gravel, non-plastic, hard, brown, moist	PID = 0	
1.5					
2.0			@ 2.1 mbgs: becomes hard to firm		
2.5	GB 11c			PID = 0	Filter Sand
3.0					0.25 mm Slotted PVC Well Screen
			3.20 27.78		
			SAND, some to trace silt, trace gravel, compact, brown, moist to wet		
3.5	GB 11d			PID = 0.5	
			3.66 27.32		PVC End Cap
			inferred Bedrock refusal		

Refusal at 3.66 meters.
Bottom of borehole at 3.66 meters.

WELL NUMBER SVP25-12

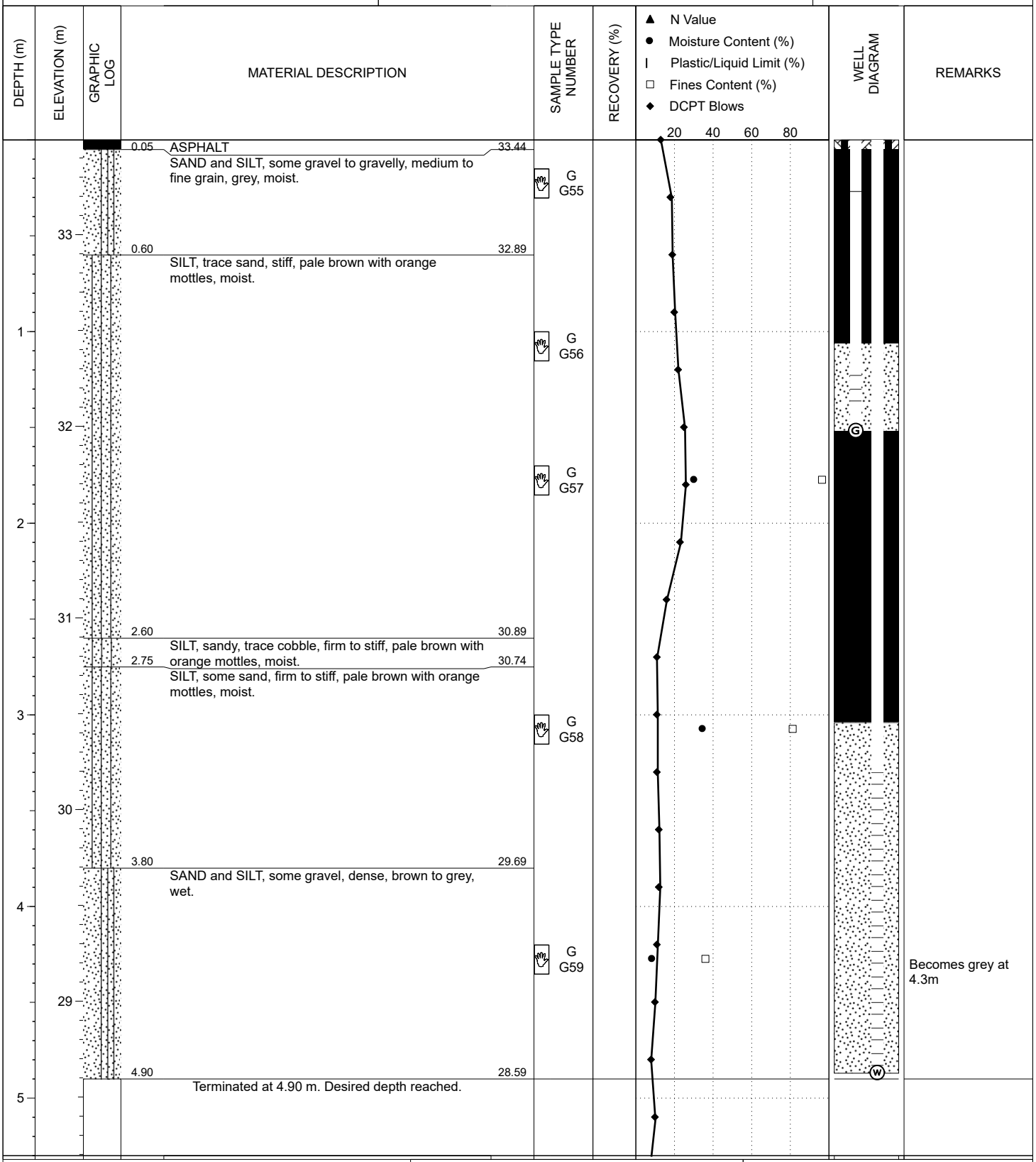
McElhanney

CLIENT BC Transit
PROJECT NAME Stage 2 PSI - Saanich Transit Centre
PROJECT NUMBER 2241-24138-00
PROJECT LOCATION Saanich, BC
DATE STARTED 3/25/25 **COMPLETED** 3/25/25
GROUND ELEVATION 31.54 m **HOLE SIZE** 0.15 m
DRILLING CONTRACTOR Terratech Drilling
GROUND WATER LEVELS:
DRILLING METHOD Sonic
AT TIME OF DRILLING ---
LOGGED BY BV **CHECKED BY** JN
AT END OF DRILLING ---
NOTES 4196 Glanford Avenue - APECs 1 and 4
AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
	GB 12a		0.05 Asphalt 31.49 SAND, trace gravel, compact, grey, moist 0.30 31.24	PID = 0.5	Flush-mount roadbox, cement, j-plug
	GB 12b		SAND and SILT, fine grained sand, hard, brown with very occasional dark brown laminations, moist to dry	PID = 0.2	Bentonite Seal
1					
			1.52 30.02		Filter Sand
	GB 12c		Sandy SILT, trace to some clay, very hard, brown, moist	PID = 0.3	Stainless Steel Soil Vapour Probe
2					
			@ 2.7 mbgs: 0.1 m diameter cobble observed with oxidized surface		
3			@ 2.9 mbgs: becomes firm to hard		
	GB 12d			PID = 0.4	Bentonite Seal
			@ 3.6 mbgs: becomes firm to soft		
4					
			@ 4.1 mbgs: trace brown mottling		
	GB 12e			PID = 0.5	
			4.57 26.97		

Bottom of borehole at 4.57 meters.

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	MW25-13
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5371949.74 471133.66	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	33.49 m

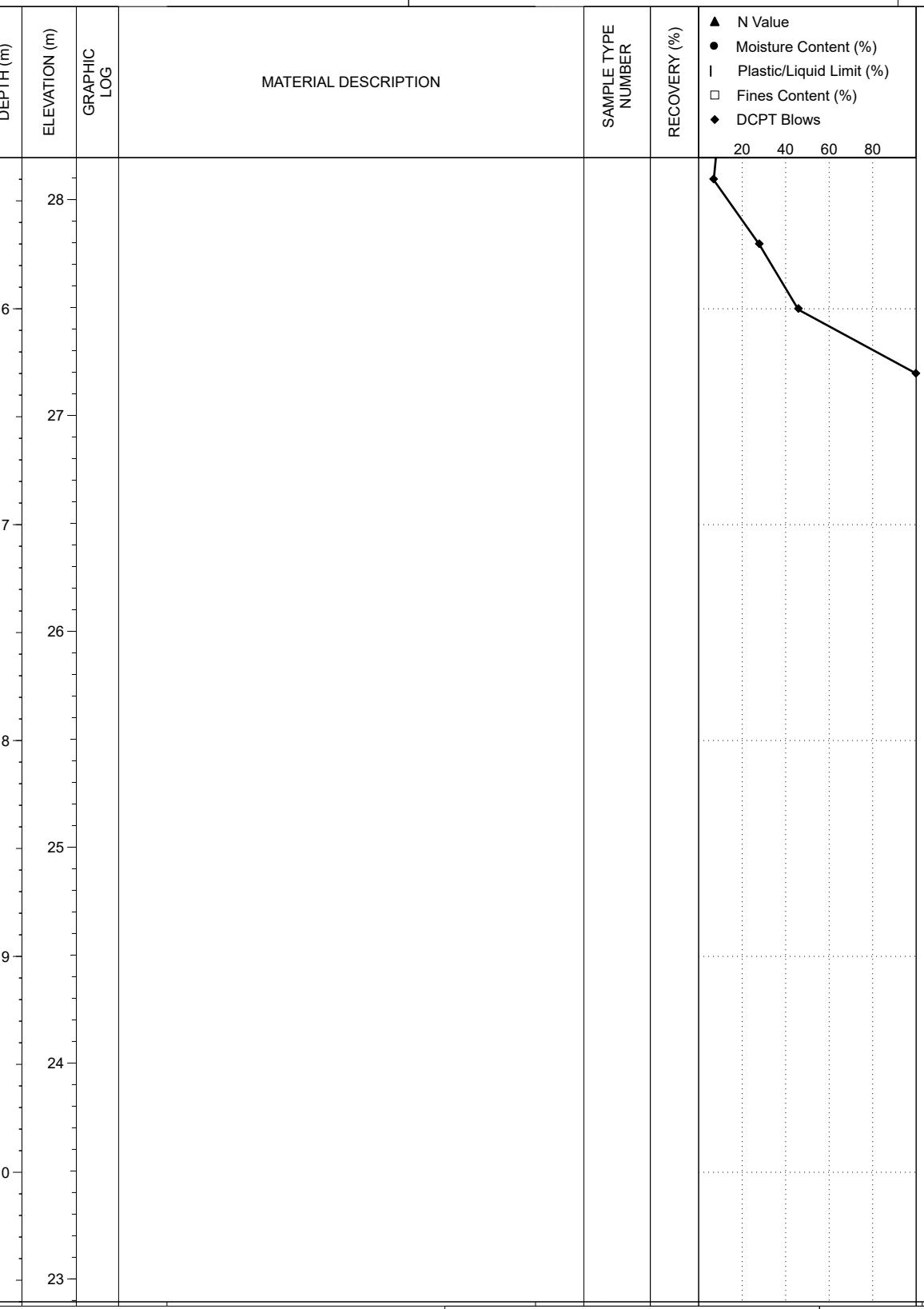


McElhanney

LOGGED BY:	B. Vernon	START DATE:	March 25, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 25, 2025
COMPLETION DEPTH:	4.90 m		Sheet 1 of 2

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	MW25-13
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5371949.74 471133.66	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	33.49 m

DEPTH (m)	ELEVATION (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	N Value / Moisture Content (%) / Plastic/Liquid Limit (%) / Fines Content (%) / DCPT Blows	WELL DIAGRAM	REMARKS
						20 40 60 80		
6	28							
7	27							
8	26							
9	25							
10	24							
	23							



McElhanney		LOGGED BY:	B. Vernon	START DATE:	March 25, 2025
		REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 25, 2025
		COMPLETION DEPTH:	4.90 m		Sheet 2 of 2

CLIENT:	BC Transit	PROJECT:	Site Preparation - Saanich Transit Center	BOREHOLE No.	MW25-14
CONTRACTOR:	Terratech Drilling Ltd.	CO-ORDS N/E:	5371913.30 471204.11	PROJECT No.	2241-24138-00
METHOD:	Sonic Drill	LOCATION:	Saanich BC	ELEVATION:	30.51 m

DEPTH (m)	ELEVATION (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY (%)	N Value / Moisture Content (%) / Plastic/Liquid Limit (%) / Fines Content (%) / DCPT Blows (20 40 60 80)	WELL DIAGRAM	WATER	REMARKS
0	30.51	CONCRETE						
0.15	30.36							
0.30	30.21	SAND, trace gravel, medium-grained, compact, brownish grey, moist.						
		SILT, some clay, trace sand, non-plastic, firm to hard, brown, moist.	G G60					
1	30							
	29							
2			G G61		● □			
	28							
3							▼	
3.35	27.16							
		SILT and CLAY, some sand, soft to firm, low plastic, grey, moist to wet.						
	27							
4			G G62		⊢●⊣ □ 23			
	26		G G63					
5								
5.18	25.33							
		Terminated at 5.18 m. Inferred bedrock refusal.						

McElhanney

LOGGED BY:	B. Vernon	START DATE:	March 27, 2025
REVIEWED BY:	J. Fischer	COMPLETION DATE:	March 27, 2025
COMPLETION DEPTH:	5.18 m		Sheet 1 of 1

WELL NUMBER SVP25-15

McElhanney

CLIENT BC Transit
PROJECT NAME Stage 2 PSI - Saanich Transit Centre
PROJECT NUMBER 2241-24138-00
PROJECT LOCATION Saanich, BC
DATE STARTED 3/27/25 **COMPLETED** 3/27/25
GROUND ELEVATION 30.51 m **HOLE SIZE** 0.15 m
DRILLING CONTRACTOR Terratech Drilling
GROUND WATER LEVELS:
DRILLING METHOD Sonic
AT TIME OF DRILLING ---
LOGGED BY BV **CHECKED BY** JN
AT END OF DRILLING ---
NOTES 4196 Glanford Avenue - APEC 2
AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
			Concrete		Flush-mount roadbox, cement, j-plug
			0.15 — 30.36		
			SILT, some clay, some sand, occasional fine gravel, non-plastic, firm to hard, brown, moist		
			@ 0.15 mbgs: becomes some sand, non-plastic	PID = 0.2	
0.5	GB 15a				Bentonite Seal
1.0					
	GB 15b			PID = 0.1	Filter Sand, SVP Screen
1.5					
2.0			@ 1.8-2.1 mbgs: some gravel		Bentonite Seal
2.5	GB 15c		@ 2.4 mbgs: becomes firm	PID = 0.1	
3.0					
			3.20 — 27.31		
			inferred Bedrock refusal		

Refusal at 3.20 meters.
Bottom of borehole at 3.20 meters.

WELL NUMBER BH25-16

McElhanney

CLIENT BC Transit
PROJECT NAME Stage 2 PSI - Saanich Transit Centre
PROJECT NUMBER 2241-24138-00
PROJECT LOCATION Saanich, BC
DATE STARTED 3/28/25 **COMPLETED** 3/28/25
GROUND ELEVATION 31.7 m **HOLE SIZE** 0.15 m
DRILLING CONTRACTOR Terratech Drilling
GROUND WATER LEVELS:
DRILLING METHOD Sonic
AT TIME OF DRILLING ---
LOGGED BY BS **CHECKED BY** JN
AT END OF DRILLING ---
NOTES 4196 Glanford Avenue
AFTER DRILLING ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	ENVIRONMENTAL DATA	WELL DIAGRAM
	GB 16a		0.05 Concrete 31.65	PID = 0.1	Cold Patch
			SAND and GRAVEL, medium-grained sand, trace silt, dense, greyish-brown, moist (inferred Fill) 0.30 31.40		
			SILT, some clay, some sand, non-plastic, firm to hard, brown, moist		
	GB 16b		@ 0.6 mbgs: becomes trace sand	PID = 0	
1					
	GB 16c			PID = 0.1	
2					Bentonite Seal
	GB 16d		@ 2.7 mbgs: becomes firm	PID = 0.1	
3					
4			@ 4.1 mbgs: becomes soft		
	GB 16e			PID = 0	
			4.57 27.13		

Bottom of borehole at 4.57 meters.

APPENDIX D

Laboratory Testing Results

Soil Moisture Content

Report

McElhanney

Client:	*BC Transit*	*Lab ID:*	*25-382 to 25-397*
Project Name:	*Saanich Transit Centre*	*Project Number:*	*2241-24138*
		Report Number:	*1*
		Report Date:	13-May-2025

Sample Type:	Auger grab samples	Sample Date:	March 24/25 - 2025
Source:	Boreholes BH25-01, -02, -04, -05, -08, -10, -13, -14	Sampled by:	Ben Vernon
		Test Date:	30-Apr-25
		Tested by:	M. Ewing

Bore Hole Number	*Sample Depth (m)*	Container Number	Tare (g)	Tare + Wet (g)	Tare + Dry (g)	Moisture (%)
BH25-01	*3.2*	H7	227.0	548.6	492.6	21.1
BH25-01	*6.8*	J7	224.8	442.8	382.0	38.7
BH25-01	*12.5*	H4	223.5	1089.9	1016.8	9.2
BH25-02	*2.8*	B13	205.4	1104.9	1027.2	9.5
BH25-04	*2.8*	B10	206.2	570.9	482.2	32.1
BH25-04	*4.3*	B12	203.0	971.9	890.4	11.9
BH25-05	*2.2*	B9	203.2	942.7	810.7	21.7
BH25-05	*4.0*	F6	211.5	532.8	468.6	25.0

Reviewed by: Kerry Barth, AScT

This report represents a testing service only.
No engineering interpretation or opininion is expressed or implied.
Engineering review and intrepretation can be provided upon written request.

Soil Moisture Content

Report

McElhanney

Client:	*BC Transit*	*Lab ID:*	*25-382 to 25-397*
Project Name:	*Saanich Transit Centre*	*Project Number:*	*2241-24138*
		Report Number:	*1*
		Report Date:	13-May-2025

Sample Type:	Auger grab samples	Sample Date:	March 24/25 - 2025
Source:	Boreholes BH25-01, -02, -04, -05, -08, -10, -13, -14	Sampled by:	Ben Vernon
		Test Date:	30-Apr-25
		Tested by:	M. Ewing

Bore Hole Number	*Sample Depth (m)*	Container Number	Tare (g)	Tare + Wet (g)	Tare + Dry (g)	Moisture (%)
BH25-08	*2.1 - 2.4*	J3	224.5	780.5	667.5	25.5
BH25-08	*3.7 - 4.0*	B3	230.3	502.7	442.9	28.1
BH25-10	*3.0*	H2	223.2	1115.8	910.0	30.0
BH25-13	*1.7*	H5	226.2	1107.5	902.5	30.3
BH25-13	*3.0*	H6	223.8	1092.3	868.4	34.7
BH25-13	*4.2*	H3	222.7	1112.0	1042.6	8.5
BH25-14	*2.2 - 2.5*	C7	253.2	1046.1	835.2	36.2
BH25-14	*4.0 - 4.2*	C9	253.2	912.0	738.5	35.8

Reviewed by: Kerry Barth, AScT

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No engineering interpretation or opininion is expressed or implied.
Engineering review and intrepretation can be provided upon written request.

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

SIEVE ANALYSIS REPORT
Series 8 16 30 50

CERTIFIED TESTING LABORATORY

PROJECT NO. 2241-24138
CLIENT BC Transit
CC

TO
BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

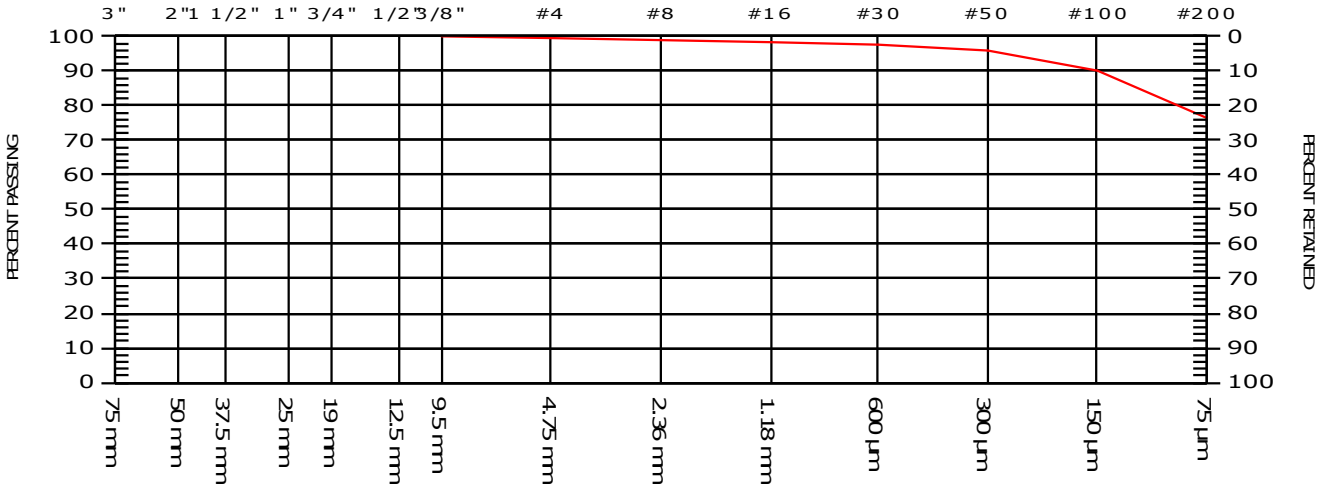
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 1 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-01 @ 3.2m
SPECIFICATION
MATERIAL TYPE SILT; sandy

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm	100.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	99.5	
No. 8	2.36 mm	98.9	
No. 16	1.18 mm	98.3	
No. 30	600 µm	97.6	
No. 50	300 µm	95.9	
No. 100	150 µm	90.1	
No. 200	75 µm	76.4	

MOISTURE CONTENT: 21.1%

COMMENTS
Lab ID: 25-0388

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

SIEVE ANALYSIS REPORT
Series 8 16 30 50

CERTIFIED TESTING LABORATORY

PROJECT NO. 2241-24138
CLIENT BC Transit
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Victoria, BC
V8W 2P3

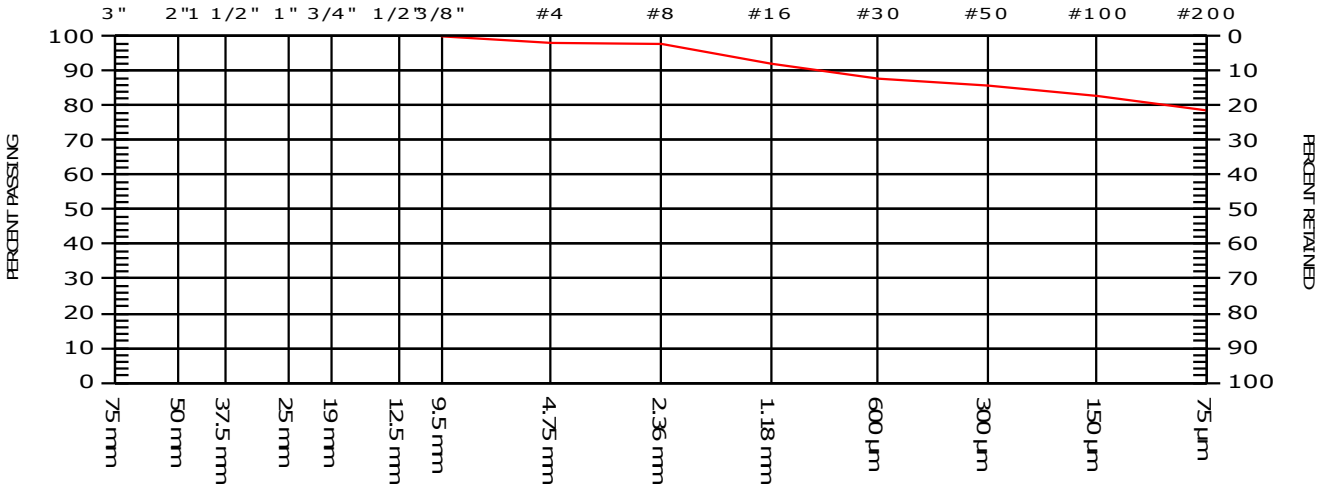
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 2 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-01 @ 6.8m
SPECIFICATION
MATERIAL TYPE SILT; some sand, trace gravel

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm	100.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	98.1	
No. 8	2.36 mm	97.8	
No. 16	1.18 mm	92.1	
No. 30	600 µm	87.8	
No. 50	300 µm	85.8	
No. 100	150 µm	82.8	
No. 200	75 µm	78.6	

MOISTURE CONTENT: 38.7%

COMMENTS
Lab ID: 25-0389

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

CERTIFIED TESTING LABORATORY

SIEVE ANALYSIS REPORT
Series 8 16 30 50

PROJECT NO. 2241-24138
CLIENT BC Transit
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BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

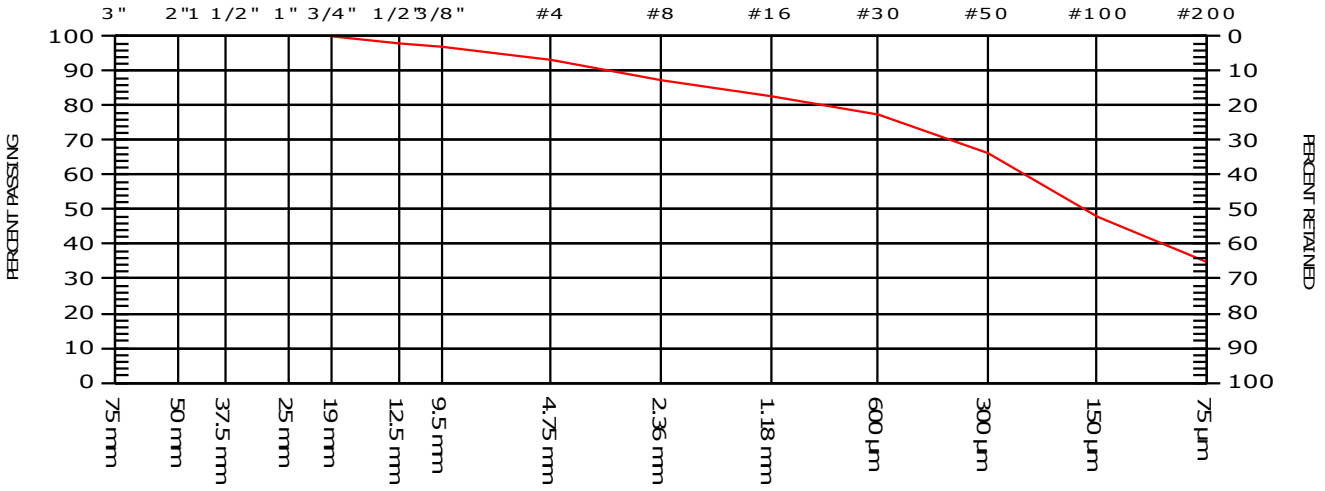
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 3 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-01 @ 12.5m
SPECIFICATION
MATERIAL TYPE SAND & SILT; trace gravel

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm	100.0	
1/2"	12.5 mm	98.0	
3/8"	9.5 mm	97.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	93.2	
No. 8	2.36 mm	87.3	
No. 16	1.18 mm	82.7	
No. 30	600 µm	77.4	
No. 50	300 µm	66.3	
No. 100	150 µm	47.9	
No. 200	75 µm	34.8	

MOISTURE CONTENT: 9.2%

COMMENTS
Lab ID: 25-0390

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

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Series 8 16 30 50

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ATTN :

PROJECT Saanich Transit Centre
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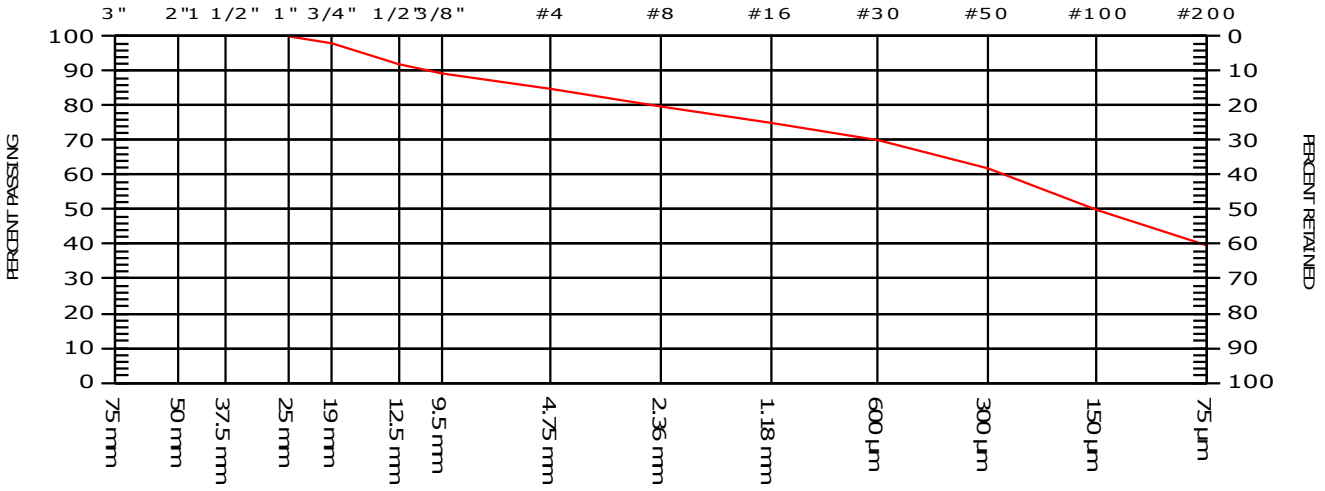
CONTRACTOR

SIEVE TEST NO. 4 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-02 @ 2.8m
SPECIFICATION
MATERIAL TYPE SAND & SILT; some gravel

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	98.0	
1/2"	12.5 mm	92.0	
3/8"	9.5 mm	89.3	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	84.8	
No. 8	2.36 mm	79.7	
No. 16	1.18 mm	75.0	
No. 30	600 µm	70.0	
No. 50	300 µm	61.9	
No. 100	150 µm	49.8	
No. 200	75 µm	39.6	

MOISTURE CONTENT: 9.5%

COMMENTS
Lab ID: 25-0391

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

SIEVE ANALYSIS REPORT
Series 8 16 30 50

CERTIFIED TESTING LABORATORY

PROJECT NO. 2241-24138
CLIENT BC Transit
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BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

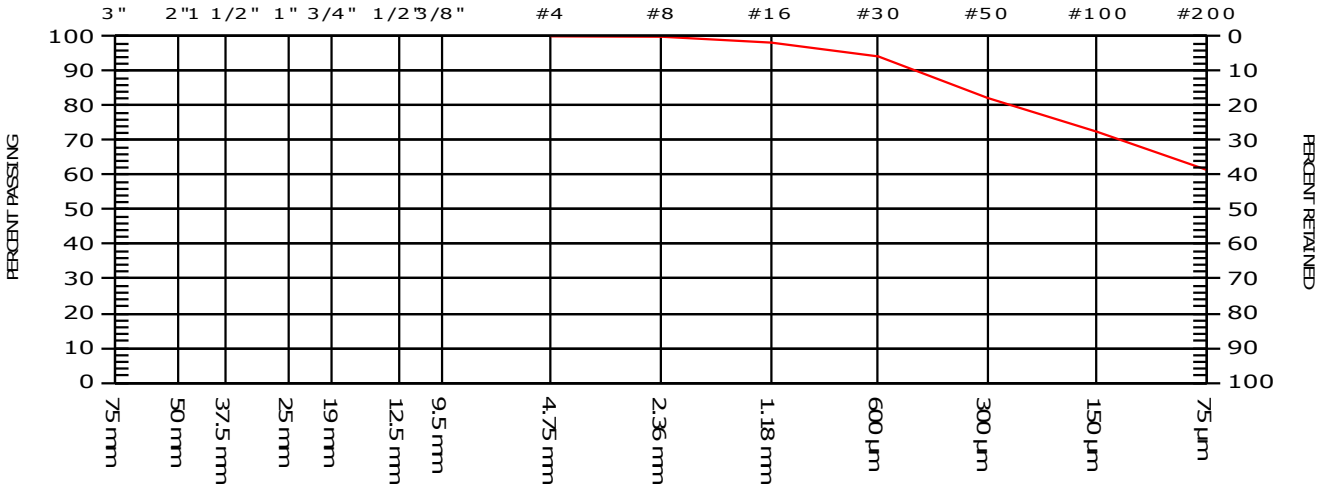
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 5 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-04 @ 2.8m
SPECIFICATION
MATERIAL TYPE SILT & SAND

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm		

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	100.0	
No. 8	2.36 mm	99.9	
No. 16	1.18 mm	98.2	
No. 30	600 µm	94.2	
No. 50	300 µm	82.2	
No. 100	150 µm	72.4	
No. 200	75 µm	61.4	

MOISTURE CONTENT: 32.1%

COMMENTS
Lab ID: 25-0392

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

CERTIFIED TESTING LABORATORY

SIEVE ANALYSIS REPORT
Series 8 16 30 50

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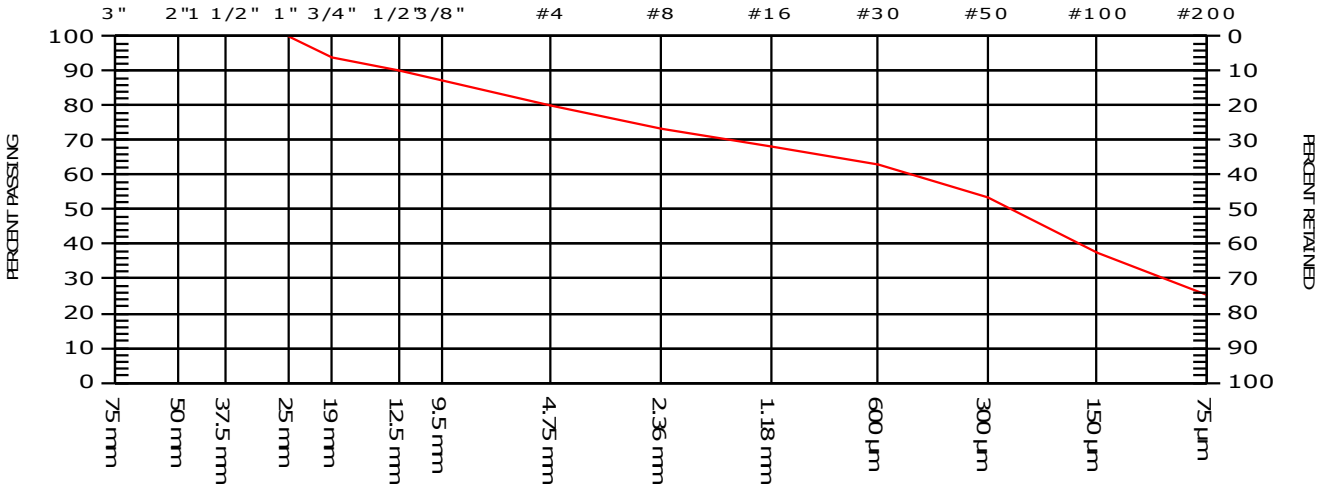
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 6 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-04 @ 4.3m
SPECIFICATION
MATERIAL TYPE SAND; silty, some gravel

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	93.9	
1/2"	12.5 mm	90.2	
3/8"	9.5 mm	87.3	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	80.0	
No. 8	2.36 mm	73.3	
No. 16	1.18 mm	68.2	
No. 30	600 µm	63.0	
No. 50	300 µm	53.5	
No. 100	150 µm	37.5	
No. 200	75 µm	25.3	

MOISTURE CONTENT: 11.9%

COMMENTS
Lab ID: 25-0393

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

CERTIFIED TESTING LABORATORY

SIEVE ANALYSIS REPORT
Series 8 16 30 50

PROJECT NO. 2241-24138
CLIENT BC Transit
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520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

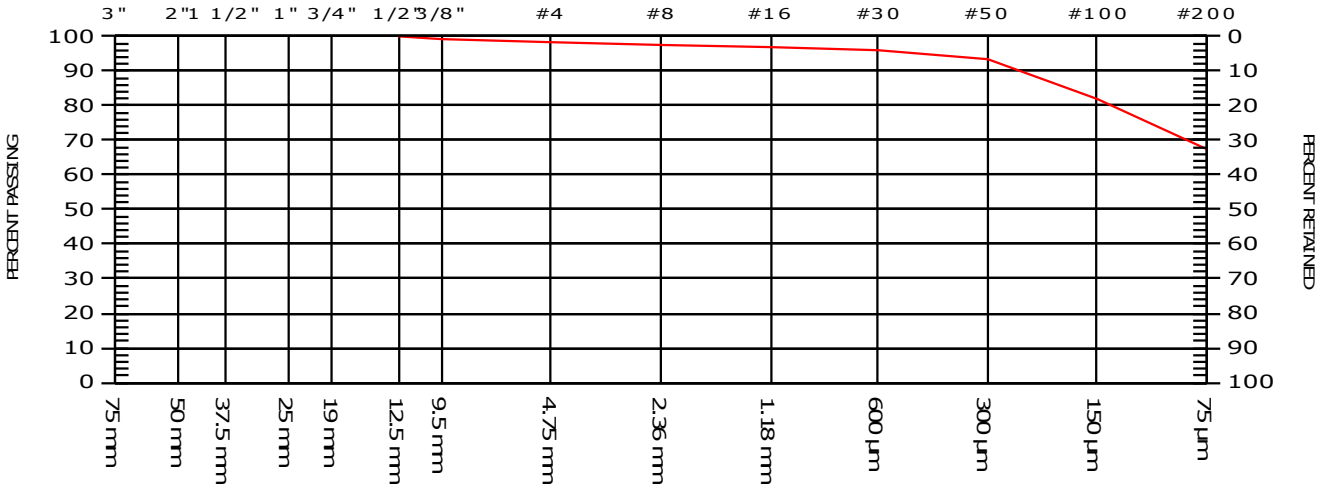
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 7 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-05 @ 2.2m
SPECIFICATION
MATERIAL TYPE SILT; sandy, trace gravel

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm	100.0	
3/8"	9.5 mm	99.2	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	98.3	
No. 8	2.36 mm	97.5	
No. 16	1.18 mm	96.9	
No. 30	600 µm	96.0	
No. 50	300 µm	93.4	
No. 100	150 µm	81.9	
No. 200	75 µm	67.4	

MOISTURE CONTENT: 21.7%

COMMENTS
Lab ID: 25-0394

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

CERTIFIED TESTING LABORATORY

SIEVE ANALYSIS REPORT
Series 8 16 30 50

PROJECT NO. 2241-24138
CLIENT BC Transit
CC

TO

BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

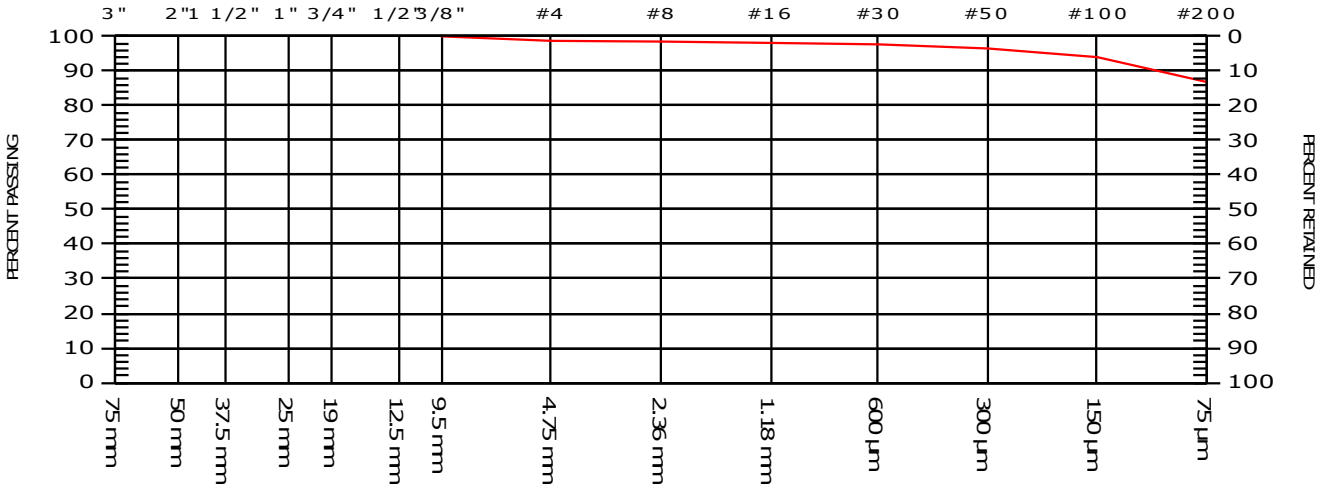
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 8 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-05 @ 4.0m
SPECIFICATION
MATERIAL TYPE SILT; some sand, trace gravel

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm	100.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	98.7	
No. 8	2.36 mm	98.5	
No. 16	1.18 mm	98.1	
No. 30	600 µm	97.7	
No. 50	300 µm	96.5	
No. 100	150 µm	94.0	
No. 200	75 µm	86.8	

MOISTURE CONTENT: 25.0%

COMMENTS
Lab ID: 25-0395

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

SIEVE ANALYSIS REPORT
Series 8 16 30 50

CERTIFIED TESTING LABORATORY

PROJECT NO. 2241-24138
CLIENT BC Transit
CC

TO
BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

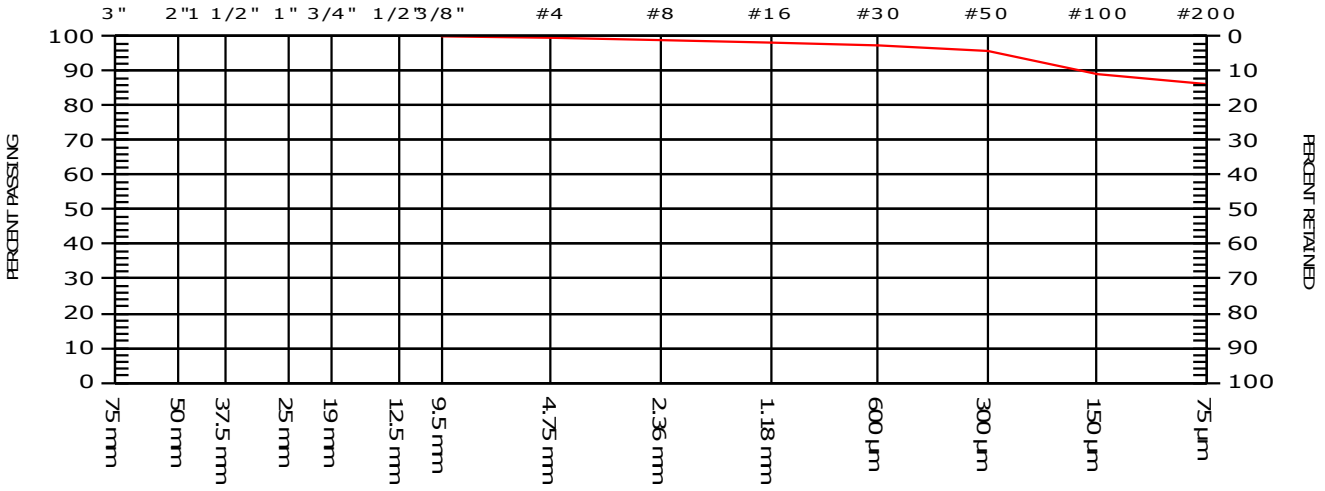
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 9 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-08 @ 2.1m - 2.4m
SPECIFICATION
MATERIAL TYPE SILT; some sand

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm	100.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	99.6	
No. 8	2.36 mm	98.9	
No. 16	1.18 mm	98.2	
No. 30	600 µm	97.4	
No. 50	300 µm	95.8	
No. 100	150 µm	89.1	
No. 200	75 µm	86.2	

MOISTURE CONTENT: 25.5%

COMMENTS
Lab ID: 25-0396

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

SIEVE ANALYSIS REPORT
Series 8 16 30 50

CERTIFIED TESTING LABORATORY

PROJECT NO. 2241-24138
CLIENT BC Transit
CC

TO
BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

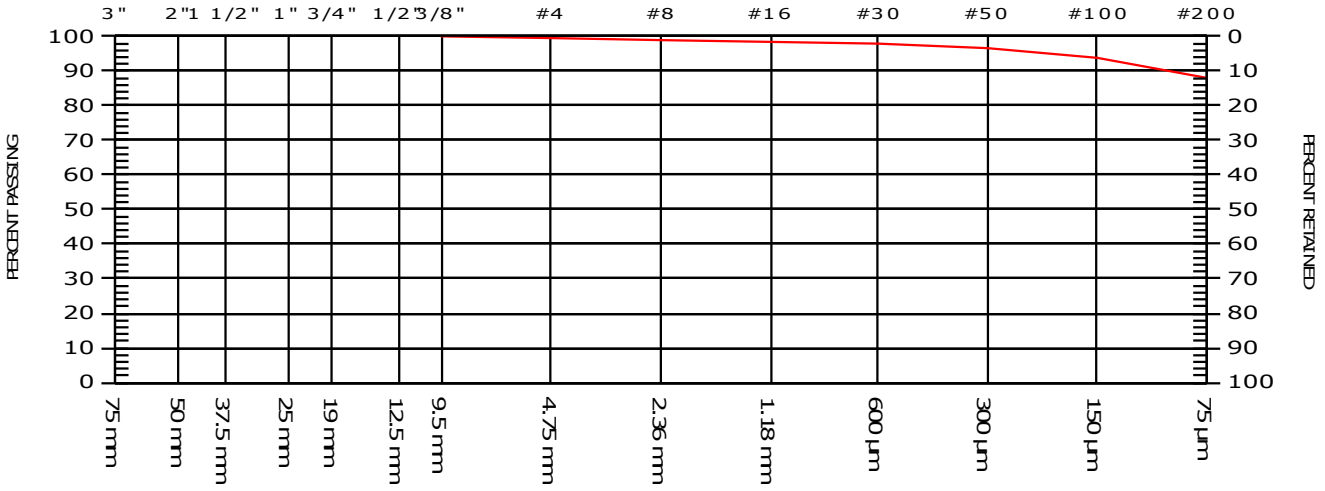
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 10 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-08 @ 3.7m - 4.0m
SPECIFICATION
MATERIAL TYPE SILT; some sand

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm	100.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	99.5	
No. 8	2.36 mm	98.9	
No. 16	1.18 mm	98.4	
No. 30	600 µm	97.9	
No. 50	300 µm	96.6	
No. 100	150 µm	93.8	
No. 200	75 µm	88.0	

MOISTURE CONTENT: 28.1%

COMMENTS
Lab ID: 25-0397

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

SIEVE ANALYSIS REPORT
Series 8 16 30 50

CERTIFIED TESTING LABORATORY

PROJECT NO. 2241-24138
CLIENT BC Transit
CC

TO
BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

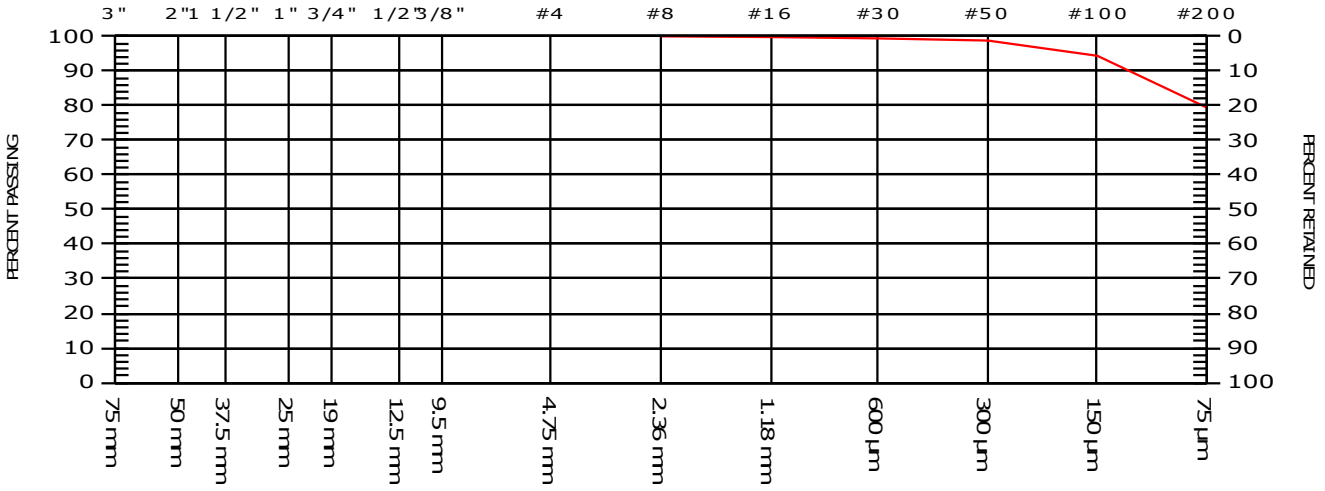
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 11 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-10 @ 3.0m
SPECIFICATION
MATERIAL TYPE SILT, some sand

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm		

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	100.0	
No. 8	2.36 mm	100.0	
No. 16	1.18 mm	99.8	
No. 30	600 µm	99.4	
No. 50	300 µm	98.8	
No. 100	150 µm	94.4	
No. 200	75 µm	79.4	

MOISTURE CONTENT: 30.0%

COMMENTS
Lab ID: 25-0382

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

SIEVE ANALYSIS REPORT
Series 8 16 30 50

CERTIFIED TESTING LABORATORY

PROJECT NO. 2241-24138
CLIENT BC Transit
CC

TO
BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

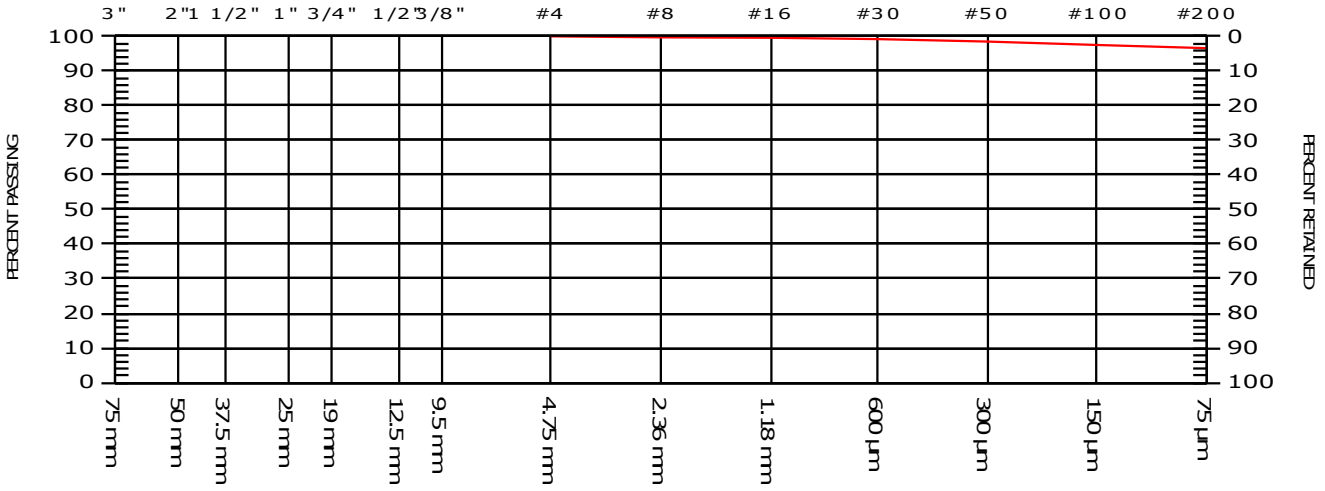
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 12 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-13 @ 1.7m
SPECIFICATION
MATERIAL TYPE SILT; trace silt

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm		

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	100.0	
No. 8	2.36 mm	99.7	
No. 16	1.18 mm	99.6	
No. 30	600 µm	99.2	
No. 50	300 µm	98.5	
No. 100	150 µm	97.5	
No. 200	75 µm	96.6	

MOISTURE CONTENT: 30.3%

COMMENTS
Lab ID: 25-0383

Page 1 14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

SIEVE ANALYSIS REPORT
Series 8 16 30 50

CERTIFIED TESTING LABORATORY

PROJECT NO. 2241-24138
CLIENT BC Transit
CC

TO
BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

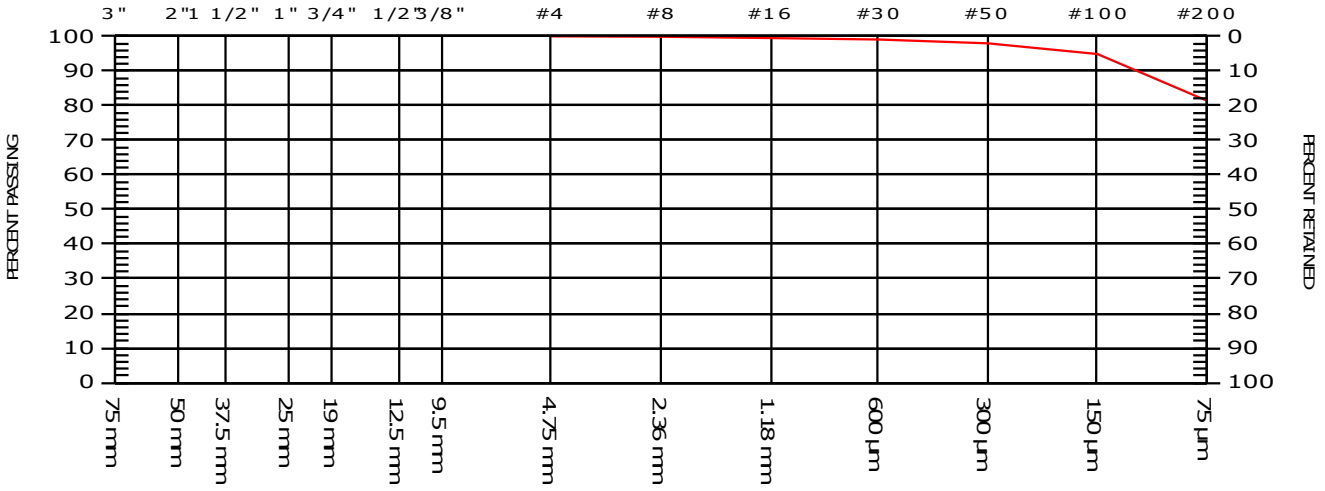
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 13 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-13 @ 3.0m
SPECIFICATION
MATERIAL TYPE SILT, some sand

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm	100.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	100.0	
No. 8	2.36 mm	99.9	
No. 16	1.18 mm	99.5	
No. 30	600 µm	99.1	
No. 50	300 µm	98.0	
No. 100	150 µm	94.9	
No. 200	75 µm	81.4	

MOISTURE CONTENT: 34.7%

COMMENTS
Lab ID: 25-0384

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

CERTIFIED TESTING LABORATORY

SIEVE ANALYSIS REPORT
Series 8 16 30 50

PROJECT NO. 2241-24138
CLIENT BC Transit
CC

TO
BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

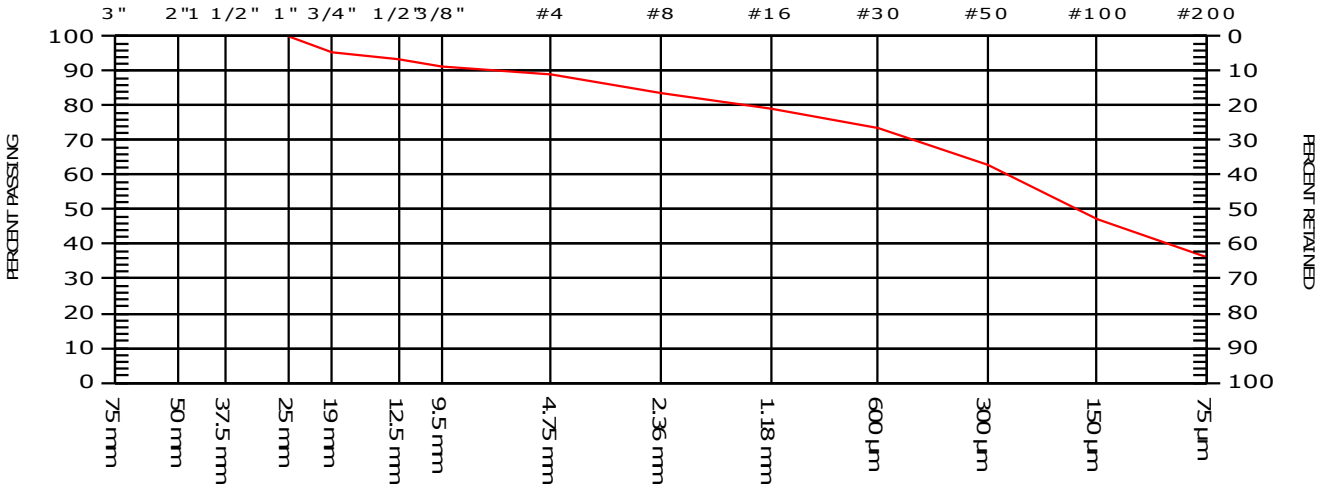
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 14 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-13 @ 4.2m
SPECIFICATION
MATERIAL TYPE SAND & SILT; some gravel

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	95.4	
1/2"	12.5 mm	93.4	
3/8"	9.5 mm	91.3	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	89.0	
No. 8	2.36 mm	83.6	
No. 16	1.18 mm	79.1	
No. 30	600 µm	73.5	
No. 50	300 µm	62.9	
No. 100	150 µm	47.2	
No. 200	75 µm	36.2	

MOISTURE CONTENT: 8.5%

COMMENTS
Lab ID: 25-0385

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.

F 4644 Madrona Place
Courtenay, BC

SIEVE ANALYSIS REPORT
Series 8 16 30 50

CERTIFIED TESTING LABORATORY

PROJECT NO. 2241-24138
CLIENT BC Transit
CC

TO
BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

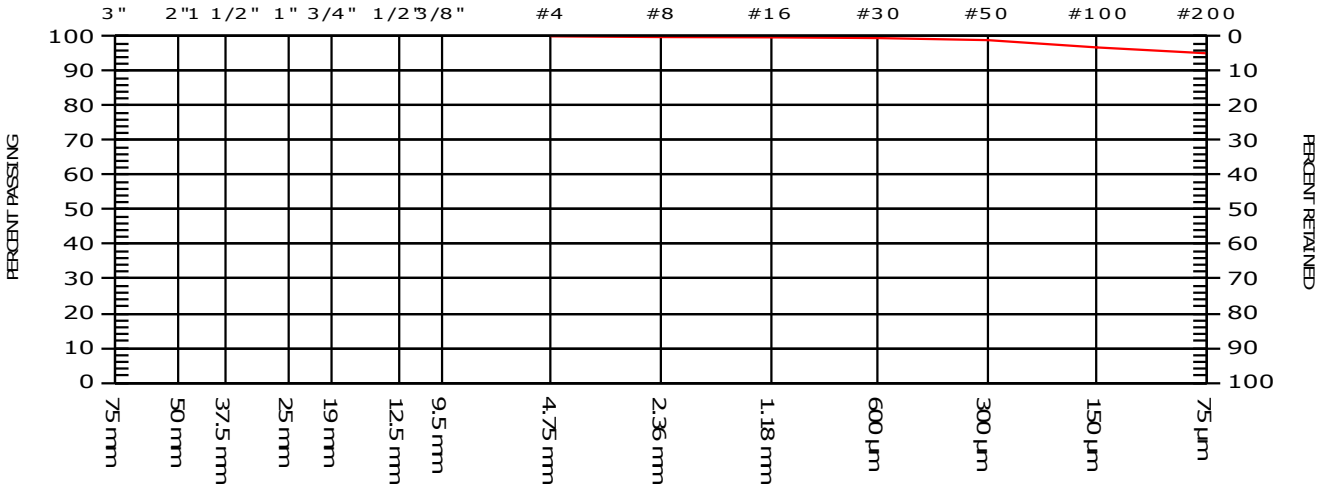
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 15 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-14 @ 2.2m - 2.5m
SPECIFICATION
MATERIAL TYPE SILT; trace sand

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm		

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	100.0	
No. 8	2.36 mm	99.8	
No. 16	1.18 mm	99.7	
No. 30	600 µm	99.5	
No. 50	300 µm	98.9	
No. 100	150 µm	96.8	
No. 200	75 µm	95.1	

MOISTURE CONTENT: 36.2%

COMMENTS
Lab ID: 25-0386

14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney Ltd.
F 4644 Madrona Place
Courtenay, BC

CERTIFIED TESTING LABORATORY

SIEVE ANALYSIS REPORT
Series 8 16 30 50

PROJECT NO. 2241-24138
CLIENT BC Transit
CC

TO
BC Transit
520 Gorge Road East, PO Box 61
Victoria, BC
V8W 2P3

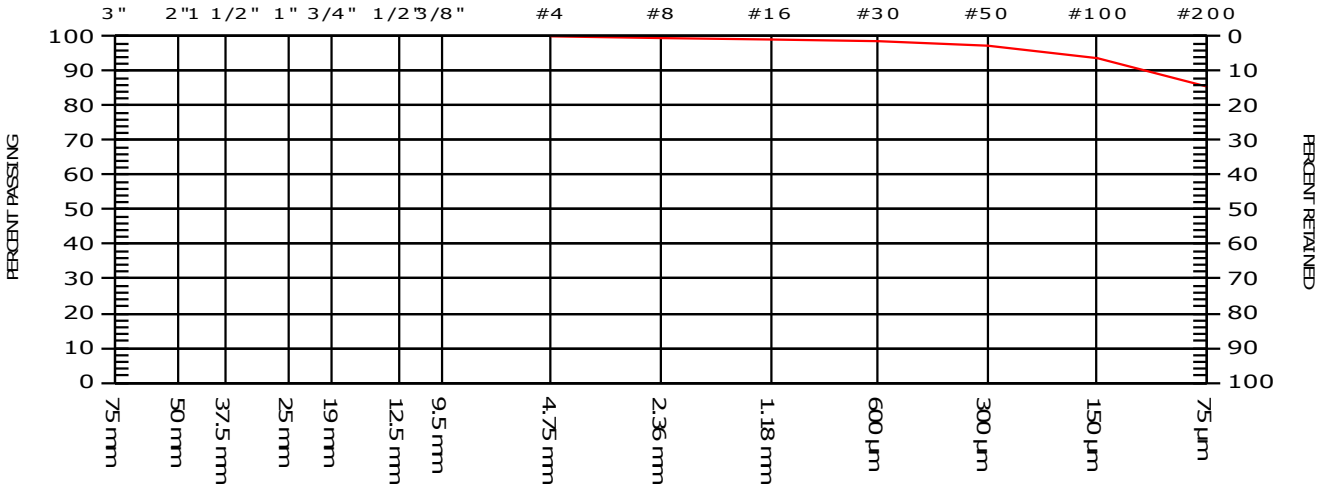
ATTN :

PROJECT Saanich Transit Centre
Geotechnical Assessment
CONTRACTOR

SIEVE TEST NO. 16 DATE TESTED 30-Apr-2025 DATE SAMPLED 24-Mar-2025 DATE RECEIVED 26-Mar-2025

SUPPLIER Bore Hole
SOURCE BH25-14 @ 4.0m - 4.2m
SPECIFICATION
MATERIAL TYPE SILT; some sand

SAMPLED BY B. Vernon
TESTED BY J. Youngberg
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm		

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	100.0	
No. 8	2.36 mm	99.5	
No. 16	1.18 mm	99.1	
No. 30	600 µm	98.6	
No. 50	300 µm	97.3	
No. 100	150 µm	93.7	
No. 200	75 µm	85.5	

MOISTURE CONTENT: 35.8%

COMMENTS
Lab ID: 25-0387

 14-May-2025

PER. Julian Youngberg
Sr. Technologist
Project Manager

McElhanney

F - 4644 Madrona Pl, Courtenay, BC

Report of: ASTM D4318

Liquid Limit, Plastic Limit and Plasticity Index of Soil

Client:	BC Transit	**Project No:**	2241-24138	**Test Pit / Borehole No.:**	BH25-01
		Project:	Saanich Transit Centre	**Sample No.:**	25-0389
		Sample Date:	2025-03-24	**Sample Depth:**	6.0-7.0m
		Sample By:	B. Vernon	**Sample Type:**	Grab
		Test Date:	2025-05-14	**Laboratory ID:**	25-0389
		Test By:	A. Johnson		

Sample Description: Clay (grey)

Approx. max. particle size in sample: <.425 mm

Liquid Limit (LL) - Method B

Trial No.	1	2	3	
N	26	24	25	
Tare	4.14	4.10	4.09	
Tare & Wet Weight	22.75	23.01	22.62	
Tare & Dry Weight	16.98	17.04	16.84	
Moisture (%)	44.94%	46.14%	45.33%	
'*k*' Factor (Table 1)	1.005	0.995	1.000	*Ave. Liquid Limit*
Liquid Limit (LL)	45	46	45	45

Sample Preparation Method

Sample Preparation:	Wet
Plastic Limit:	Hand Rolled
Liquid Limit Device:	Manual
Grooving Tool:	Plastic
Mixing Water:	Distilled
Removal method of +0.425mm particles:	Mixed on glass plate, oversized particles removed

Plastic Limit (PL)

Trial No.	1	2	3	
Tare	28.20	28.43	28.31	
Tare & Wet Weight	35.26	35.87	35.69	
Tare & Dry Weight	34.14	34.71	34.53	
Moisture (%)	18.86%	18.47%	18.65%	*Ave. Plastic Limit*
Plastic Limit (PL)	19	18	19	19

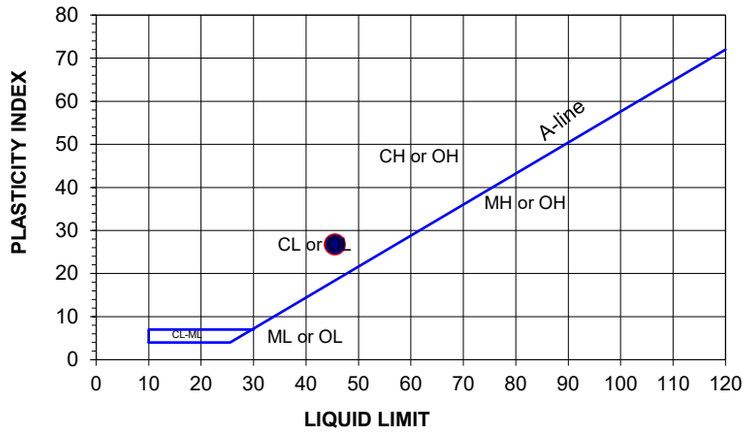
As Received Water Content (Oven Dried)

Tare ID	J7
Tare	224.80
Tare & Wet Weight	442.80
Tare & Dry Weight	382.00
Moisture (%)	38.68%

Summary of Results

Liquid Limit (LL)	45
Plastic Limit (PL)	19
Plasticity Index (PI)	27

PLASTICITY CHART



Comments:

Reviewed By:

Kerry Barth, AScT

This report represents a testing service only.
No engineering interpretation opinion is expressed or implied.
Engineering review and interpretation can be provided on written request.

McElhanney

F - 4644 Madrona Pl, Courtenay, BC

Report of: *ASTM D4318*

Liquid Limit, Plastic Limit and Plasticity Index of Soil

Client:	BC Transit	**Project No:**	2241-24138	**Test Pit / Borehole No.:**	BH25-14
		Project:	Saanich Transit Centre	**Sample No.:**	25-0387
		Sample Date:	2025-03-24	**Sample Depth:**	4.0 - 4.2m
		Sample By:	B. Vernon	**Sample Type:**	Grab
		Test Date:	2025-04-30	**Laboratory ID:**	25-0387
		Test By:	A. Johnson		

Sample Description: Clay (grey)

Approx. max. particle size in sample: <.425 mm

Liquid Limit (LL) - Method B

Trial No.	1	2	3	
N	30	28	20	
Tare	4.08	4.10	4.11	
Tare & Wet Weight	23.51	20.92	20.36	
Tare & Dry Weight	16.66	15.00	14.52	
Moisture (%)	54.45%	54.31%	56.10%	
'*k*' Factor (Table 1)	1.022	1.014	0.973	*Ave. Liquid Limit*
Liquid Limit (LL)	56	55	55	55

Sample Preparation Method

Sample Preparation:	Wet
Plastic Limit:	Hand Rolled
Liquid Limit Device:	Manual
Grooving Tool:	Plastic
Mixing Water:	Distilled
Removal method of +0.425mm particles:	Mixed on glass plate, oversized particles removed

Plastic Limit (PL)

Trial No.	1	2	3	
Tare	28.20	28.42	28.33	
Tare & Wet Weight	35.03	35.33	35.66	
Tare & Dry Weight	33.76	34.06	34.30	
Moisture (%)	22.84%	22.52%	22.78%	*Ave. Plastic Limit*
Plastic Limit (PL)	23	23	23	23

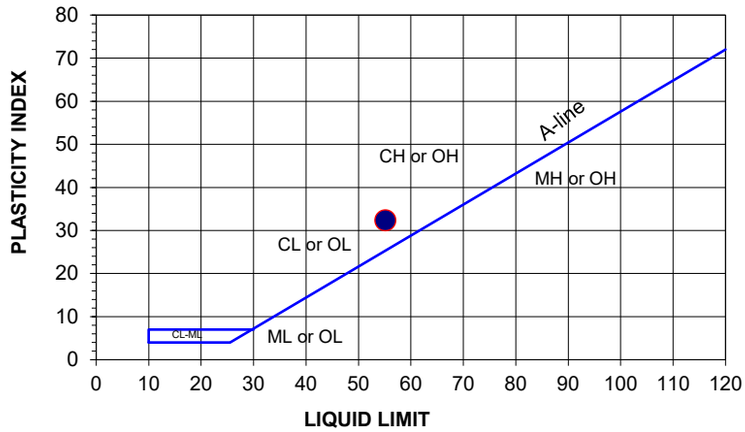
As Received Water Content (Oven Dried)

Tare ID	C9
Tare	253.20
Tare & Wet Weight	912.00
Tare & Dry Weight	738.50
Moisture (%)	35.75%

Summary of Results

Liquid Limit (LL)	55
Plastic Limit (PL)	23
Plasticity Index (PI)	32

PLASTICITY CHART



Comments:

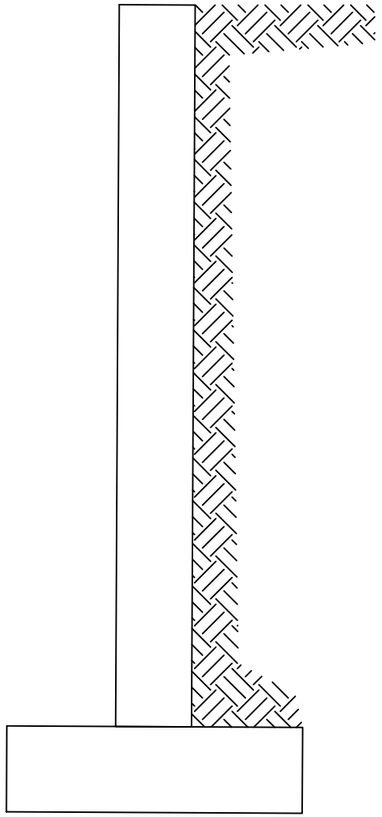
Reviewed By:

Kerry Barth, AScT

This report represents a testing service only.
No engineering interpretation opinion is expressed or implied.
Engineering review and interpretation can be provided on written request.

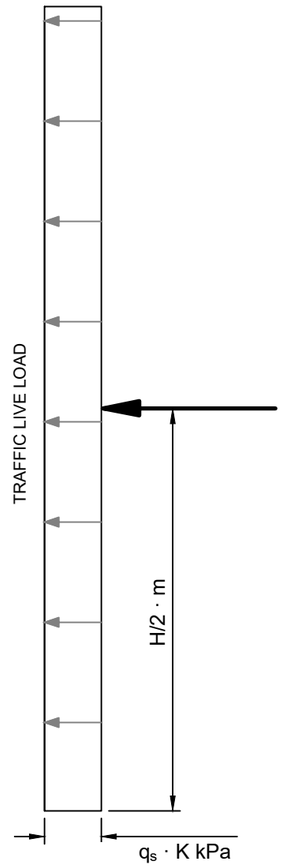
APPENDIX E

Lateral Earth Pressures



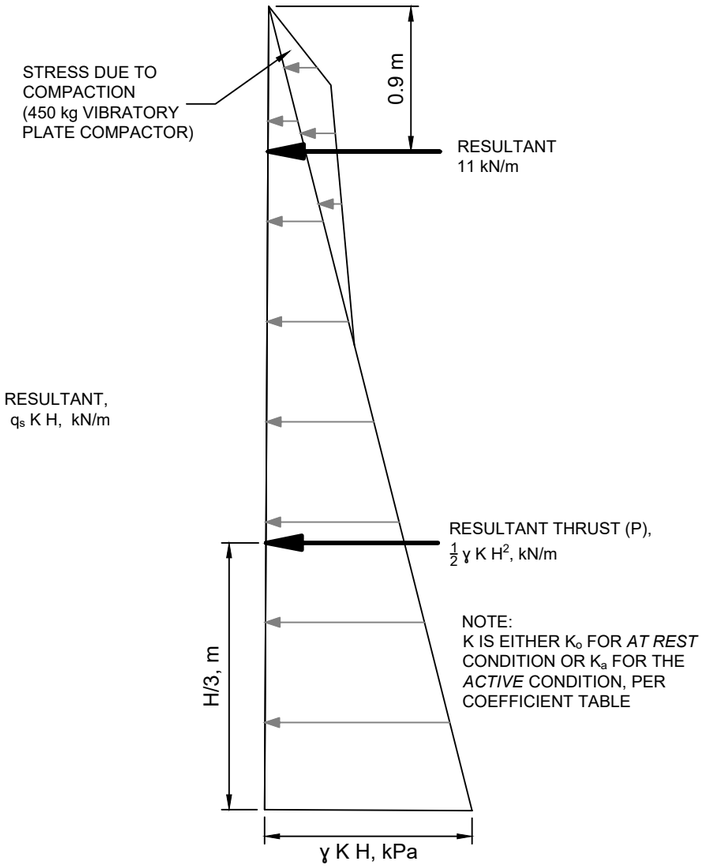
LATERAL STRESS

=



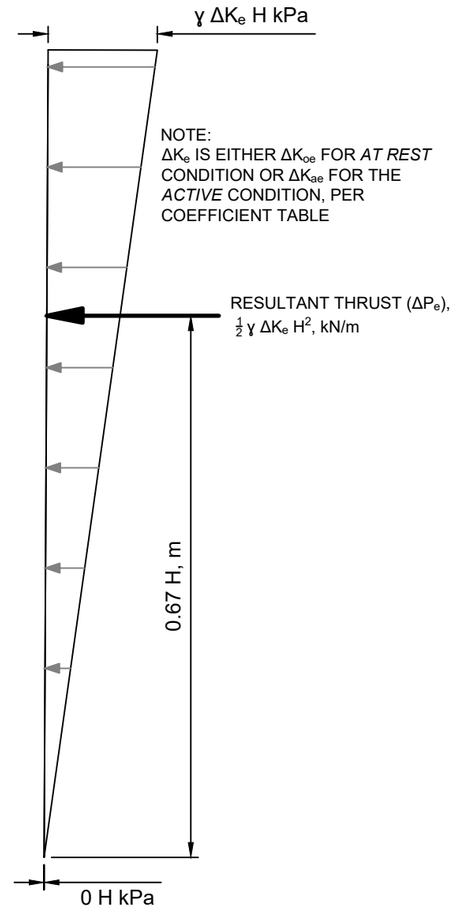
SURCHARGE

+



SOIL PRESSURE

+



SEISMIC

COEFFICIENT	SAND & SILT/ SILTY SAND	SILT & CLAY
UNIT WEIGHT, γ	18 kN/m^3	17 kN/m^3
PGA 0.5 x (1 in 2475 year event)	0.396	0.396
ACTIVE, Ka	0.30	0.32
AT REST, Ko	0.50	0.53
PASSIVE, Kp	3.0	2.76
INCREMENTAL DYNAMIC ACTIVE, ΔKae	0.44	0.47
INCREMENTAL DYNAMIC AT REST, ΔKoe	0.79	0.79

q_s, kPa (FROM BC BUILDING CODE)

PASSENGER CARS <4000 KG GVW	2.4
UNLOADED BUSES AND LIGHT TRUCKS <9000 KG GVW	6.0
LOADED BUSES AND TRUCKS >9000 KG GVW	12.0

NOTE: DRAWING IS INCLUDED FOR INFORMATION PURPOSES ONLY AND IS TO BE INTERPRETED WITH THE CORRESPONDING GEOTECHNICAL REPORT AND THE LATEST VERSION OF BC BUILDING CODE.

DESIGN ASSUMPTIONS

- FULLY DRAINED CONDITIONS
- HORIZONTAL FREE-DRAINING GRANULAR BACKFILL
- NO WALL FRICTION
- COMPACTION TO AT LEAST 95% MAXIMUM MODIFIED PROCTOR DRY DENSITY

Rev	Date	Description	Drawn	Design	App'd
0	2025-06-03	ISSUED FOR REFERENCE	CG	CG	JF

BENCHMARK
ALL ELEVATION REFER TO CONTROL MONUMENT: -
LOCATED AT: -
ELEVATION: -

NOT TO SCALE

ORIGINAL DWG SIZE: ANSI B (11" x 17")

McElhanney
1 - 1351 Estevan Road,
Nanaimo BC V9S 3Y3
Tel. 250 716 3336

PRELIMINARY NOT FOR CONSTRUCTION

THIS DRAWING HAS NOT BEEN APPROVED AND MAY CONTAIN ERRORS AND OMISSIONS

BC TRANSIT
520 GORGE RD, E, VICTORIA, BC

SAANICH TRANSIT CENTER
LATERAL EARTH PRESSURE CALCULATIONS

Drawing No.
B-02

Project Number	Rev.
2241-24138	0

DESTROY ALL PRINTS BEARING PREVIOUS REVISION