PRP Holdings Ltd.

Geotechnical Assessment:
Condo Development at
1177 Foothills Boulevard,

July 26, 2022

Revision 4

Project No.: 21-H-022
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SoilTech Consulting Ltd

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1. Introduction

PRP Holdings Ltd. (PRP) retained SoilTech Consulting Ltd. (SoilTech) to conduct a geotechnical assessment at 1177 Foothills Boulevard, Prince George, BC and to provide geotechnical design recommendations for the proposed condo development.

To conduct this assessment, we have completed:

- A review of existing public data relevant to the geology and water conditions at the site.
- A review of a geotechnical report addressing slope stability (Appendix C) authored by McElhanney: *Geotechnical Slope Review for Proposed Condo Building at 1177 Foothills Boulevard, Prince George,* dated June 16, 2020, Project No. 2341-21020-00.
- A field assessment program including boreholes, test pits, and groundwater monitoring wells in the proposed lot and roadway.

The geotechnical assessment was required to provide geotechnical design recommendations for:

- General site preparation
- Temporary excavations
- Building site preparation including Structural Fill
- Shallow foundations
- Grade supported floor slabs
- Frost penetration and protection
- Foundation drainage and backfill
- Pavement structures for roadways, drive aisles, and parking areas
- Estimated seismic classification

Geotechnical slope review and development setbacks were addressed in the McElhanney report. Their report should be read in conjunction with this report. Our recommendations regarding the slope and development restrictions in the indicated areas are intended to supplement those provided by McElhanney.

2. Site Conditions and Description

From discussions with PRP and a review for preliminary drawings we understand the development will consist of a six (6) storey building with an elevator and a parkade. The building will be located near the northwest property line and be supported on conventional concrete foundations with grade supported floor slabs. The lot is located at the toe of Cranbrook Hill below Cranbrook Hill Road. The slope is approximately 28 m in height, has an average grade of approximately 33%, and lies to the west of the proposed condo location. The Cranbrook Hill Reservoir PW 805 lie above and to the west of the property. PW 805 connects to the watermain buried in Foothills Boulevard via a buried line running parallel to the southern property line as shown in Figure 1.

Based on orthophotos from PG Map, the development area remained in similar condition from 1993 to 2021 prior to the clearing and grubbing activities around the time of our investigation. Based on published geological information, McElhanney's geotechnical slope review report, and our field assessment the soils at the site are likely a colluvial deposit, loose and unconsolidated sediments deposited at the base of a hillslope. There is evidence of undocumented fill and/or disturbed material covering most of the site

possibly from previous earthworks activities related to the construction of Cranbrook Hill Road and/or Foothills Boulevard.

Figure 1. Project location and nearby City of Prince George infrastructure shown on PG Map 2020 Otho Imagery

3. Field Assessment

The field assessment was carried out on June 14 and 16, 2021 and consisted of six (6) drillholes (DH21-01 to DH21-06) and eight (8) test pits (TP21-01 to TP21-8) through the proposed development area (Figure 2). The boreholes were advanced with a truck mounted drill rig (Uncharted Drilling Ltd.) and the test pits were excavated using a Caterpillar 312B excavator (Myatovic Construction Ltd.) under the direction of our field personnel. The boreholes were advance to between 4.5 m and 13 m depth and the test pits to between 0.5 to 1.7 m depth below the existing ground surface. Groundwater level monitoring wells were installed in DH21-05 and DH21-06. The test locations were backfilled with loose soil from the excavations following our review and sample collection.

SoilTech personnel observed and recorded the subsurface conditions in each of the test locations. The observed soils were classified in accordance with the Modified Unified Soil Classification System of Soils (MUCSS) and are detailed in Appendix A. Pocket penetrometer measurements were taken where applicable at various depths. Soil samples were also collected at various depth and select samples were to our laboratory for index tests. The observed soil and ground water conditions, sampling depths, field

measurements and index test results are detailed in the borehole and test pit logs in Appendix A. Detailed laboratory reports for the index tests are in Appendix B.

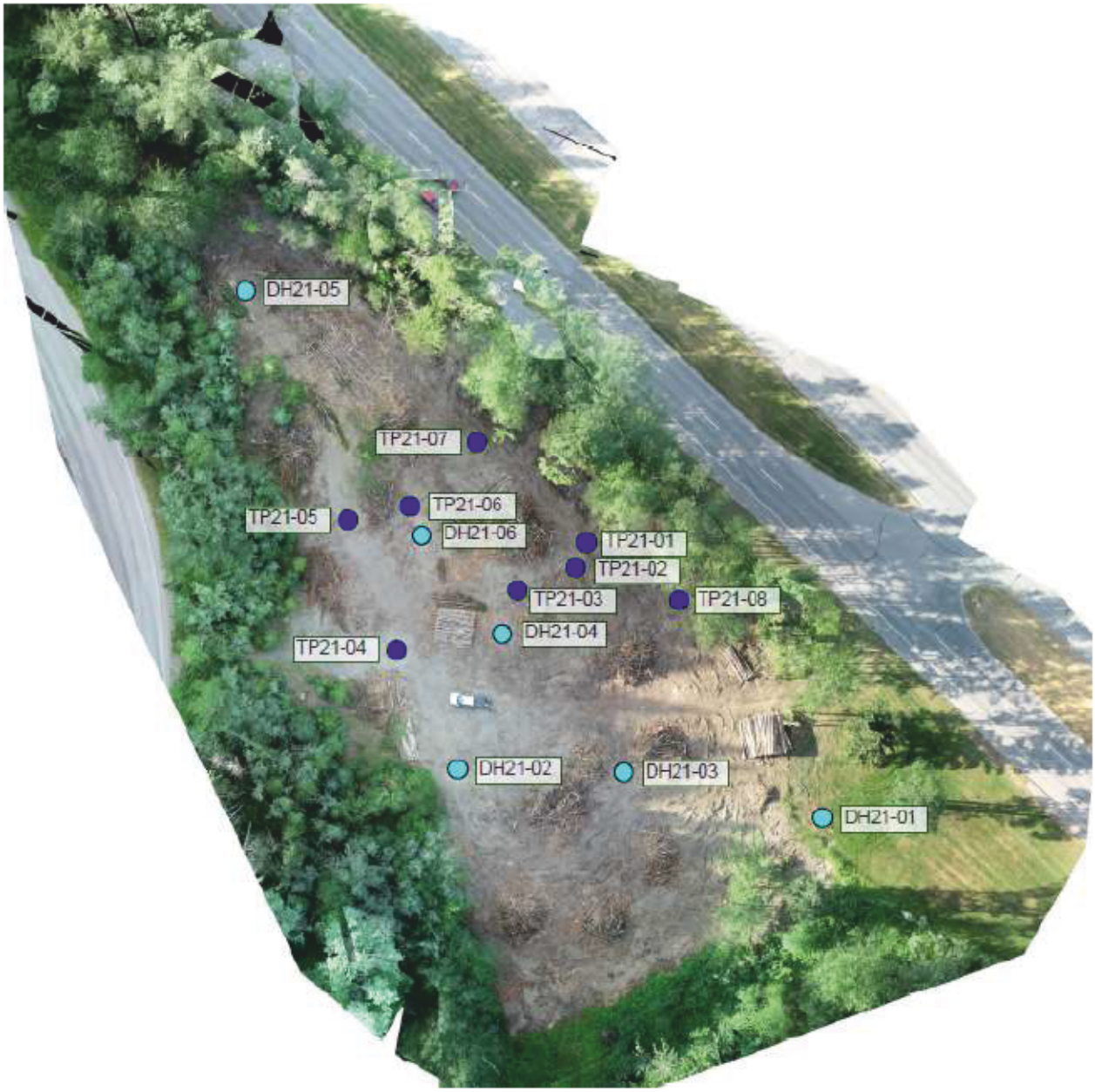


Figure 2. Proposed Development area and investigation locations. Orthophoto created on June 20, 2021.

4. Subsurface Conditions

Generally, we observed four distinct natural soil types in the field assessment (Table 1).

Table 1. Observed Natural Soil Types and Locations

Soil Unit	Description	Locations
Sand	Gravelly to some gravel, trace fines, loose to compact, brown, gray, moist	TP21-01, TP21-02, TP21-03, TP21-04, TP21-05, TP21-06, TP21-07, DH21-02, DH21-03, DH21-04, DH21-06
Gravel	Sand, trace fines, compact to dense, brown, gray, moist	DH21-01, DH21-05, DH21-03, DH21-04, DH21-05, DH21-06
Silt	Clayey, some sand, stiff to very stiff, intermediate plasticity, brown, wet of plastic limit	TP21-08, DH21-01, DH21-03
Bedrock		DH21-02, DH21-05, DH21-06

Where silt was encountered, it was deposited between sand and/or gravel layers. Our observations are consistent with published background surficial geology mapping for the area which details the site is within an alluvial deposit and colluvial deposit.

The average in-situ moisture contents for the natural sand and gravel were between 9.5% to 5.1%. The sand and gravel are near optimum moisture for compaction. The moisture content of the natural Silt ranged between 21.3% to 32.7% and was generally over its plastic limit. Groundwater was observed in DH21-05 and DH21-06 (Refer to Section 5.9).

Figure 3. Test pits and drill hole locations where fill was encountered and depth to natural soil.

Undocumented fill or disturbed material was encountered in most of the drill holes and the test pits except TP21-04 & TP 21-05. The fill generally consisted of very loose sand with some gravel and trace fines. The fill we observed was generally free of organics and deleterious materials. The locations of test pits and drill holes encountering undocumented fill and the depth at those location where natural soil was observed is presented in Figure 3.

4.1 Groundwater Monitoring

Groundwater monitoring wells were installed in DH21-05 and DH21-06. The wells were monitored between June 16, 2021 and July 15, 2022. The water levels detailed in Figure 5 show minimal fluctuation. We will continue to monitor the levels at the site up into and including the construction period of the building and will provide updated recommendations if it is determined the groundwater will influence bearing support.

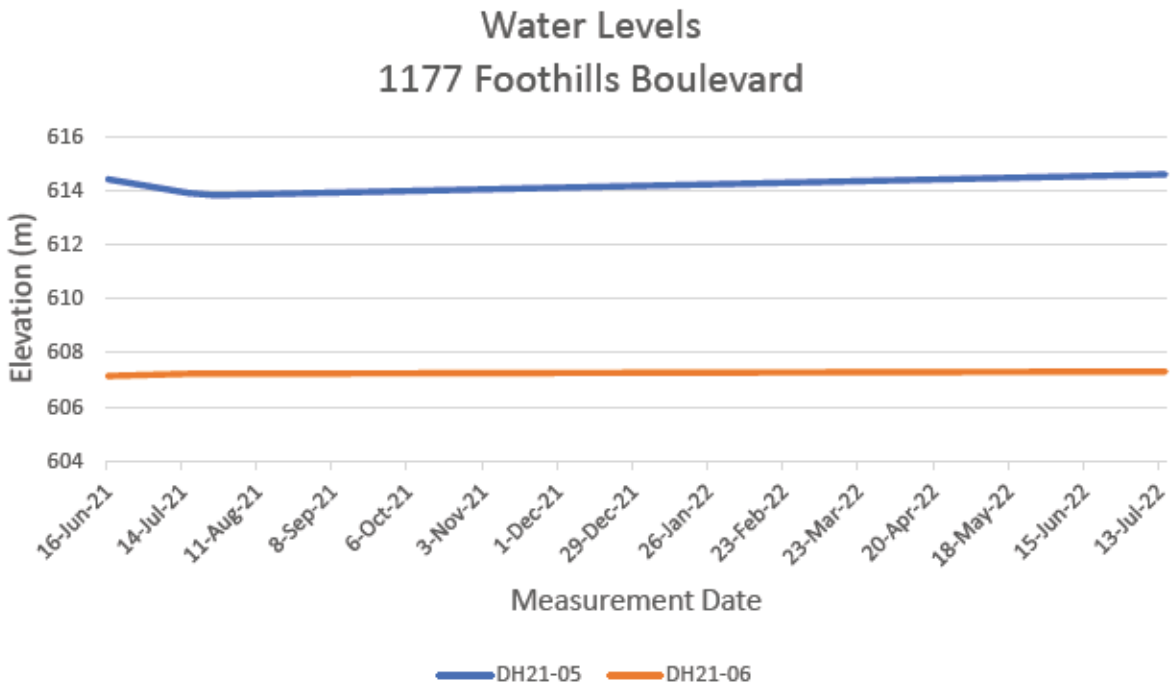


Figure 4. Measured groundwater levels

5. Discussion and Recommendations

There is suitable area for the development on the property. Several items should be taken into consideration for the design and construction of the development:

- McElhanney's slope stability report identified two areas with development restrictions (Figure 4).
- Undocumented fill was encountered in all the investigation locations (Figure 2) and should removed below load bearing structures and pavement structures.
- The existing sand fill at the site was observed to be generally free of deleterious material and may be suitable for common fill or road subgrade fill.
- The natural soil will provide adequate support for conventional shallow concrete foundations.
- If natural loose sand is present below the footings, it should be compacted to 100% Standard Proctor Density prior to the installation of concrete formwork.
- Structural Fill should be used to raise grades below load bearing structures.
- Structural Fill can also be implemented to improve bearing support.
- The natural gravel may be suitable for Structural Fill.
- Foundation should bear on natural silt or gravel, compacted natural sand or Structural Fill.
- The estimated Seismic Site Class is D.
- The natural sand and gravel are non-frost susceptible. The natural silt is frost susceptible and is susceptible to the formation of ice lenses that can cause frost heave.
- Foundations for unheated buildings and utilities installed at shallow depths may require frost protection.
- Pavement structures for the anticipated traffic load are detailed in Section 5.10 and should be installed over an adequately prepared subgrade.
- A geotextile separation layer is not required for pavement structures installed over sand or gravel subgrades with trace fines.
- Subsurface conditions are suitable for storm water disposal in the southeast corner of the property.
- Excavations in the natural loose sand will likely require shallower excavation slopes than the Work Safe BC Minimums.
- Measures should be taken to prevent ponding in excavations and erosion of excavation slopes.

The following sections cover the items above in further detail.

5.1 Areas of Restricted Development

Figure 5 details the areas McElhanney identified for restricted development from their slope assessment. Based on our assessment and our review of the McElhanney slope assessment report (Appendix C) we agree with the recommendations they provided. We referenced *The Guidelines for legislated Landslide Assessments for proposed Residential Developments in BC (2010)*, published by the Association of Engineers and Geoscientists of BC (now EGBC) when completing our review of their assessment.

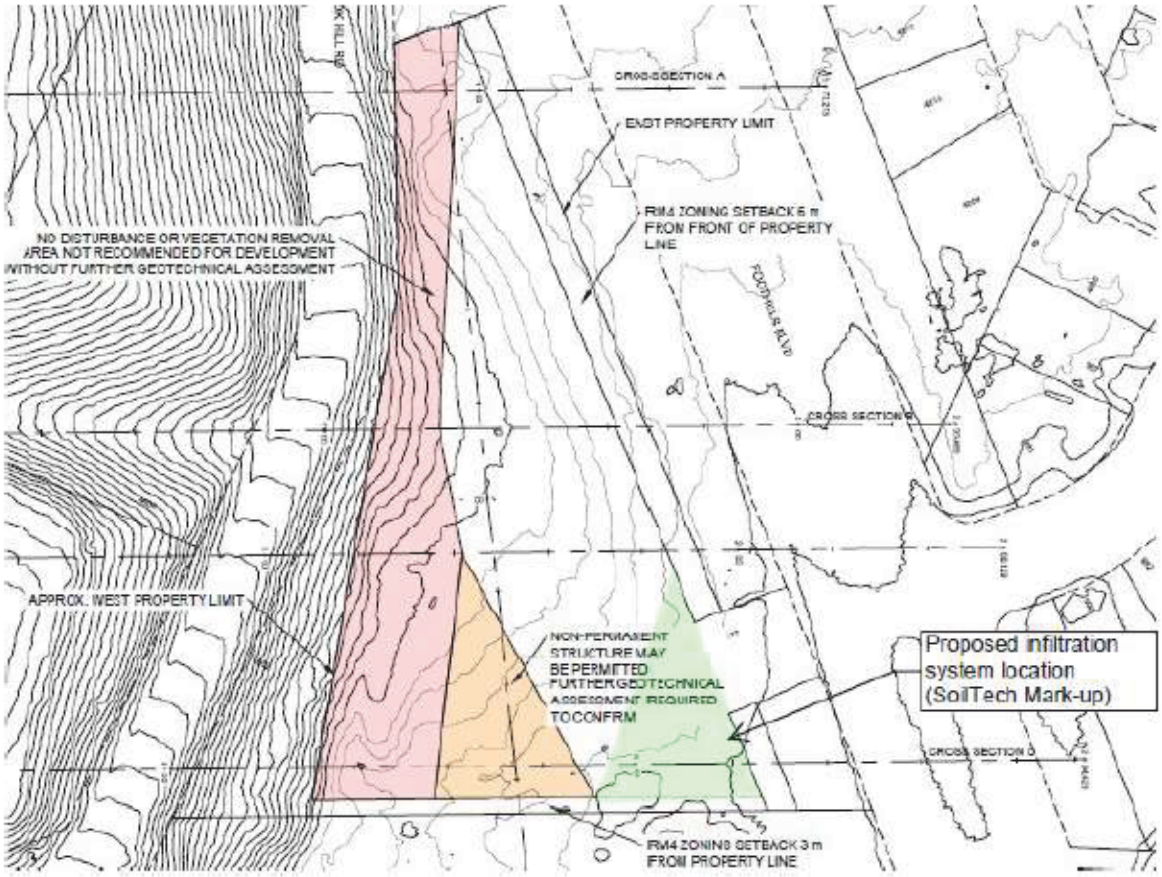


Figure 5. Areas of restricted development show in red and orange. SoilTech's proposed Infiltration system area shown in green. Shown on a section of McElhanney Drawing No. C-01.

They defined an area of no disturbance or vegetation removal from the area highlighted in red along the west border of the lot. No development should take place in this area except measures that will increase the surficial stability of the slope in the area such as additional landscaping. Temporary Excavations near the setback should not extend below a 3H:1V line projected from the inflection point at the start of the toe of the slope (Figure 6). Permanent slopes on the west side of the setback should not be steeper than 3H:1V. Retaining walls are not permitted at the setback boundary.

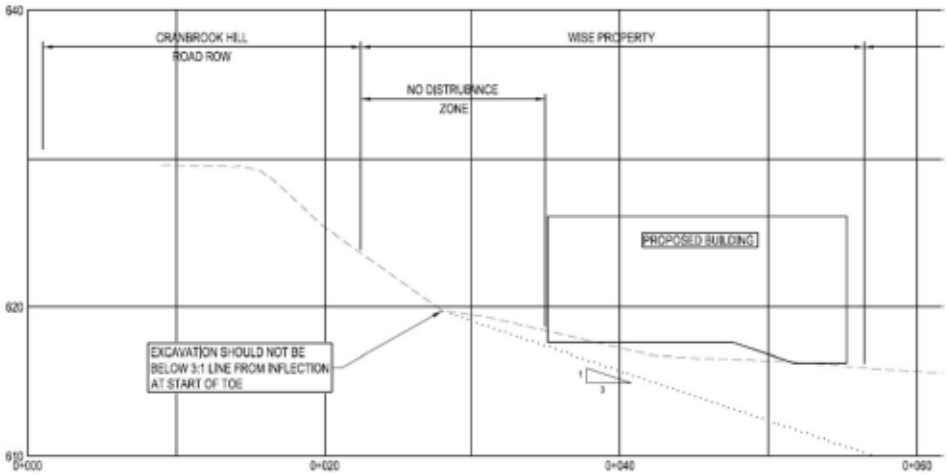


Figure 6. Example of excavation depth limitation shown on McElhanney Drawing SK02

The triangular area in orange near the southern border is suitable for some development such as parking lots, walkways, gardens, small green houses, or gazebos, etc. Temporary Excavations within this are should not extend below a 3H:1V line projected from the inflection point at the start of the toe of the slope. Any backfill of excavations in this area should be compacted to at least 95% Standard Proctor Density (SPD). The resulting grade of the area should be not less than 1 m below its current elevation, but it can be raised following the recommendations in Section 5.2. The final grade of the area should slope away from the hill and in a manner to prevent ponding and infiltration of water into the ground at the toe of the slope.

5.2 General Site Preparation

Topsoil, undocumented fill, disturbed soils, soft fine-grained wet soils, and deleterious materials (organics, wood, and construction debris, etc.) should be removed below roads, drive aisles, parking areas, sidewalks, building areas etc. and any other areas sensitive to settlement. Areas below buildings and other structural elements should be prepared as described in Section 5.3. Prepare road subgrades and pavement structures as detailed in Section 5.9. General site grading should include considerations for drainage as discussed in Section 5.8. To achieve the desired site grades and elevations, areas may have to be raised with common or Structural Fill.

Common fill can be used in landscaped areas. The native soil and some of the existing sand fill at the site may be suitable for common fill if adequately moisture conditioned for compaction. Alternatively, approved imported soil can be used. To minimize settlement common fill should be placed in uniform layers and compacted to 95% Standard Proctor Density (SPD) under acceptable moisture conditions.

5.3 Building Site Preparation

Existing fill (undocumented), soft wet fine-grained soils and deleterious or organic soil are not considered suitable for the support of load bearing structures and should be removed from below building foundations and grade-supported floor slabs. Use an excavator equipped with a clean up bucket to minimize the disturbance to the base of the excavation. If the exposed surface at base of the excavation is disturbed or loose, it may need to be compacted prior to the installation of the formwork or Structural Fill. If the resulting excavation is below the design elevation, raise the grade to the desired elevation with Structural Fill as detailed in Section 5.3.1. Structural Fill can also be implemented to improve ground bearing support (Section 5.5). The prepared foundation grade bearing surfaces should consist of undisturbed natural soil or compacted Structural Fill placed over natural soil.

5.3.1 Structural Fill

Structural Fill consists of well compacted granular material meeting specifications for Select Granular Subbase (SGSB) or Crushed Base Course (CBC) as detailed in Section 5.8.1. or other material approved by the engineer. Structural Fill should be installed over competent natural soil and extend laterally from the sides of the footings by a horizontal distance equal to the depth of fill below the footings to allow for a 45° (1 horizontal to 1 vertical, 1H:1V) distribution of stress through the compacted fill. Place the fill in maximum 300 mm thick layers, or less dependent on the compaction equipment utilized, and compact to 100% SPD. Bring the soil to near the optimum moisture content for compaction where required. The natural bearing surface and the installation of Structural Fill should be reviewed by a qualified engineer or their representative.

Alternatively, a lean concrete mix with a minimum compressive strength of 10 MPa can be used in place of Structural Fill. The concrete should extend a minimum of 0.3 m horizontal distance where it bears on

the natural soil from the edge of the footing or structure element. It can be installed using formwork or pouring against the soil sidewalls of the excavation.

5.4 Seismic Site Class

Based on our investigation, field measurements, and knowledge of subsurface conditions in the area we estimate the site is no worse than Seismic Class D as defined in Table 4.1.8.4.-A of the 2018 British Columbia Code. The 2020 National Building Code seismic model indicates a Peak Ground Acceleration (PGA) of 0.082g (g, 9.81 m/s^2) based on Site Class D with a probability of 2% exceedance in 50 years (1 in 2475 years).

5.5 Spread Footing Foundations

Conventional spread footings area suitable for the proposed building development, provided that the foundation grade is prepared adequately (Section 5.3). The natural loose sand observed at the site should be watered and compacted prior to installing foundations over top. Building foundations can be placed on the undisturbed compact sand and gravel soil, the stiff to very stiff silt, compacted natural loose sand, or Structural Fill placed over natural soil. It may be desirable to implement a layer of Structural Fill to improve the ground bearing support.

Based on the readings to date the groundwater will not impact the bearing support of the soil as the water level is at significant depth below the proposed footing elevations. Design footings bearing using the factored bearing capacity values listed in Table 2. Use minimum footing sizes for strip and pad footings as recommended in the current BC Building Code. Measures to protect foundations from frost heave, including minimum soil cover, are detailed in Section 5.7.

Table 2. Factored Bearing Resistance Values for Prepared Bearing Surfaces

Bearing Surface	Footing Width (m)	Ultimate Limit State (ULS)[1]	Serviceability Limit State (SLS)[2]
Compacted Natural Sand or Natural Silt	< 1.2	150	100
	1.2 to 2.5	185	125
Structural Fill Layer at least 0.6 m thick	< 1.2	225	150
	1.2 to 2.5	260	175

[1]The ultimate resistance factor values were calculated using a geotechnical resistance factor of 0.5

[2]For settlements less than 25 mm

5.6 Grade Supported Slabs

Prepare areas below structural and floor slabs as described in Section 5.3. A level course of CBC can be implemented to achieve a flat level grade. If radon protection measures are required below the floor slabs install as recommended in the current BC Building Code. Slabs in unheated areas will require frost protection.

Grade supported slabs in the parkade will likely experience higher loading than typical floor slabs. It may be desirable to implement and pavement structure below the parkade slab to improve the bearing support. We can provide a structure upon request.

5.7 Frost Protection

Table 3. Minimum Soil Cover for Frost Protection

Footing Type and Heating Conditions	Minimum Soil Cover
Exterior footings for a permanently heated structure with no interior foundation wall or below slab insulation	1.2 m
Exterior footings for a permanently heated structure with interior foundation wall or below slab insulation	2.4 m
Exterior and interior footings for an unheated structure or an unheated portion of a structure	2.4 m

Frost penetration depth is based on the air-freezing index and mean annual temperature for the site. For the Prince George, BC area the air freezing index is 928 Degree-Days °C, the mean annual temperature is 4.1 °C and the frost penetration depth is 2.4 m. Provide footings the minimum soil cover recommended in Table 3. to protect the bearing soil from freezing. Installing insulation below interior slabs and on the interior of foundation walls reduces heat infiltration into the ground and increases the amount of soil cover and/or insulation required to protect the foundation from frost.

Alternative methods to protect structural elements from frost heave include:

- Removing the frost susceptible soil from below the element to 2.4 m depth (below final grade) and replacing it with Structural Fill.
- Using insultation as described in Section 5.7.1.

5.7.1 Insulating Structural Elements

There are many different combinations of vertical and horizontal insulation details that can be applied to heated foundations dependent on the type and depth of installation. If intending to implement insulation to install the foundation for a heated structure with reduced soil cover, we can provide insulation recommendations to suit the chosen installation detail.

For unheated structures and buildings, the thickness of the insulation and horizontal width of the insulation surrounding the component (Figure 5) is a dependant on the depth of installation below the final grade. The width of insulation required is measured from outer edges of the component being protected. Use a rigid board insulation with insulation with a minimum R-value of 5 per 25 mm (per inch).

Extruded polystyrene (XPS) and expanded polystyrene (EPS) are suitable insulation types depending on the application and loading. The insultation should be installed at a minimum depth of 250 mm and over a minimum 150 mm thick layer of non-frost susceptible soil (less than 5% fines). Use Structural Fill for this layer below load bearing components.

For unheated structures insulation should surround the element in a manner suitable to prevent cold bridges. Alternatively, the insulation can be placed below the element. If placing Insulation below foundations or grade supported slabs a rigid board insulation with sufficient compressive strength is required. Use the manufacturers recommended compressive strength factor of safety to allow for creep

and fatigue of insulation. Void forms can be used below grade beams to accommodate soil movement from frost.

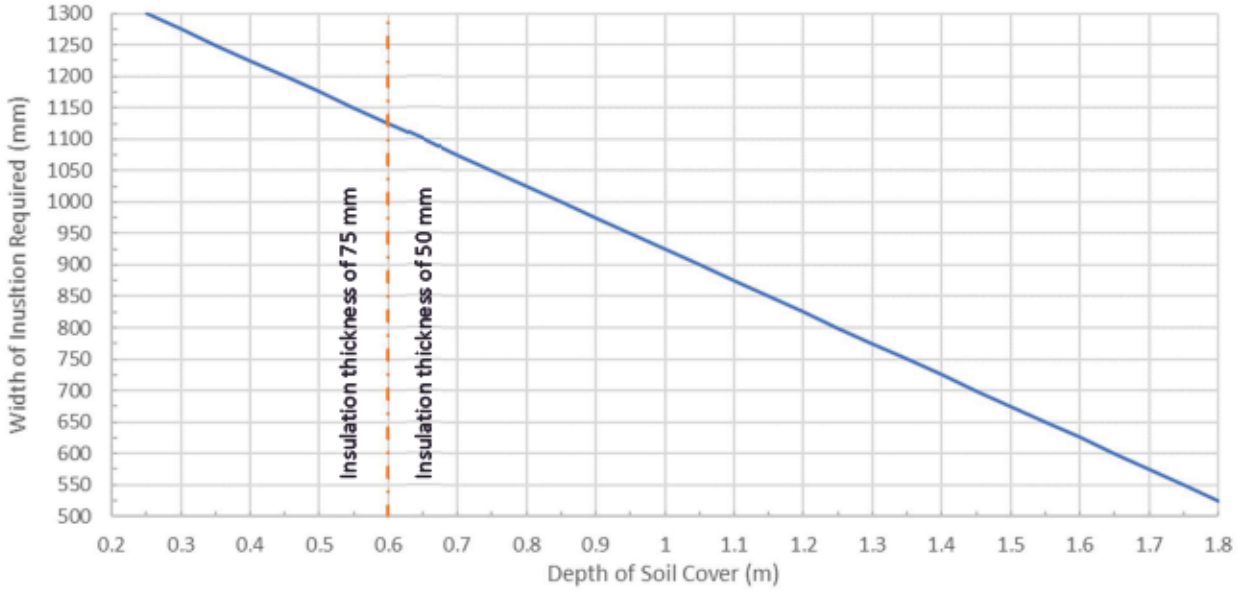


Figure 5. Insulation thickness and width required based on installation depth.

5.8 Foundation Drainage and Backfill

The type of backfill and level of compaction will depend on the intended use of the area next to the foundation. Building foundations can be backfilled following the recommendations for general site preparation in Section 5.2. To minimize the infiltration of water into the foundation backfill and bearing soil below slope the surrounding exterior grade away from the foundation at a minimum 2%. The natural sand with trace fines at the site has a moderate to high permeability thus any basements or crawl spaces installed in or over this layer will likely will not require a perimeter drainage system. Soil conditions should be reviewed in the foundation excavations for basements and crawls spaces to confirm subsurface conditions.

5.9 Pavement Structures

At the time of preparation of this report the site-specific traffic volumes are unknown. The proposed road and vehicle trafficked areas are primarily intended to support loads from passenger vehicles. The pavement structures will consist of a flexible asphalt pavement, over a layer of Crushed Base Coarse (CBC), over a layer of Select Granular Subbase (SGSB) installed over a prepared subgrade (Section 5.9.3). We recommend extending the proposed pavement structures below any curbs and sidewalks. It is anticipated the subgrade will consist of sand with trace fines which will not require a geotextile separation layer. Geotextile may need to be implemented if the natural silt is encountered at the subgrade level (refer to Section 5.9.4).

The recommended pavement structures for the road, drive aisles, and parking areas is detailed in Table 4. We evaluated the structure using the design methods and guidelines from the AASHTO 1993 Pavement Design Method and Ministry of Transportation and Infrastructure (MoTI) pavement structures design guidelines Technical Circular T-01/15. Use aggregates meeting the requirements detailed in Section 5.8.1

and asphalt meeting the specifications detailed in the current MoTI Standard Specifications for Highway Construction.

Table 4. Recommended Pavement Structures

Pavement Component	Exterior Drive Aisles and Parking Areas
Mix C Hot Mix Asphalt	65 mm
Crushed Base Coarse (CBC)	225 mm
Select Granular Subbase (SGSB)	300 mm
Geotextile	Not required
Total	590 mm

For areas that are expected to have commercial vehicles traffic, such as garbage bins or loading bays, we recommend using at least 150 mm of Portland cement concrete instead of flexible asphalt pavement. Concrete has a higher resistance to deformation and will prolong the life of the overall structure.

The proposed pavement structures will not fully protect against seasonal frost heaving. Typical frost for the area will penetrate deeper than the thickness of the proposed pavement structures. Some of natural silty subgrade soils and fills with soil of similar consistency are frost susceptible and may heave. Providing good drainage combined with a uniform pavement structure and subgrade can help reduce the amount of differential frost heaving. Additionally, providing a thicker granular structure or use of insulation will help reduce the effects of frost heaving. On-going maintenance such as repairing transverse cracking can extend the life of the pavement.

5.9.1 Aggregates

Table 5. Aggregate Gradations

Particle Size (mm)	Percent Passing	
	CBC[1]	SGSB
100	–	–
75	–	95 – 100
25	100	–
19	80 – 100	35 – 100
9.5	50 – 85	–
4.75	35 – 70	15 – 60
2.36	25 – 50	–
1.18	15 – 35	–
0.300	5 – 20	3 – 15
0.075	0 – 5	0 – 5

[1] CBC to have minimum 60% one-face fracture by mass

Aggregates should be clean, tough, durable, and free of clay lumps and excessive flat and elongated pieces. Aggregates should withstand the deleterious effects of exposure to freeze-thaw, water, and general construction such as placing, grading, packing etc. Use aggregates that meet the Aggregate Quality

specifications detailed in Section 202.04 of the current MoTI Standard Specifications for Highway Construction. For CBC and HSFA use a crushed material with a minimum 60% one-face fracture by mass on particles larger than 4.75 mm. The SGSB can be a processed or pit run gravel. Gradation specifications for the aggregates can be found in Table 5.

5.9.2 Pavement Structure Construction

Apply the following recommendations and specifications to the construction of the pavement structures:

- Place SGSB and CBC in a maximum 300 mm thick layers and compact to 100% SPD. Bring the soil to near optimum moisture content for compaction where required.
- Proof-roll the CBC layer and repair any soft areas before placing any concrete or asphalt.
- Place the asphalt surface as per the suppliers recommended procedures and compact it to a minimum average degree of compaction of 98% for roads and 97% drive aisles and parking areas when comparing the in-situ density to the measured maximum theoretical density for the mix with no single measured in-situ location less than 95%.

5.9.3 Subgrade Preparation

The prepared subgrade should consist of undisturbed natural soil or adequately constructed fill. The natural soil if properly moisture conditioned and compacted is suitable for subgrade fill. We recommend the following to prepare the subgrade:

- Remove any undocumented fill, organic soil, deleterious materials, soft wet fine-grained soil, and disturbed soil from below the proposed paved area. Extend the excavation beyond the edges of the pavement equal to the depth of the fill required below the pavement.
- Raise the grade of low areas to the design subgrade elevation with compacted soil that has similar properties and gradations to the surrounding subgrade soils.
- Place the fill material in uniform layers not exceeding 200 mm for fine-grained soil and 300 mm for granular soil.
- Compact the initial layers to 97% SPD and the final 300 mm of subgrade fill to 100% SPD. Bring the soil to near the optimum moisture content for compaction where required.
- Crown the subgrade at a minimum 2% slope away from the road centerline.
- Proof-roll the subgrade and repair any soft areas prior to installing the pavement structure.
- Place a non-woven geotextile over the prepared surface if applicable (Section 5.9.4).

5.9.4 Geotextile

Implementing a non-woven geotextile over the subgrade if it consists of fine-grained soils will help improve the long-term performance of the pavement structure by separating the fine-grained subgrade from the granular material within the pavement structure. Separating the dissimilar materials prolongs the longevity, integrity, and function of the overall pavement structure. We recommend a medium non-woven geotextile that meet specified Minimum Average Roll Values (MARV) presented in Table 6. Refer to manufacturers' recommendation for installation and proper overlap lengths.

Table 6. Recommended Minimum Average Roll Values (MARV) for Nonwoven Geotextile

Property	ASTM Standard	MARV
Puncture Strength[1]	D6241	>1375 N
Apparent Opening Size	D4751	0.60 mm max avg roll value
Tear Strength	D4533	>250 N
Elongation	D4632	>50%
Grab Tensile Strength	D4632	>700 N
Permittivity	D4491	0.05 sec^{-1}

[1]Refer to AASHTO M288 Tables 1 & 3

A non-woven geotextile is not required if placing the pavement structure over a subgrade consisting of sand or gravel with trace fines. If fine-grained soil (silt or clay) is encountered at the subgrade surface a non-woven geotextile should be installed to separate it from the pavement structure.

5.10 Temporary Excavations

Temporary excavations will be required for construction of various elements of the development including foundations, buried services, etc. We recommend using slopes of 1.5 Horizonal to 1 Vertical (1.5H:1V) or shallower for excavations in the natural loose sand and 1H:1V in the natural silt and gravel. Measures should be taken to prevent erosion of side excavation slopes. Groundwater or surface water encountered during construction should be directed away from excavations. Prevent water ponding in excavations. Flatter excavation slopes may be required if very loose sandy, soft soil, fill, seepage, etc. is encountered in excavations or if unfavourable weather conditions are encountered. Consult a qualified engineer if such conditions are encountered or if excavation deeper than 5 m is required.

Care should be taken when excavating near all types of existing structures and foundations. Maintain a 2H:1V slope from the base of the structure to the base of excavations. If excavations are required to be closer to an existing structure a qualified engineer should be consulted as temporary construction support may be required. Refer to Section 5.1 for excavation near the Do Not Disturb area boundary

5.11 Stormwater Infiltration Systems

Infiltration areas should be limited to the southeast corner of lot (Figure 4). The anticipated subsurface conditions in that area suitable for disposing of storm water by ground infiltration. Systems should extend below the natural silt layer into the sand and gravel below. Design infiltration systems using an infiltration rate of 5×10^{-5} m/s.

6. Review and Quality Assurance

This assessment and our recommendations are based on preliminary plans provided for the development. The final design drawings should be reviewed by SoilTech to confirm the intentions of the geotechnical design recommendations included in this report have been incorporated and are appropriate for the development. The field assessment was limited to the borehole and test pit locations. Their locations and depths were chosen to prevent disturbing the ground below foundations and the observed conditions may not be representative of the entire site. If the conditions (i.e., soil, groundwater, etc.) encountered during construction differ from those in our assessment they should be reviewed as alternate or additional recommendations may be required.

The foundation design and bearing surfaces during construction should be reviewed by a qualified engineer, technician or building official prior to installing foundation components to verify conditions and that they are adequate to support the proposed foundation. Testing should be completed on the Structural Fill to confirm it meets the required gradation and adequate compaction has been achieved. To issue applicable Building Code Schedules, the excavation for and installation of Structural Fill below foundations should be reviewed by a SoilTech.

During the subgrade preparation and construction of the pavement structure have an experienced geotechnical engineer or technician review excavations, fill materials, fill placement and compaction, proof rolls and the installation of any geotextile and geogrid products. Depending on weather and site conditions, materials may need to be placed in smaller lift thicknesses, dried, or have water added to achieve recommended degree of compaction. Testing should be completed on pipe bedding, subgrade fill, pavement structure layers and the materials used to confirm specifications are met.

7. Closure

The information discussed in this report is based on SoilTech's interpretation and understanding of current site conditions and the referenced documents. This report has been completed for the exclusive use of the recipient and their agents. We take not responsibly for any damages suffered from any use or reliance of information contained within this report by third parties or for use other than the intended purpose.

If there are any questions or if additional information is required, please contact the undersigned.

Sincerely,

Paul Nielsen, AScT.

Reviewed by,

Hans Jorgensen, P.Eng.

Appendix A:

Test Pit and Borehole Logs

ID Number **DH21-01**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Values)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits: Plastic Limit	Atterbeg Limits: Liquid Limit	Atterbeg Limits: Plasticy Index
0		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
1.5		SILT, clayey, some sand, stiff to very stiff, intermediate plasticity, brown, wet of plastic limit	B01-1		3,5,5,5		21.3	18	46	28
		-75 mm SPT used for sampling	B01-2		3,5,5,5		25.6			
		Particle Analysis: Sand 12.5%, Silt 66.7%, Clay 20.8%								
3		GRAVEL, and Sand, trace fines, dense, brown, gray, moist	B01-3		15,19, 19,17		3.9			
		- 50 mm SPT used for sampling								
4.5		- 75 mm SPT used for sampling	B01-4		10,23, 30,24		3.5			
		Particle Analysis: Gravel 56.0%, Sand 39.3%, Fines 4.7%								

◪ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-01**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits: Plastic Limit	Atterbeg Limits: Liquid Limit	Atterbeg Limits: Plasticy Index
5.5										
6		- 75 mm SPT used for sampling	B01-5		7,16, 10,13		4.1			
6.5										
7										
7.5		- 75 mm SPT used for sampling	B01-6		3,8,8, 14		5.3			
8										
8.5										
9		- 75 mm SPT used for sampling	B01-7		6,10,6, 4		5.3			
9.5		- layer of pea gravel roughly 5 mm dimater, gap graded, wet	B01-8		6,10,6, 4		4			
10		End of test pit at 9.7 m No groundwater encountered Test pit backfilled with soil and bentonite chips								

◪ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-02**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Values)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits: Plastic Limit	Atterbeg Limits: Liquid Limit	Atterbeg Limits: Plasticy Index
0		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
1.5		SAND, gravelly, trace fines, loose ,brown, gray, moist	B02-1		1,4,4,4		10.7			
		-50 mm SPT used for sampling								
3		-some gravel, medium to fine sand Particle Analysis: Gravel 17.9%, Sand 72.6%, Fines 9.5%	B02-2		3,4,4,3		8.6			
4.5			B02-3		2,3,4,2		7.7			
5										

◢ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-02**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits: Plastic Limit	Atterbeg Limits: Liquid Limit	Atterbeg Limits: Plasticy Index
5.5										
6			B02-4		2,5,5,4		11.1			
6.5										
7										
7.5			B02-5		4,6,4,4		10.6			
		-wet	B02-6		4,6,4,4		18.4			
8										
8.5										
9		BEDROCK	B02-7		Refusal		2.1			
9.5										
		End of test pit at 9.7 m No groundwater encountered Test pit backfilled with soil and bentonite chips								
10										

◪ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-03**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Values)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits: Plastic Limit	Atterbeg Limits: Liquid Limit	Atterbeg Limits: Plasticy Index
0		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
1.5		Sand, gravelly, trace fines, very loose ,brown, FILL or Disturbed -50 mm SPT used for sampling	B03-1		1,1,1,1		12			
2.5		SAND, gravelly, trace fines, loose ,brown, gray, moist								
3		- 50 mm SPT used for sampling	B03-2		3,5,6,7		11.3			
4.5		- 50 mm SPT used for sampling	B03-3		2,3,3,2		15.2			

◪ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-03**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
5.5		SILT, and clay, trace sand, firm, intermediate plasticity, brown, wet of plastic limit Particle Analysis: Sand 2.7%, Silt 54.4%, Clay 42.9%	B03-4		2,3,3,2		32.7	25	38	13
6		- 50 mm SPT used for sampling -Stiff	B03-5		1,3,5,9		31.7			
6.5										
7		SAND, gravelly, trace fines, loose ,brown, gray, moist	B03-6		1,3,5,9		9.4			
7.5		GRAVEL, and Sand, trace fines, dense, brown, gray, moist - 75 mm SPT used for sampling	B03-7		8,16, 15,17		10.4			
8										
8.5										
9		- 75 mm SPT used for sampling	B03-8		8,14, 18,16		5.4			
9.5										
10		End of test pit at 9.7 m No groundwater encountered Test pit backfilled with soil and bentonite chips								

◪ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-04**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Values)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits: Plastic Limit	Atterbeg Limits: Liquid Limit	Atterbeg Limits: Plasticy Index
0		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
1.5		SAND, gravelly, trace fines, loose ,brown, gray, moist -50 mm SPT used for sampling	B04-1		3,3,3,2		12.6			
3			B04-2		4,4,4,4		8.5			
4.5			B04-3		3,4,4,4		10.9			
5										

◢ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-04**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits: Plastic Limit	Atterbeg Limits: Liquid Limit	Atterbeg Limits: Plasticy Index
5.5										
6			B04-4		2,4,5,5		5.5			
6.5										
7										
7.5		-Compact, trace gravel, medium to fine sand	B04-5		2,6,8,7		7.6			
8										
8.5										
9		-Compact, trace gravel, medium sand, gap graded	B04-6		3,8, 9,15		2.5			
9.5										
10										

◢ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **BH21-04**

SoilTech Consulting Ltd

Client	PPP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
10.5		GRAVEL, and Sand, trace fines, dense, brown, gray, moist	B04-6		19,25,25		5.1			
11		-75 mm SPT used for sampling								
		End of test pit at 11.2 m No groundwater encountered Test pit backfilled with soil and bentonite chips								
11.5										
12										
12.5										
13										
13.5										
14										
14.5										
15										

◢ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-05**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits: Plastic Limit	Atterbeg Limits: Liquid Limit	Atterbeg Limits: Plasticy Index
0.5		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
1		GRAVEL, sandy, trace fines, compact ,brown, gray, moist								
1.5		-75 mm SPT used for sampling	B05-1		6,7,12, 21		12.6			
2		BEDROCK								
2.5		-Stabilized ground water								
3		-Groundwater at time of drilling	B05-2		Reusal		7.1			
3.5										
4		-Ground water monitoring well installed								
4.5		End of test pit at 4.5 m Groundwater encountered Test pit backfilled with soil and bentonite chips								
5										

◪ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-06**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Values)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits: Plastic Limit	Atterbeg Limits: Liquid Limit	Atterbeg Limits: Plasticy Index
0.5		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
1		SAND, gravelly, trace fines, medium to fine, loose, brown, gray, moist								
1.5			B06-1		4,6,3,4		13.1			
2										
2.5										
3		-trace gravel, medium to fine sand	B06-2				6.4			
		Particle Analysis: Gravel 6.6%, Sand 84.2%, Fines 9.2%								
3.5		-SPT hammer damaged, SPT Data erronious								
4										
4.5			B06-3				5.3			
5										

◢ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-06**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
5.5										
6			B06-4				7.1			
6.5										
7										
7.5										
8										
8.5										
9		GRAVEL, sandy, trace fines, inferred compact ,brown, gray, moist	B06-5				4.6			
9.5										
10										

◪ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **DH21-06**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Uncharted Drilling
Project Number	21-H-022	**Method**	ODEX
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Truck Mounted Rig
Project Location	1177 Foothills Boulevard	**Date Started**	June 14, 2021
Logged By	P.Nielsen	**Date Finished**	June 14, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits: Plastic Limit	Atterbeg Limits: Liquid Limit	Atterbeg Limits: Plasticy Index
10.5		GRAVEL, and Sand, trace fines, dense, brown, gray, moist	B06-6				4.7			
11		-Groundwater at time of drilling								
11.5		-stablizied ground water								
12		BEDROCK	B06-6				12.9			
12.5		-Ground water monitoring well installed								
13		End of test pit at 12.0 m No groundwater encountered Test pit backfilled with soil and bentonite chips								
13.5										
14										
14.5										
15										

◢ Standard Penetration Slit Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **TP21-01**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Myatovic Construction Ltd.
Project Number	21-H-022	**Method**	Excavation
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Caterpillar 312B Excavator
Project Location	1177 Foothills Boulevard	**Date Started**	June 16, 2021
Logged By	P.Nielsen	**Date Finished**	June 16, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
0		FILL: Sand, gravel, organics, rootlets brown, moist								
0.5										
1										
1.5		SAND, gravelly, trace fines, inferred loose, brown, gray, moist Particle Analysis: Gravel 25.9%, Sand 70.2%, Fines 3.8% ☒	B01-1				7.4			
2		End of test pit at 1.6 m No groundwater encountered Test pit backfilled with excavated soil								
2.5										
3										
3.5										
4										
4.5										
5										

◪ Standard Penetration Split Spoon Sampler (SPT)

☒ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **TP21-02**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Myatovic Construction Ltd.
Project Number	21-H-022	**Method**	Excavation
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Caterpillar 312B Excavator
Project Location	1177 Foothills Boulevard	**Date Started**	June 16, 2021
Logged By	P.Nielsen	**Date Finished**	June 16, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
0		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
0.5										
1										
		SAND, gravelly, trace fines, inferred loose to compact, ☒ brown, gray, moist	B02-1				9.5			
1.5		End of test pit at 1.2 m No groundwater encountered Test pit backfilled with excavated soil								
2										
2.5										
3										
3.5										
4										
4.5										
5										

◪ Standard Penetration Split Spoon Sampler (SPT)

☒ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **TP21-03**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Myatovic Construction Ltd.
Project Number	21-H-022	**Method**	Excavation
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Caterpillar 312B Excavator
Project Location	1177 Foothills Boulevard	**Date Started**	June 16, 2021
Logged By	P.Nielsen	**Date Finished**	June 16, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
0.5		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
1										
1.5		SAND, gravelly, trace fines, inferred loose, brown, gray, moist	B03-1				14.9			
		-some gravel, trace fines, inferred loose to compact, brown, gray moist								
2		End of test pit at 1.7 m No groundwater encountered Test pit backfilled with excavated soil								
2.5										
3										
3.5										
4										
4.5										
5										

◪ Standard Penetration Split Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **TP21-04**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Myatovic Construction Ltd.
Project Number	21-H-022	**Method**	Excavation
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Caterpillar 312B Excavator
Project Location	1177 Foothills Boulevard	**Date Started**	June 16, 2021
Logged By	P.Nielsen	**Date Finished**	June 16, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
0		SAND, gravelly, trace fines, inferred loose, brown, gray, moist								
0.5		-disturbed up to 0.5 m (potential FILL)								
1		☒	B04-1				10.3			
1.5		End of test pit at 1.0 m No groundwater encountered Test pit backfilled with excavated soil								
2										
2.5										
3										
3.5										
4										
4.5										
5										

◪ Standard Penetration Split Spoon Sampler (SPT)

☒ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **TP21-05**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Myatovic Construction Ltd.
Project Number	21-H-022	**Method**	Excavation
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Caterpillar 312B Excavator
Project Location	1177 Foothills Boulevard	**Date Started**	June 16, 2021
Logged By	P.Nielsen	**Date Finished**	June 16, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
0.5		SAND, gravelly, trace fines, inferred loose, brown, gray, moist. Distrubed up to 0.3 m ☒	B05-1				13.5			
1		End of test pit at 0.5 m No groundwater encountered Test pit backfilled with excavated soil								
1.5										
2										
2.5										
3										
3.5										
4										
4.5										
5										

◪ Standard Penetration Split Spoon Sampler (SPT)

☒ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **TP21-06**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Myatovic Construction Ltd.
Project Number	21-H-022	**Method**	Excavation
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Caterpillar 312B Excavator
Project Location	1177 Foothills Boulevard	**Date Started**	June 16, 2021
Logged By	P.Nielsen	**Date Finished**	June 16, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
0		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
0.5		SAND, gravelly, trace fines, inferred loose, brown, gray, moist ☒ Particle Analysis: Gravel 23.3%, Sand 71.1%, Fines 5.6%	B06-1				11			
1		End of test pit at 1.0 m No groundwater encountered Test pit backfilled with excavated soil								
1.5										
2										
2.5										
3										
3.5										
4										
4.5										
5										

◪ Standard Penetration Split Spoon Sampler (SPT)

☒ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **TP21-07**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Myatovic Construction Ltd.
Project Number	21-H-022	**Method**	Excavation
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Caterpillar 312B Excavator
Project Location	1177 Foothills Boulevard	**Date Started**	June 16, 2021
Logged By	P.Nielsen	**Date Finished**	June 16, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
0		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
0.5		SAND, gravelly, trace fines, inferred loose, brown, gray, moist ☒	B07-1				8.6			
1		End of test pit at 1.0 m No groundwater encountered Test pit backfilled with excavated soil								
1.5										
2										
2.5										
3										
3.5										
4										
4.5										
5										

◪ Standard Penetration Split Spoon Sampler (SPT)

☒ Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

ID Number **TP21-08**

SoilTech Consulting Ltd

Client	PRP Holdings Ltd.	**Contractor**	Myatovic Construction Ltd.
Project Number	21-H-022	**Method**	Excavation
Project Name	Condo 1177 Foothills Boulevard	**Equipment**	Caterpillar 312B Excavator
Project Location	1177 Foothills Boulevard	**Date Started**	June 16, 2021
Logged By	P.Nielsen	**Date Finished**	June 16, 2021
BH/TP Location	See Figure 1 of Geotechnical Report	**Ground Elevation**	Existing Grade
Comments			

Depth (m)	Graphic Log	Stratigraphic Description	Sample Number	% Recovery	Blow Counts (N Value)	Pocket Pen (kPa)	Moisture Content (%)	Atterbeg Limits		
								Plastic Limit	Liquid Limit	Plasticy Index
0		FILL: Sand, gravel, inferred very loose,organics, rootlets brown, moist								
0.5										
1										
1.5		Organic layer at 1.5 m								
		SILT, clayey, trace sand, very stiff, intermediate plasticity, brown, wet of plastic limit				250	23.5	21.8	36.5	14.7
		Particle Analysis:Sand 9.0%, Silt 65%, Clay 26%								
2										
2.5										
3		End of test pit at 3.2 m								
		No groundwater encountered								
3.5		Test pit backfilled with excavated soil								
4										
4.5										
5										

◪ Standard Penetration Split Spoon Sampler (SPT)

⊠ Bulk/ Bag Sample

Stablized Ground water

Groundwater At time of Drilling

Appendix B:

Laboratory Soil Test Reports

SoilTech Consulting Ltd

1215 Babine Road, Prince George, BC, V2N 6E1
778-349-5574
paul@soiltech.ca

Sieve Analysis

Reference ASTM C117 and C136

Project Details

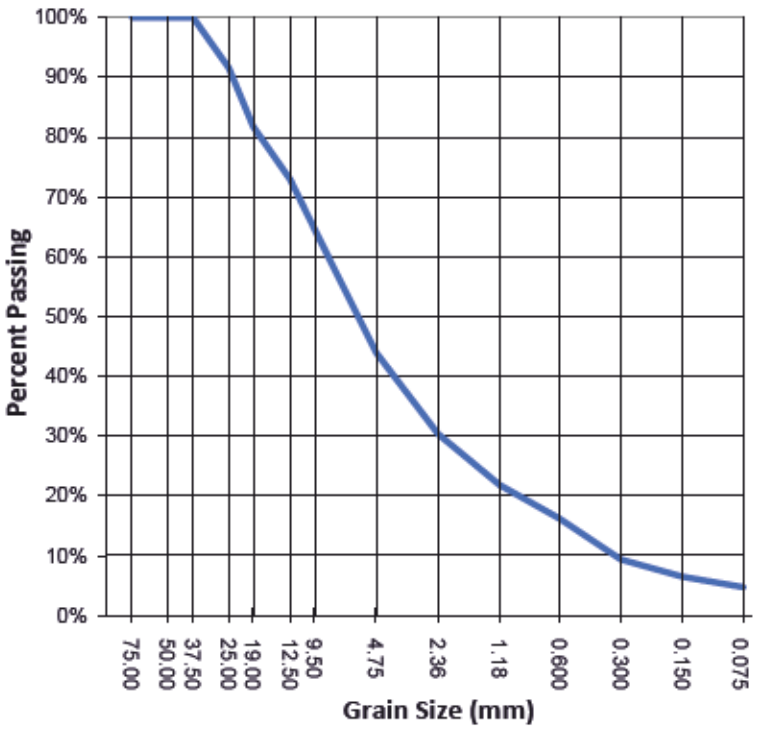
Client	PRP Holdings Ltd.	**Project No.**	21-H-022
Project	Condo Development at 1177 Foothills	**Sieve Report No.**	1

Sample Details

Supplier	Existing	**Sampling Date**	June 14, 2021
Source	DH21-01	**Date Received**	June 14, 2021
Location	SPT: 4.5 to 5.1 m	**Date Tested**	June 24, 2021
Description	Gravel and Sand	**Sampled By**	PN
Specification		**Tested By**	CM

Sieve Size (mm)	Percent Passing	Specifications	
		Min	Max
75.0	100.0%		
50.0	100.0%		
37.5	100.0%		
25.0	91.6%		
19.0	81.8%		
12.5	72.8%		
9.5	64.6%		
4.75	44.0%		
2.36	30.3%		
1.18	21.9%		
0.600	16.3%		
0.300	9.4%		
0.150	6.5%		
0.075	4.7%		

Moisture Content 3.5%



Comments

SoilTech Consulting Ltd

1215 Babine Road, Prince George, BC, V2N 6E1
778-349-5574
paul@soiltech.ca

Sieve Analysis

Reference ASTM C117 and C136

Project Details

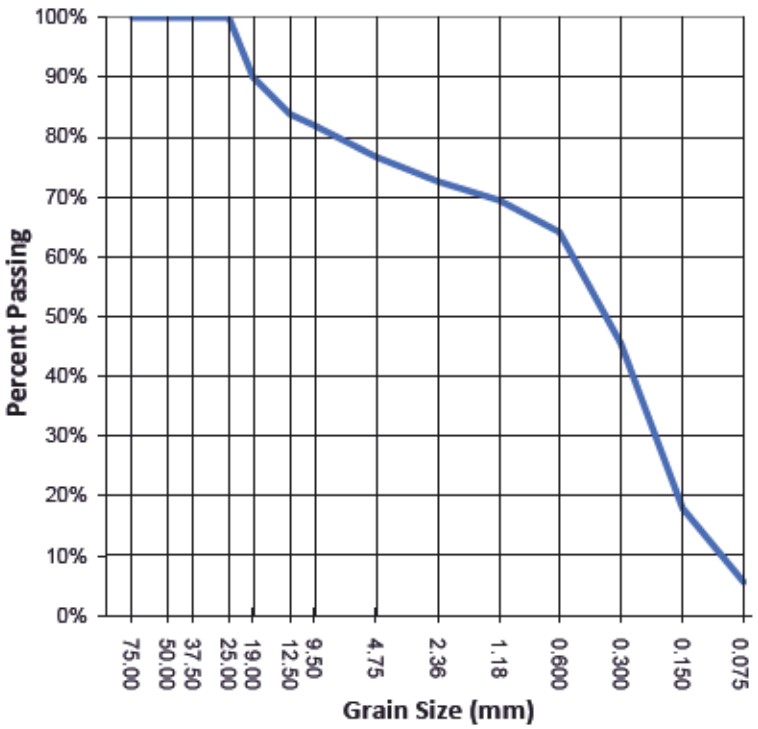
Client	PRP Holdings Ltd.	**Project No.**	21-H-022
Project	Condo Development at 1177 Foothills	**Sieve Report No.**	2

Sample Details

Supplier	Existing	**Sampling Date**	June 14, 2021
Source	TP21-06	**Date Received**	June 14, 2021
Location	1.0 m Depth	**Date Tested**	June 24, 2021
Description	Sand, gravelly, trace fines	**Sampled By**	PN
Specification		**Tested By**	KB

Sieve Size (mm)	Percent Passing	Specifications	
		Min	Max
75.0	100.0%		
50.0	100.0%		
37.5	100.0%		
25.0	100.0%		
19.0	89.9%		
12.5	83.8%		
9.5	82.0%		
4.75	76.7%		
2.36	72.6%		
1.18	69.4%		
0.600	64.2%		
0.300	45.5%		
0.150	18.0%		
0.075	5.6%		

Moisture Content 9.9%



Comments

SoilTech Consulting Ltd

1215 Babine Road, Prince George, BC, V2N 6E1
778-349-5574
paul@soiltech.ca

Sieve Analysis

Reference ASTM C117 and C136

Project Details

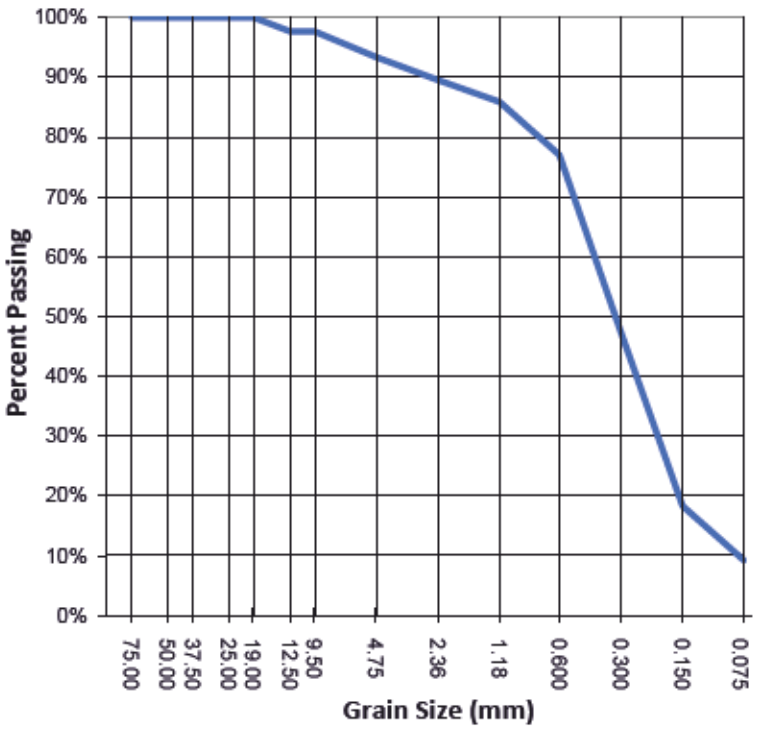
Client	PRP Holdings Ltd.	**Project No.**	21-H-022
Project	Condo Development at 1177 Foothills	**Sieve Report No.**	3

Sample Details

Supplier	Existing	**Sampling Date**	June 14, 2021
Source	DH21-06	**Date Received**	June 14, 2021
Location	SPT: 3.0 to 3.6 m	**Date Tested**	June 24, 2021
Description	Sand	**Sampled By**	PN
Specification		**Tested By**	KB

Sieve Size (mm)	Percent Passing	Specifications	
		Min	Max
75.0	100.0%		
50.0	100.0%		
37.5	100.0%		
25.0	100.0%		
19.0	100.0%		
12.5	97.7%		
9.5	97.7%		
4.75	93.4%		
2.36	89.5%		
1.18	85.9%		
0.600	77.0%		
0.300	47.4%		
0.150	18.3%		
0.075	9.2%		

Moisture Content 11.5%



Comments

SoilTech Consulting Ltd

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paul@soiltech.ca

Sieve Analysis

Reference ASTM C117 and C136

Project Details

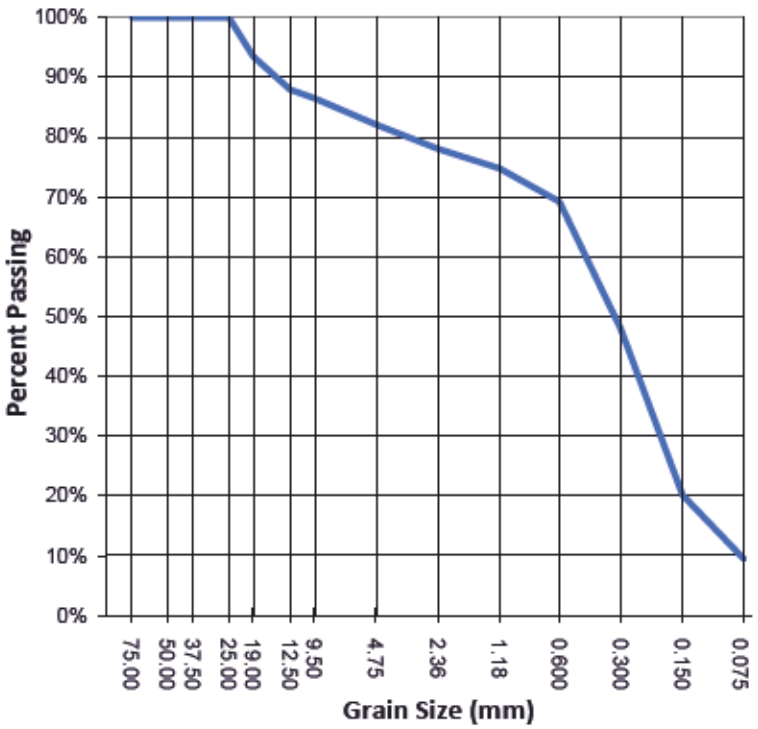
Client	PRP Holdings Ltd.	**Project No.**	21-H-022
Project	Condo Development at 1177 Foothills	**Sieve Report No.**	4

Sample Details

Supplier	Existing	**Sampling Date**	June 14, 2021
Source	DH21-02	**Date Received**	June 14, 2021
Location	SPT: 3.0 to 3.6 m	**Date Tested**	June 24, 2021
Description	Sand, some gravel, trace fines	**Sampled By**	PN
Specification		**Tested By**	KB

Sieve Size (mm)	Percent Passing	Specifications	
		Min	Max
75.0	100.0%		
50.0	100.0%		
37.5	100.0%		
25.0	100.0%		
19.0	93.5%		
12.5	87.9%		
9.5	86.5%		
4.75	82.1%		
2.36	78.0%		
1.18	74.8%		
0.600	69.2%		
0.300	47.9%		
0.150	20.1%		
0.075	9.5%		

Moisture Content 7.0%



Comments

SoilTech Consulting Ltd

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paul@soiltech.ca

Sieve Analysis

Reference ASTM C117 and C136

Project Details

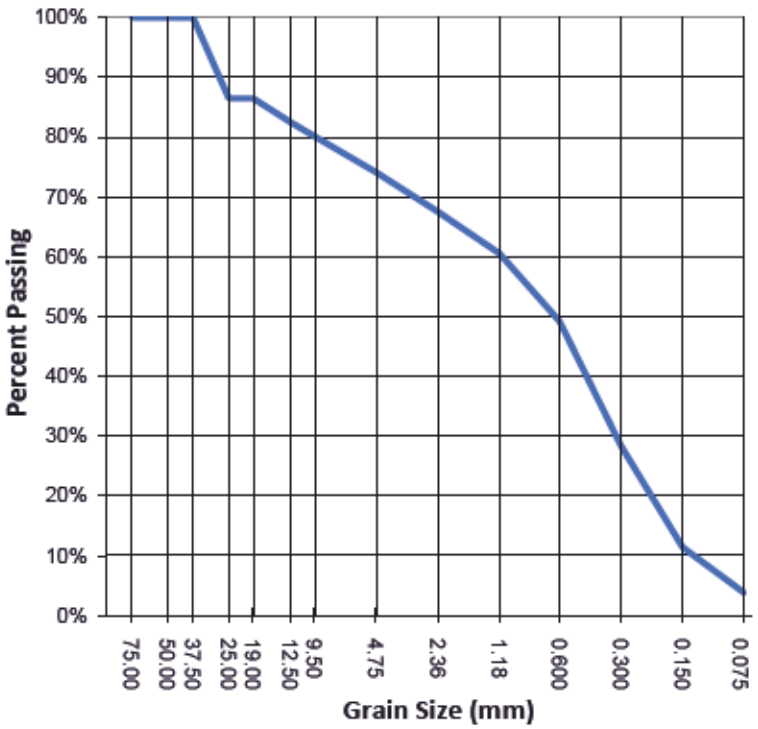
Client	PRP Holdings Ltd.	**Project No.**	21-H-022
Project	Condo Development at 1177 Foothills	**Sieve Report No.**	5

Sample Details

Supplier	Existing	**Sampling Date**	June 14, 2021
Source	TP21-01	**Date Received**	June 14, 2021
Location	1.5 m Depth	**Date Tested**	June 24, 2021
Description	Gravelly Sand	**Sampled By**	PN
Specification		**Tested By**	KB

Sieve Size (mm)	Percent Passing	Specifications	
		Min	Max
75.0	100.0%		
50.0	100.0%		
37.5	100.0%		
25.0	86.5%		
19.0	86.5%		
12.5	82.5%		
9.5	80.1%		
4.75	74.1%		
2.36	67.5%		
1.18	60.6%		
0.600	49.3%		
0.300	28.5%		
0.150	11.4%		
0.075	3.8%		

Moisture Content 6.6%



Comments

SoilTech Consulting Ltd

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Particle Size Distribution

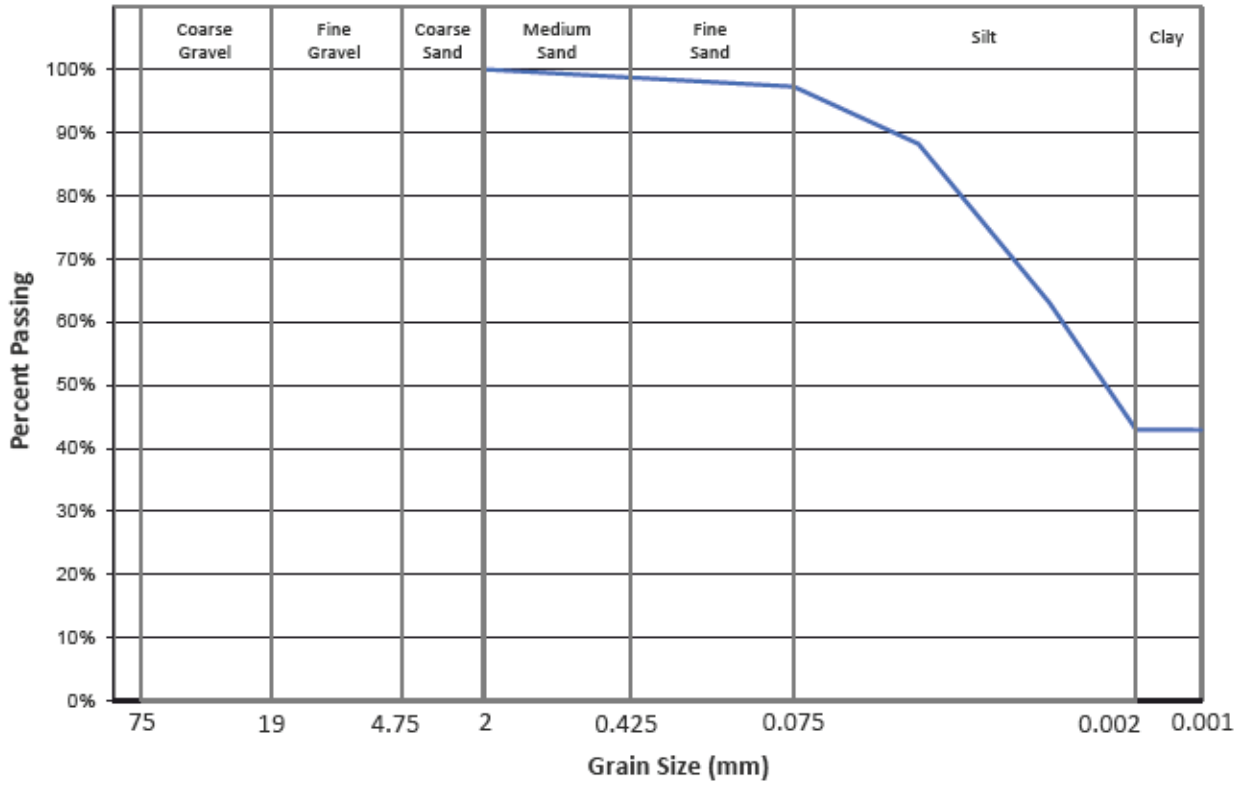
Reference ASTM C117, C136 and D7928

Project Details

Client	PRP Holdings Ltd.	**Project No.**	21-H-022
Project	Condo 1177 Foothills Boulevard	**Location**	Prince George, BC

Sample Details

Source	DH21-03	**Sampling Date**	June 14, 2021
Sample ID	B03-5	**Date Tested**	June 21, 2021
Depth	20-21.75 ft	**Sampled By**	P. Nielsen
Description	Silt and Clay, trace Sand	**Tested By**	P.Nielsen
Moisture Content	31.7%		



Gravel	0.0%	**Sand**	2.7%	**Silt**	54.4%	**Clay**	42.9%

SoilTech Consulting Ltd

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Particle Size Distribution

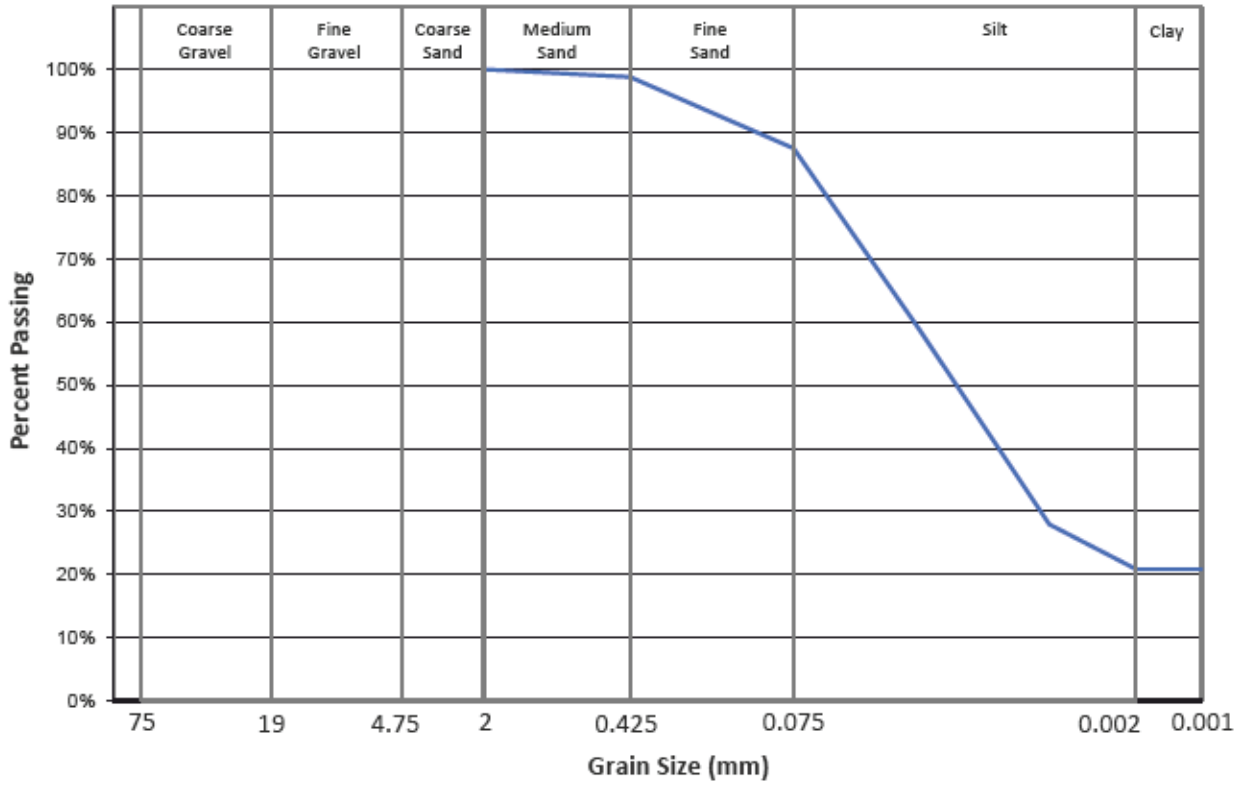
Reference ASTM C117, C136 and D7928

Project Details

Client	PRP Holdings Ltd.	**Project No.**	21-H-022
Project	Condo 1177 Foothills Boulevard	**Location**	Prince George, BC

Sample Details

Source	DH21-01	**Sampling Date**	June 14, 2021
Sample ID	B01-2	**Date Tested**	June 21, 2021
Depth	6-7 ft	**Sampled By**	P. Nielsen
Description	SILT, Clayey, some sand	**Tested By**	P.Nielsen
Moisture Content	25.6%		



Gravel	0.0%	**Sand**	12.5%	**Silt**	66.7%	**Clay**	20.8%

SoilTech Consulting Ltd

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Particle Size Distribution

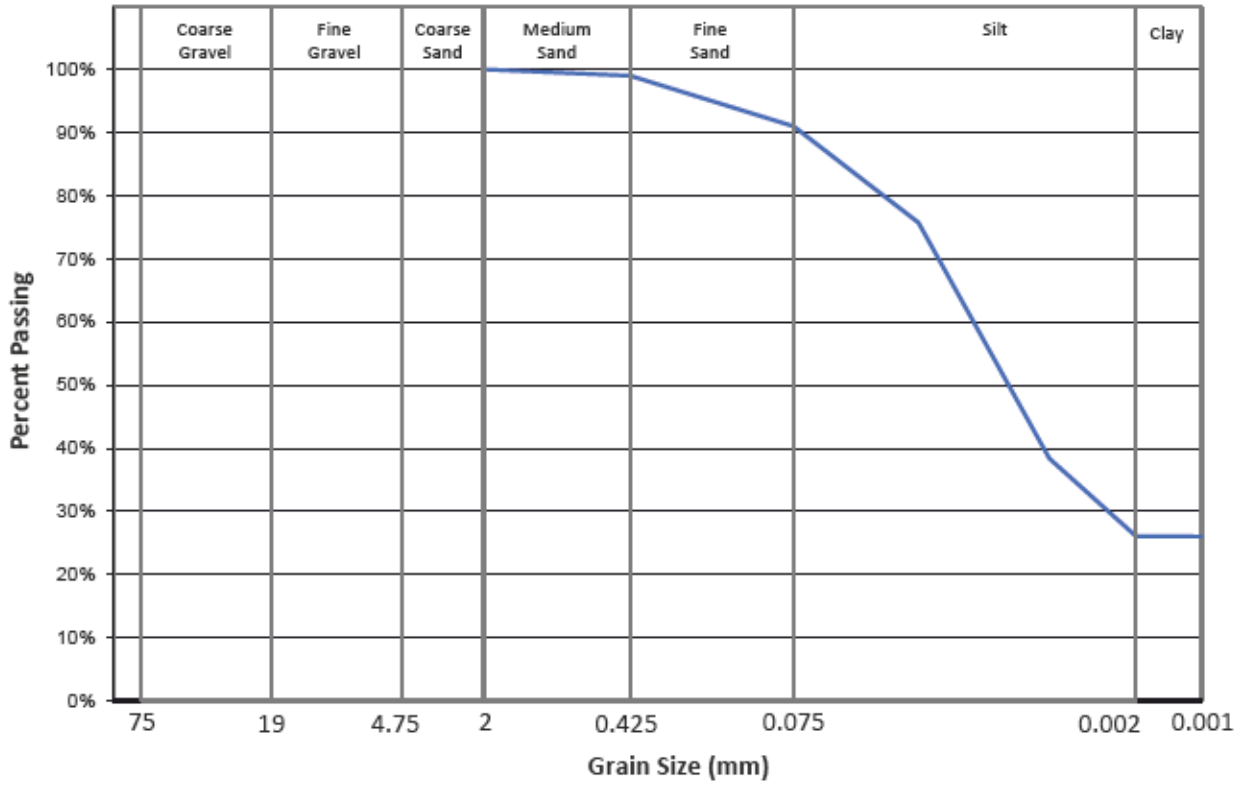
Reference ASTM C117, C136 and D7928

Project Details

Client	PRP Holdings Ltd.	**Project No.**	21-H-022
Project	Condo 1177 Foothills Boulevard	**Location**	Prince George, BC

Sample Details

Source	TP21-08	**Sampling Date**	June 16, 2021
Sample ID	B08-1	**Date Tested**	June 21, 2021
Depth	1.6 m	**Sampled By**	P. Nielsen
Description	SILT, Clayey, trace Sand	**Tested By**	P.Nielsen
Moisture Content	23.5%		



Gravel	0.0%	**Sand**	9.0%	**Silt**	65.0%	**Clay**	26.0%

SoilTech Consulting Ltd

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mail@soiltech.ca

Liquid Limit, Plastic Limit and Plasticity Index of Soils

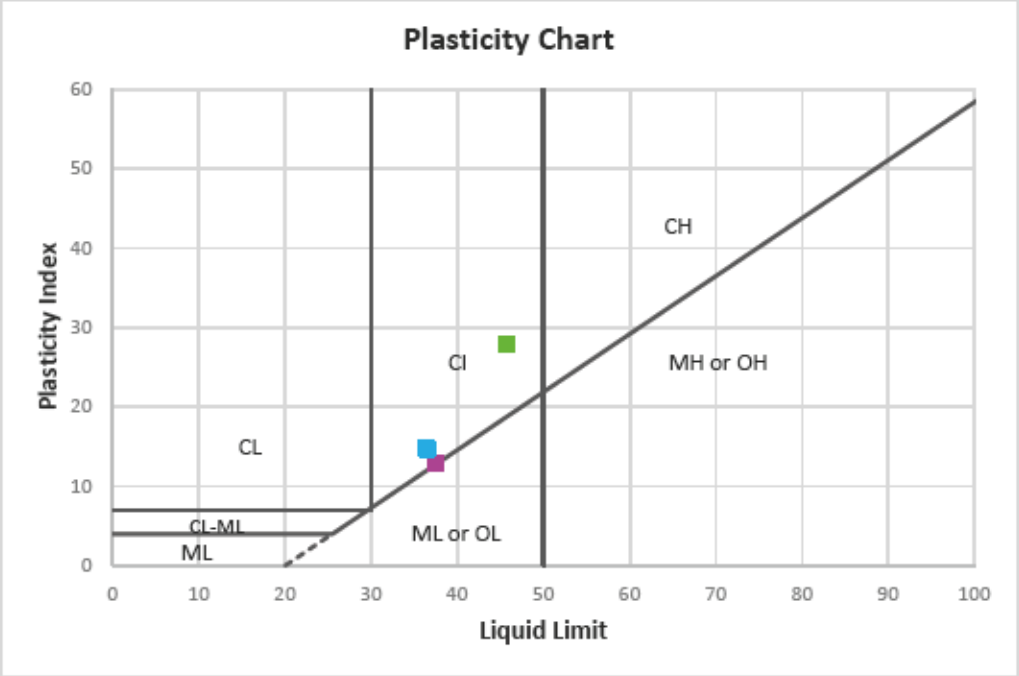
Reference ASTM D4318

Project Details

Client	PRP Holdings Ltd.	**Project No.**	21-H-022
Project	Condo 1177 Foothills Boulevard	**Location**	Prince George, BC

Sample Details

Sample Date	June 14/16, 2021	**Test Date**	June 22, 2021
Sampled By	P. Nielsen	**Tested By**	K.Boshier



Symbol	Sample ID	Location	Depth	Passing 425 µm (%)	Natural Moisture (%)	Liquid Limit	Plastic Limit	Plasticity Index	Soil Type
■	B01-2	DH 21-01	6-7 ft	90	25.6	46	18	28	CI
■	B03-5	DH21-03	20-21.75 ft	97.6	31.7	38	25	13	CI
■	B08-1	TP21-08	1.6 m	87.6	23.5	37	22	15	CI

NP - Non-Plastic result
ND - Not Determined

Appendix C:

McElhanney Slope Assessment Report

Our File: 2341-21020-00 | June 16, 2020

Peter Wise
26063 26th Avenue
Aldergrove, BC V4W 2W1

Via email: petewise@me.com

Re: Geotechnical Slope Review for Proposed Condo Building at 1177 Foothills Boulevard, Prince George

1. Introduction

McElhanney Ltd. (McElhanney) has completed a preliminary desktop geotechnical review of the property located at 1177 Foothills Boulevard, east of Cranbrook Hill Road in Prince George, BC.

In conducting the geotechnical assessment and submitting this letter, McElhanney has:

- Reviewed available background information including LiDAR, air photos, publicly available geological mapping, and the BC Water Well Database.
- Conducted a site reconnaissance visit to observe the conditions of the site and adjacent slope to identify the natural hazards that could affect the proposed development.
- Prepared this letter summarizing the preliminary desktop geotechnical slope review completed and provide slope setback recommendations for potential suitability of development.

This report is subject to the appended *Statement of Limitations – Geotechnical Services*.

2. Site and Project Description

The proposed development is townhouses with associated parking. The site is located on the west side of Foothills Blvd., east of Cranbrook Hill Road and north of Elkhorn Crescent in Prince George, BC (the Site, see *Figure 1*) near the toe of Cranbrook Hill. There is a triangle of City of Prince George (CoPG)-owned land between Cranbrook Hill Road and the Site that is approximately 28m wide on the south edge. Based on discussions with CoPG, the west slope within the property boundary is currently designated as a significant slope, which has a grade of 25% or greater. Cranbrook Hill is approximately 150 m in height in the area of the site.

The purpose of the preliminary geotechnical review was to complete a desktop study of the site and slope conditions downslope of Cranbrook Hill Road to assess the slope stability and provide a setback from the steep slope for the proposed development.

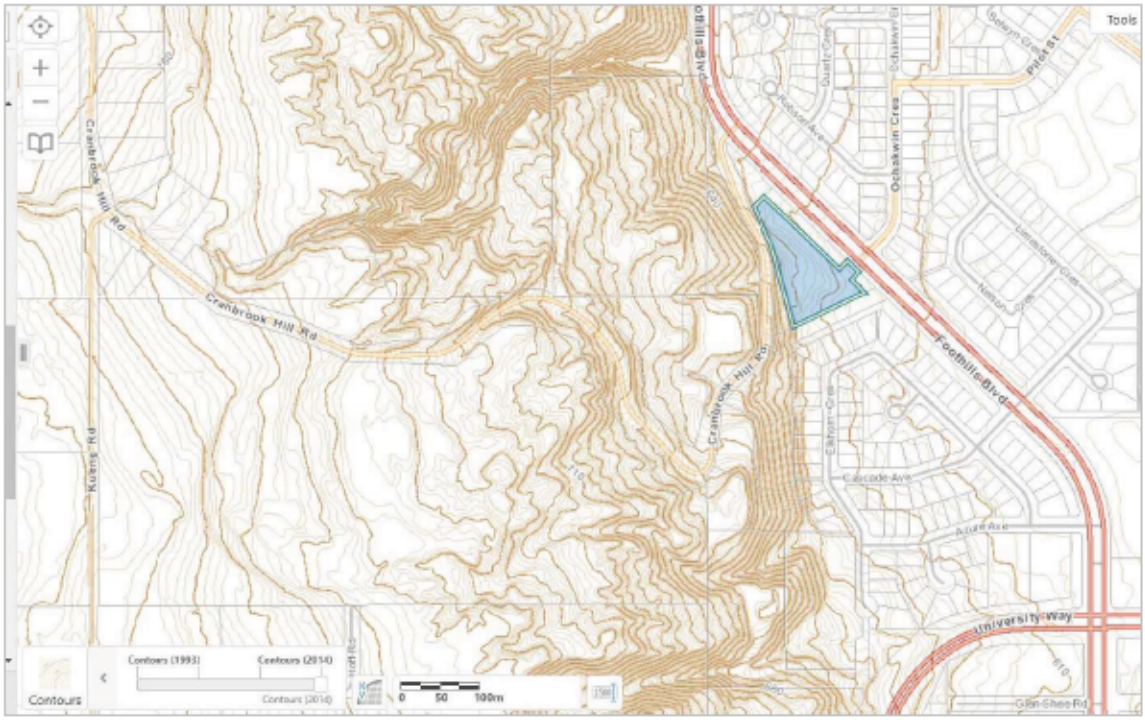


Figure 1: Site (outlined in green) and west slope (Image source: PGMap, https://pgmappub.princegeorge.ca).

3. Topography and Geology

Based on published geological information available for the study area, the surficial geology is mapped as near the contact between glaciofluvial sand and gravel deposits and glaciolacustrine lake bottom deposits comprising of silt, clay and fine to medium sand [1]. The upper elevations on the top of Cranbrook Hill are mapped as ground moraine deposits (till). However, it is likely the toe of Cranbrook Hill is colluvial, from soil that was eroded from higher elevations and deposited below. It is also possible that there is undocumented fill and/or side cast material from historic road construction from Cranbrook Hill Road. No nearby water well records were available for the Site on the online BC Water Resources Online Database.

From the east shoulder of Cranbrook Hill Road, the CoPG-owned land and the Site slopes from the west to the east with significant slopes just east of the road, and moderate slopes in the middle of the Site. The significant slope down Cranbrook Hill Road is up to about 28m in height, with an average approximate slope angle of 33°. Local experience suggests that there are no known or minimal issues with the section of Cranbrook Hill Road that is immediately adjacent and upslope of the Site.

[1] Surficial Geology of Prince George, Map 3-1969, Geological Survey of Canada, Scale 1:250,000

There are three drainage gullies west of the Site that drain into the west ditch of Cranbrook Hill Road. The gullies are V-shaped and deeply incised. Gullies on Cranbrook Hill have been known to have debris flow events. There appears to be an alluvial fan on the Site at the base of one of the gullies.

3.1. AERIAL IMAGERY REVIEW

Air photo stereo pairs were reviewed for site history. Observations were made of the site and the immediate uphill slope, with a few observations of the surrounding slopes (see *Table 1*).

Table 1. Air photo observations.

Year	Air Photo Numbers	Observations
1946	BC 299-89, -90	Cranbrook Hill Road appears to have been constructed within drainage gullies on the slope, in about the same location as the existing road. There was a previous trail on steeper sections of the slope. The slope and the Site are treed.
1951	BC1286-97, -98	No changes observed.
1958	BC2524-101, -102	The gully south of the Site appears to be larger with a larger treeless section, indicating that a mass wasting event had occurred.
1963	BC5070-35, 36	The gully north of the Site appears to be larger with a larger treeless section, indicating a mass wasting event had occurred. The property to the east of the Site appears to have been cleared.
1968	BC7055-118	CoPG buried reservoir constructed west of the Site. Clearing on the steep section of the slope had been completed, and an access trail was constructed below the reservoir.
1977	BC77071-227, 228	Foothills Blvd constructed and paved. Cranbrook Hill Road appears to have been paved. The subdivision south of the Site had been constructed. Trees have grown back on the site.
1985	BC85054-154, 155	Site cleared of trees on flatter section, trees left on steep slope.
1988	BC88050-281, 282	Bushes growing back on the south end of Site.
1994	BC30BC94033-34, 35	No changes observed.
2006	30BCC06090-156, 157	No changes observed.

There is a presumed medium-sized landslide south of Cranbrook Hill Road visible in CoPG LiDAR that has been zoned as "Community Forest" southwest (upslope) of the site (see *Figure 2*).

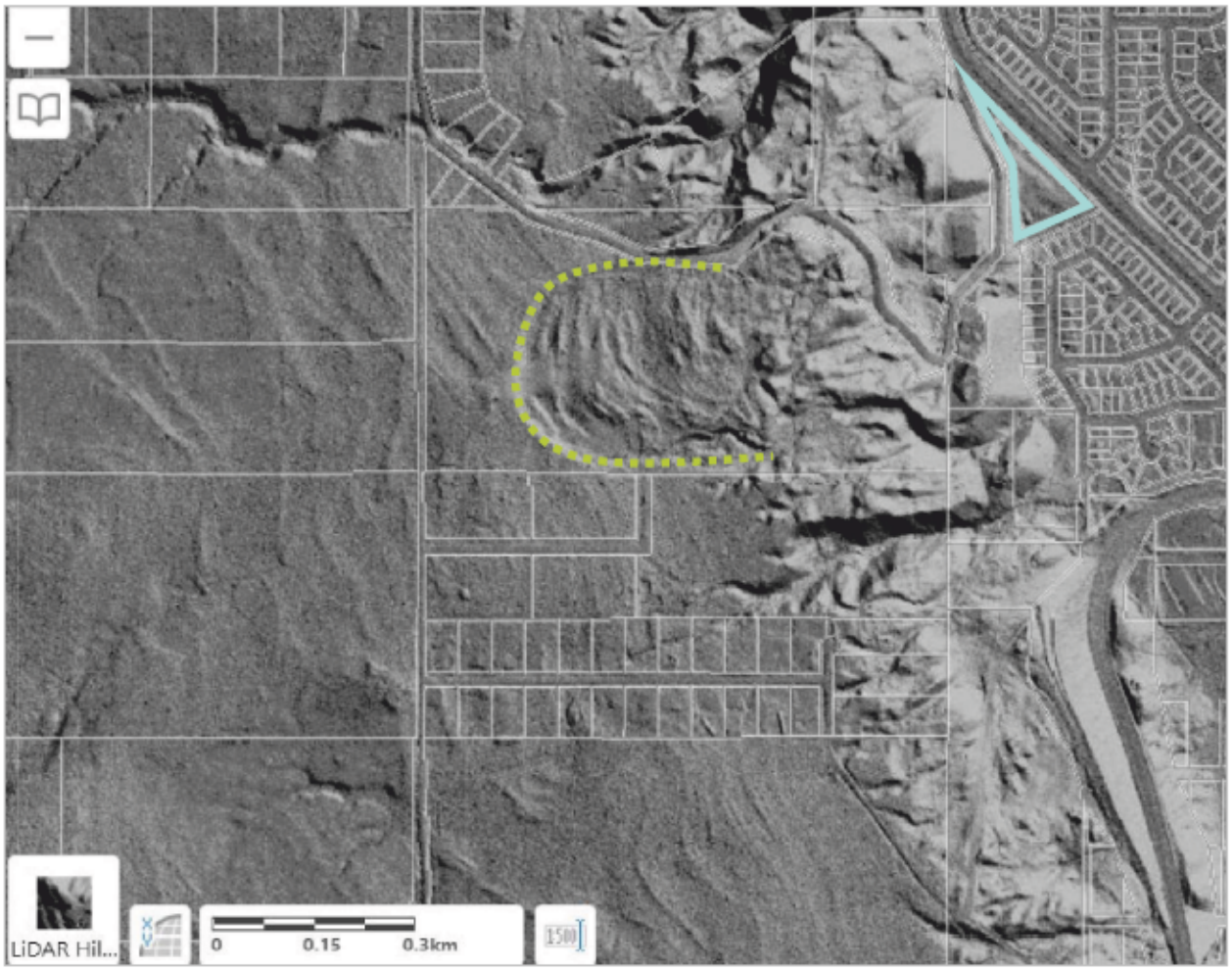


Figure 2. Hummocky land with a curved headscarp is likely a landslide, although age and rate of movement is not known. Yellow outlines the likely landslide headscarp, and light blue outlines the site (Image source: PGMap, https://pgmappub.princegeorge.ca).

4. Local Infrastructure

Cranbrook Hill Road appears to be constructed by cut and fill methods upslope of the site. From local experience, there are frequent ditch and road repairs due to runoff and erosion issues on this section of the road.

West and upslope of Cranbrook Hill Road, CoPG pumping well PW805 is adjacent a buried water reservoir (CoPG Asset ID28) (see *Figure 3*). The reservoir was installed in 1966, and there is a very steep tree covered slope below the reservoir. Due to the age of the reservoir, it is expected that it is leaking or

could leak, which increases the destabilizing effects of water pressure beyond any background/natural groundwater or seepage that could be present in the area. In addition, it is assumed, due to the age of the infrastructure, that both the reservoir and Cranbrook Hill Road are constructed with undocumented fills.

Figure 3: Local water infrastructure in relation to the site. Pumping well and reservoir located approximately in dashed blue outline, site outline in dark teal (Image source: PGMap, https://pgmappub.princegeorge.ca).

5. Geotechnical Site Reconnaissance

A site visit was conducted on May 4, 2020 (see photo plate attached). Overall, the slope was covered in dense vegetation, including mature trees. Some surface creep was visible in limited areas. There were no signs of distress in the asphalt on Cranbrook Hill Road, however there was cracking on the gravel shoulder near the south end of the site. There was also several pistol-butted trees near cross section B (the middle of the slope).

There was evidence of road gravel on the surface of the slope near the road, indicating that snow removal in this section of road is likely pushing the snowbanks east of the road, down the slope.

6. Discussion and Recommendations

It is McElhanney's opinion that the site is suitable for development and rezoning as intended for multi-family development given that the slope and setback recommendations provided below are adhered to.

Based on the desktop review, there was no evidence of deep-seated movements in the slope immediately above the site identified at the time of the desktop assessment; however, given the significant slope area on the west side of the site with evidence of surficial soil slumping, the steep portion of the west side of the site is considered not suitable for development. In addition, it is recommended that this portion of the site is not to be disturbed (vegetation removal, tree clearing, regrading etc.) without detailed geotechnical assessment. If it is determined that this area will not be developed, is recommended that this steep slope area is classified as AG for the rezoning application.

It is recommended that a setback of 22m to 84m from the east shoulder of Cranbrook Rd, from the north to south end of the site, respectively, is maintained as a no build zone for permanent structures as shown on Drawings C-01 and C 02. This is based on a 3H:1V (18°) slope projected from the east shoulder of Cranbrook Hill Road to the east.

There is a generally flatter area marked on the south part of Drawing C-01 at the toe of the slope that could potentially be developed for non-permanent structures (non-buildings) such as parking lots, roadways and utilities corridors if the site grading can be completed by approved filling methods only. There should be no excavation in this area unless additional geotechnical work is completed. Suitability for development of this area would need to be confirmed with follow up geotechnical review of the site, with consideration of proposed development. No excavations are permitted near the toe of the slope without further geotechnical review and advisement. The soil conditions in this area are generally unknown and future subsurface testing and geotechnical analysis would be required.

Part of the development process should be discussion with the City of Prince George to determine how the City will dispose of the snow along Cranbrook Hill Road such that the snow melt will not impact the development.

6.1. ADDITIONAL STUDY RECOMMENDATIONS

This assessment is a preliminary overview for the proposed development. Further detailed assessment, subsurface investigation and slope stability analysis is recommended for the following situations:

- Disturbance (tree cleaning, regrading, etc.) within the recommended no development zone as shown on Drawing C-01, is not recommended. If anticipated for site development, detailed geotechnical investigation is required.
- If development is needed within the recommended no development zone identified on Drawing C-01, which is 84m from the shoulder of Cranbrook Hill Road at the south end of the site and 22m on the north end of the site, then the proposed design should be reviewed by a geotechnical engineer. Further study such as subsurface investigation and detailed slope stability analysis may be required.

7. Closure

This report has been prepared by McElhanney Ltd. for the benefit of Peter Wise. The information and data contained herein represent McElhanney's best professional judgment considering the knowledge

and information available to McElhanney at the time of preparation. Except as required by law, this report and the information and data contained herein are to be treated as confidential and may be used and relied upon only by the client, its officers, and employees.

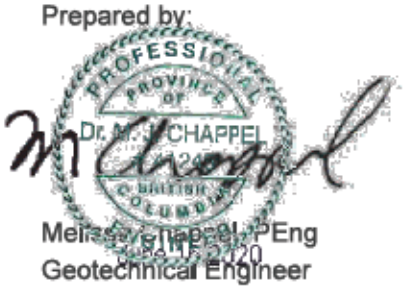
McElhanney Ltd. denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this document or any of its contents without the express written consent of McElhanney and the client.

We trust this report submission meets your requirements for the project. Should you have any queries, please do not hesitate to contact the author of the document.

Respectfully submitted,

McElhanney Ltd.

Prepared by:



Melissa Chappel, PEng
Geotechnical Engineer

Reviewed by:

Ryan Gibbard, PEng
Senior Geotechnical Engineer

Attachments:

- Statement of Limitations – Geotechnical Services
- Drawings C-01 and C-02
- Photo Plate

Statement of Limitations – Geotechnical Services

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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.

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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.

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Drawings C-01 and C-02

PHOTOGRAPH NO. 1: North end of the site looking south up Cranbrook Hill Road.

PHOTOGRAPH NO. 2: Near north end of slope facing northwest.

PHOTOGRAPH NO. 3: Pistol-butted trees near middle (Cross section B) of the slope.

PHOTOGRAPH NO. 4: Cracking in shoulder at crest of slope (at arrow) between cross sections B and C.

PHOTOGRAPH NO. 5: Cranbrook Hill Road looking northwest from the south end of the site of the road and the slope west of the road.

PHOTOGRAPH NO. 6: South end of the top of the slope, looking south.

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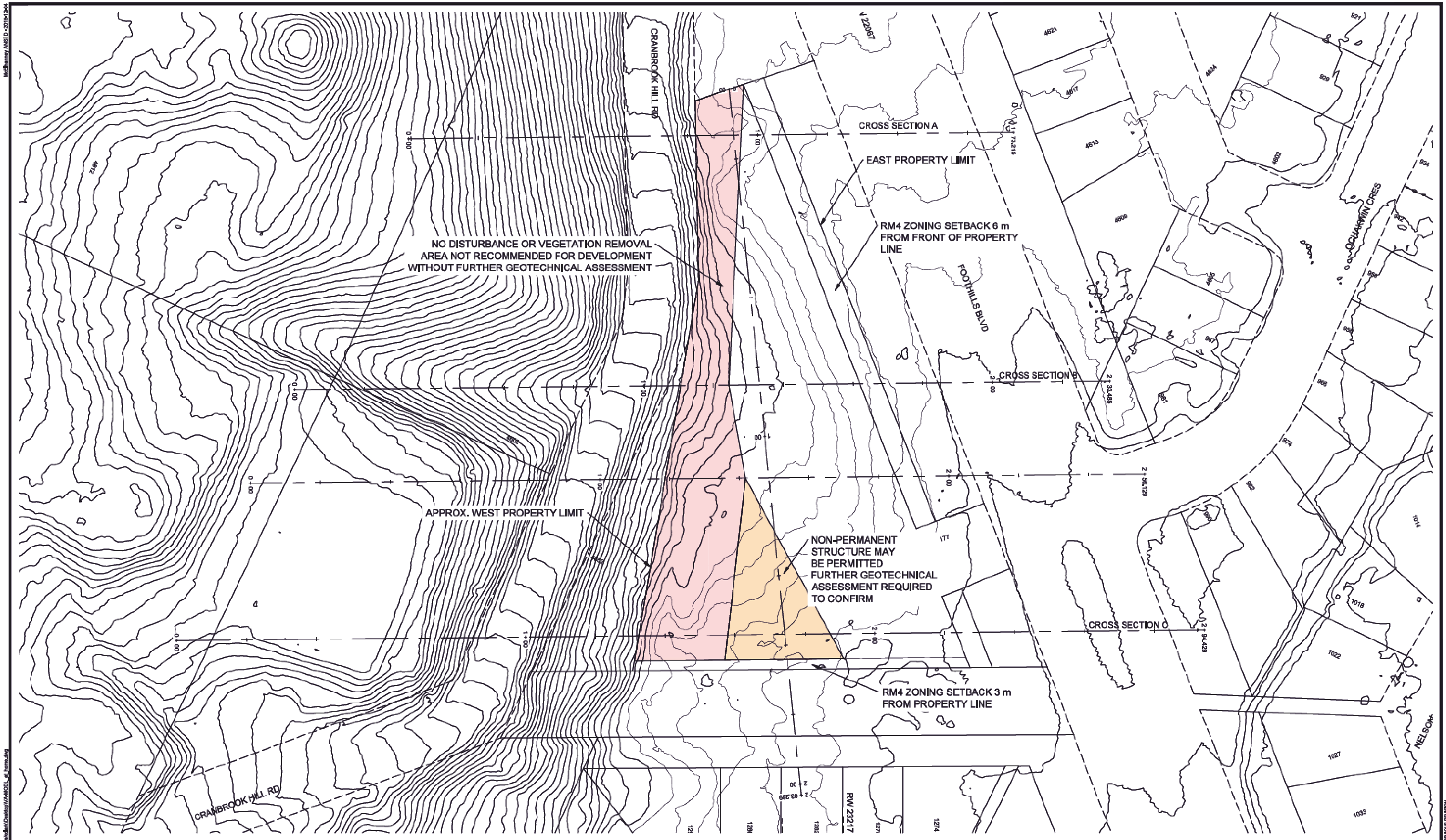

Rev	Date	Description	Drawn	Design	App'd
A	2020-04-03	FOR REVIEW	SAB	-	MC

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ORIGINAL DWG SIZE: ANSI D (22" x 34")

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Approved Sealed

PETER WISE

1177 FOOTHILLS BOULEVARD
PROPOSED DEVELOPMENT
GEOTECHNICAL ASSESSMENT
PLAN

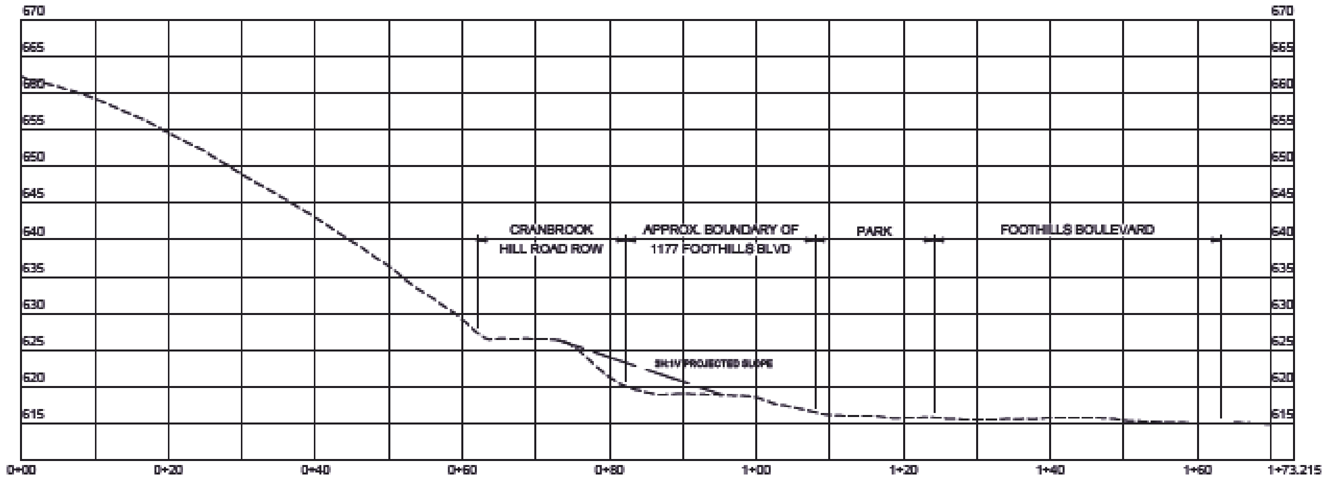
Drawing No. C-01

Project Number 2341-21020-00

Rev. A

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

CROSS SECTION A



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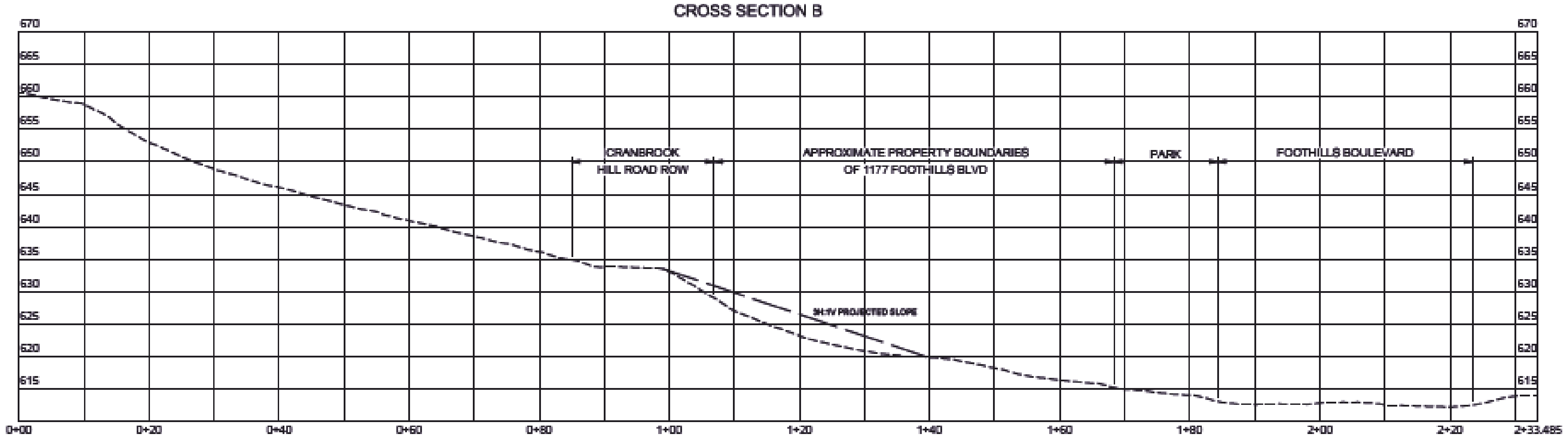

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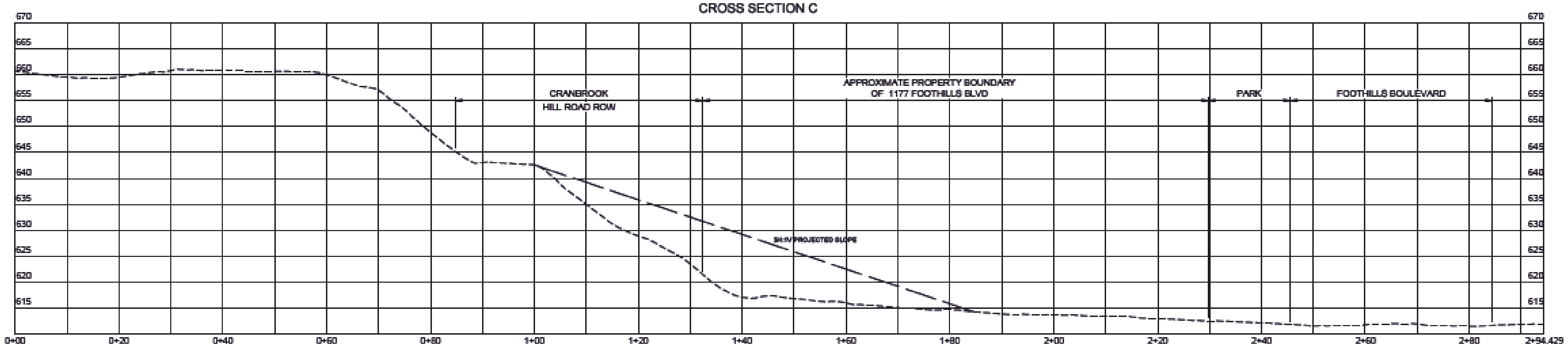

Rev	Date	Description	Drawn	Design	App'd
A	2020-04-03	FOR REVIEW	SAB	•	MC

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PROPOSED DEVELOPMENT
GEOTECHNICAL ASSESSMENT
PROFILES

Drawing No. C-02

Project Number 2341-21020-00

Rev. A

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