GENERAL

The following changes in the Tender Documents are effective IMMEDIATELY. This addendum will form part of the Contract Documents

DRAWINGS

1. Topographic Survey
2. Soil Report dated 20 Feb 2017
3. Universal Washroom Emergency call System
4. Details 4 and 7 on sheet SK01 Issued for Addendum 02, dated 12th October 2017
5. MEL-ROL LM cut sheet
6. 501 Foundation Coating cut sheet

SPECIFICATIONS

None

CLARIFICATIONS

None

QUESTIONS

Question 1 (Received 2017-10-11)

Q: There is no way to determine the existing grade determine the fill thickness required under the slab.

A: Refer to A100a for existing grades and see attached Topographic Survey.
Note that Ground Floor level is at 1.58m.

Question 2 (Received 2017-10-11)

Q: Specification 31 00 99 Part 3.1 refers to a Soil report dated 16 Feb 2017, can it be provided?

A: NMS section 31 00 99 Part 3.1 is to refer to soil report dated 20 feb 2017, attached.

Question 3 (Received 2017-10-11)

Q: Can the door schedule #D104 & 105 – "Privacy Set with Occupied Indicator" be changed to a Storeroom function (80) lock (see Universal Washroom Emergency Call System attached)?

A: This is not how washroom doors need to work, for clarity please see answer to question 7.

Question 4 (Received 2017-10-11)

Q: With reference to the Planter Bench as per dwg A406.
Detail 4 – show 125dia be 12.5dia?

Detail 4 – how long is the Threated Rods with Countersunk Bolts?
Detail 7 – the cast into concrete bent arm – how long and what diameter?
Detail 7 – 6mm steel plate – is this an angle? What size?

A: Please see attached revised Details 4 and 7 on sheet SK01 dated 12th October 2017.

Question 5 (Received 2017-10-11)

Q: On Structural dwg S102 point 8 is specified to use 12.5mm plywood for roofing sheathing, on Architectural dwg A104 is specified 16mm plywood. Please clarify.
A: 12.5mm Plywood can be used.

Question 6 (Received 2017-10-12)

Q: 22ga Prestige is not standard therefor only limited colours can 24ga be used?
What is the gage of the Gutter?
Drawings indicate RWL as Mechanical scope – however there is no RWL scope shown on the mechanical drawings, please clarify.
A: 24ga can be used for metal roof.
The Gutter is to be 20ga
RWL are in architectural scope, they are 50mm Sch. 40 pipe painted to match window wall spandrel panels.

Question 7 (Received 2017-10-12)

Q: Horton 4000 w/ "satin stainless finish" is specified (08 71 00 2.2.4.1).
Can clear or dark bronze anodized aluminum be used instead?
Clarify intention of washroom electric strike or relay switching. Specifically; hardware note "Provide lock jam integrated into security system & Occupancy sensor…"

A: Clear anodized aluminum can be used instead of satin stainless finish.
The intent for Washroom doors is to be automatically locked afterhours. If someone is still inside while this happens the occupancy sensor will detect the person and keep the push button operable from inside.

Question 8 (Received 2017-10-12)

Q: Can the Bituminuous dampprofing specified in 07 11 13 part2 2.1
+ 5 degrees Celsius = Tremproof 201/60
- 5 degrees Celsius = Bakor 710-11
Be replaced by
+ 5 degrees Celsius = Mel-Rol Lm (Waterproofing) or 520 Sealmastic (Dampprofing)
- 5 degrees Celsius = Mel-Rol Lm all Seasson (Waterprofing) 501 Foundation Coating (Dampprofing)

A: Yes this is an acceptable alternative.

Question 9 (Received 2017-10-16)

Q: Finishes schedule on drawings A201 & A202 call up the canopy and bollard as stainless. The detail for the bollard calls out painted yellow. The detail for the canopy calls out steel plate. Please clarify.

A: The bollard is to be made of galvanized steel and painted as per finishes schedule.
The canopy is to be made of steel, shop finished with Zinc rich primer and painted as per finishes schedule.

END OF ADDENDUM 2

CAP AND ABANDON EXISTING WATER LINE

50 Ø POTABLE

POTABLE WATER SOURCE

50ø PVC POTABLE

100ø PVC PERFORATED DRAIN TILE

PROPANE SERVICE LINE AS PER MECHANICAL DRAWING M2.1

REMOVE 50ø STAND PIPE

INSTALL FIRE HYDRANT AND VALVE TO DISTRICT OF DELTA SPECIFICATIONS, BYLAW 5100, SCHEDULE B, SECTION 7.2.9

25ø POTABLE

50ø PE POTABLE WATER CONNECTION TO ANNEX

100ø PVC FIRE WATER CONNECTION TO ANNEX

CAP EXISTING FIRE WATER LINE HERE AND AT THE BUILDING

50ø P.E. SEWAGE FORCEMAIN CONNECTED TO EXISTING GRAVITY PIPE FROM ANNEX

SIAMESE CONNECTION

100 Ø

43.7m – 13ø PROPANE LINE TO EX. LODGE

ABANDONED 150 Ø PVC FIRE WATER (NOT EDITABLE)

PROPANE SERVICE LINE CONNECTION AS PER MECHANICAL DWG M2.1

ASSUMED POSITION OF SEWAGE FORCEMAIN FROM FACILITY TECHNICIAN'S HOUSE (DIAMETER AND MATERIAL UNKNOWN)

PROPANE SERVICE LINE AS PER MECHANICAL DWG M2.1

FORCEMAIN FROM FACILITY TECHNICIAN'S HOUSE
mm PE FORCEMAIN,

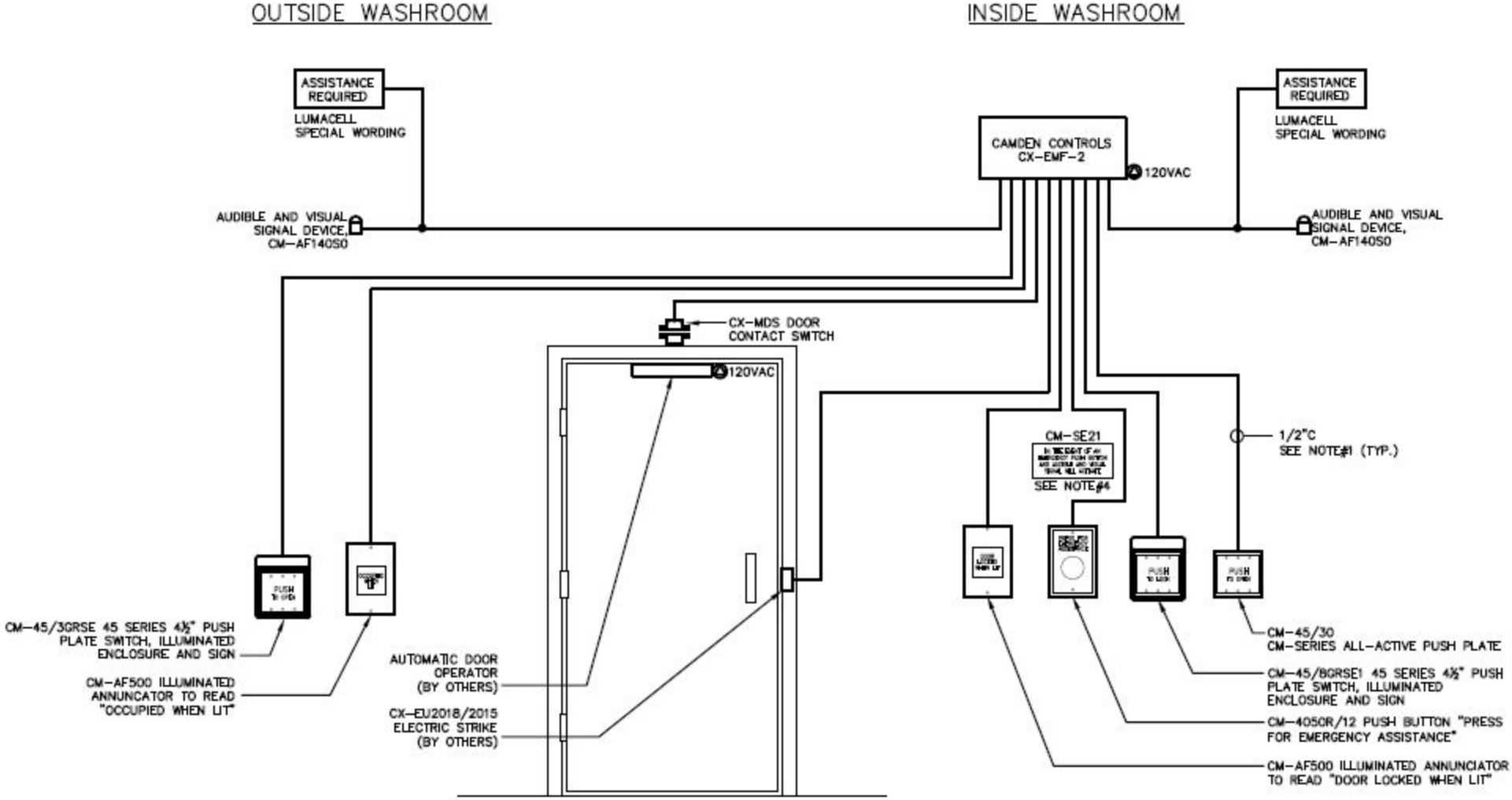
MMISSION AND REMOVE EXISTING
C TANK/PUMP CHAMBER

REFERENCE PLAN 57378

REFERENCE PLAN 57378

UNIVERSAL WASHROOM EMERGENCY CALL SYSTEM

SCALE: N.T.S.

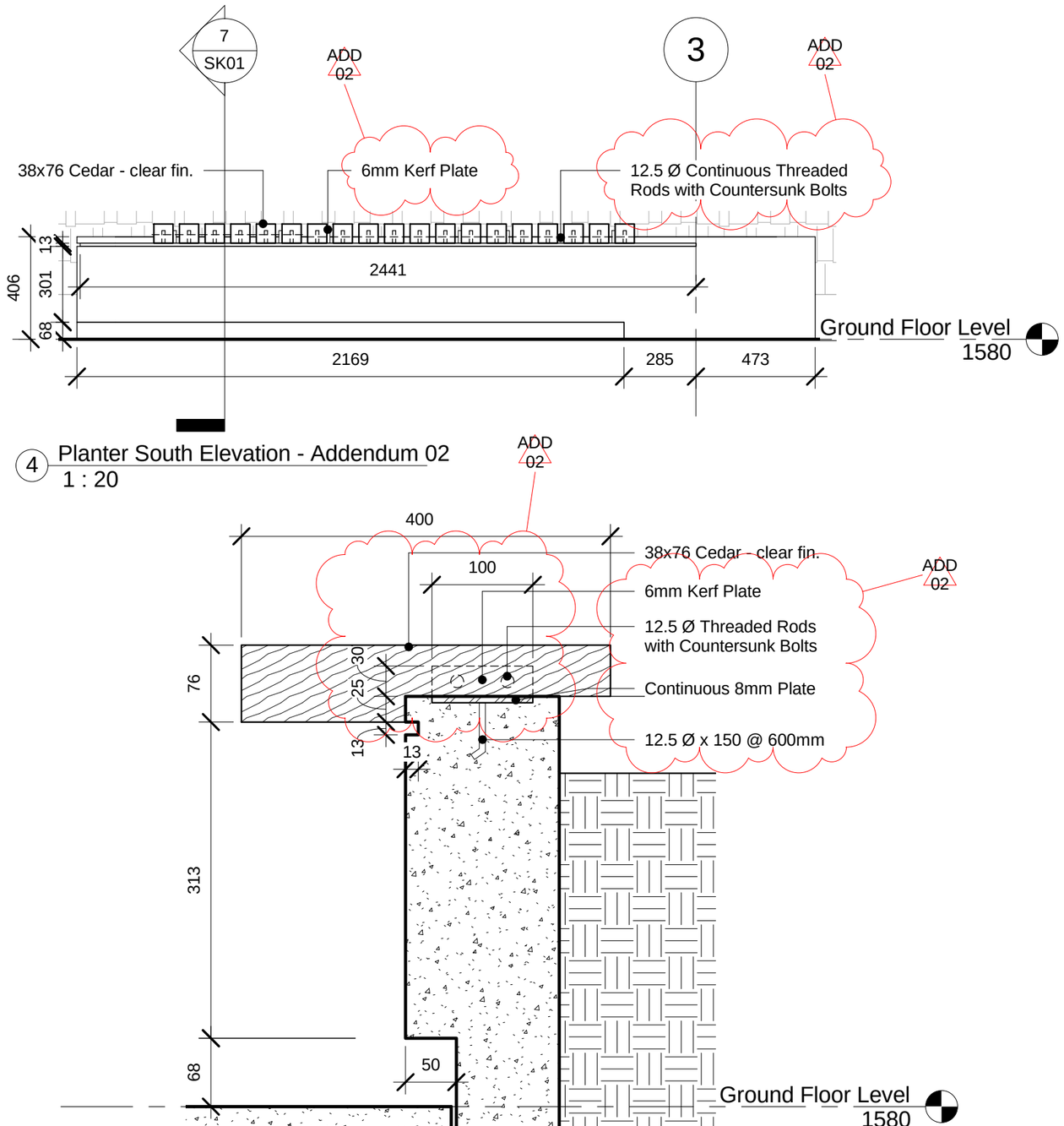


THE DOOR TO THE UNIVERSAL WASHROOM SHALL OPERATE AS FOLLOWS:

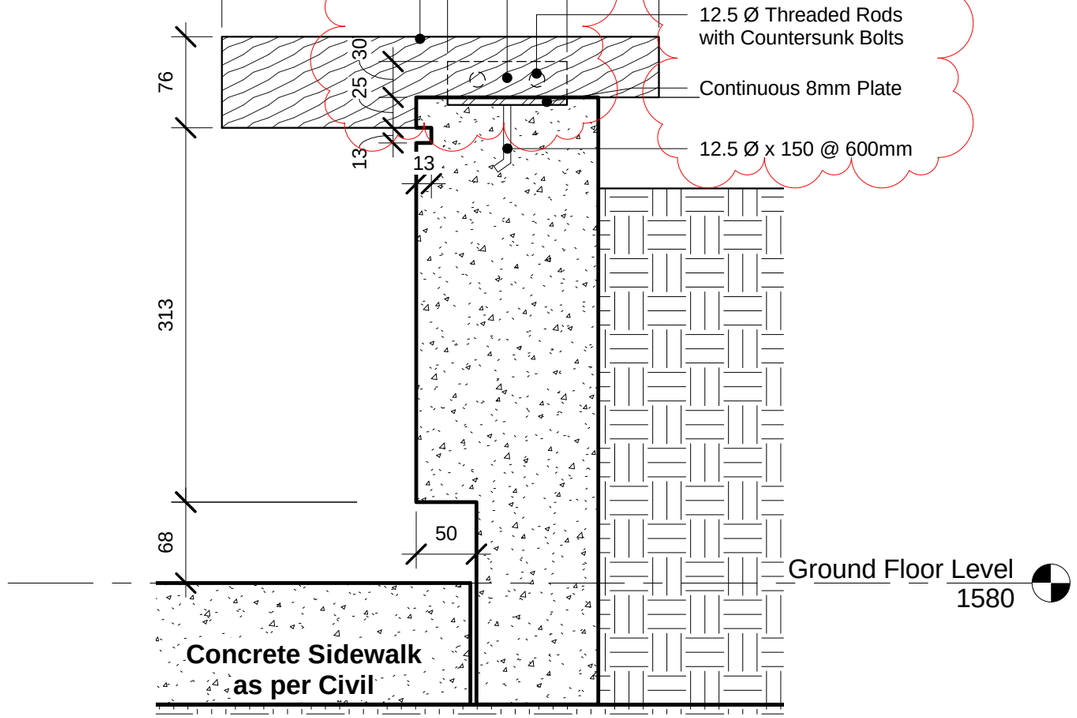
1. WHEN THE OUTSIDE H/C PUSH PLATE IS PUSHED, THE ELECTRIC DOOR STRIKE REMAIN DE-ENERGIZED WHILE THE OPERATOR CYCLES OPEN AND CLOSED.
2. WHEN THE DOOR IS CLOSED AND THE "PUSH TO LOCK" BUTTON INSIDE THE WASHROOM IS PRESSED, THE ELECTRIC DOOR STRIKE IS ENERGIZED AND THE DOOR IS SOLIDLY LOCKED.
3. WHEN THE "PUSH TO OPEN" BUTTON INSIDE THE WASHROOM IS PRESSED, THE ELECTRIC DOOR STRIKE IS AGAIN DE-ENERGIZED, THE OPERATOR CYCLES OPEN AND CLOSED.
4. WHEN THE DOOR IS CLOSED AFTER EXIT, THE ELECTRIC DOOR STRIKE REMAINS IN THE DE-ENERGIZED MODE READY FOR THE NEXT ENTRY/EXIT OR FOR A MANUAL OPENING OF THE DOOR.
5. WALL MOUNTED ROOM OCCUPANCY INDICATOR LIGHT SHALL BE TIED TO THE 'PUSH TO LOCK' BUTTON SUCH THAT UPON ACTIVATION OF THE 'PUSH TO LOCK' BUTTON, THE OCCUPANCY LIGHT IS ILLUMINATED, AND UPON ACTIVATION OF THE 'PUSH TO OPEN' BUTTON, THE OCCUPANCY LIGHT TURNS OFF.
6. UPON ACTIVATION OF THE EMERGENCY CALL BUTTON, THE AUDIBLE AND VISUAL ALARMS ARE ACTIVATED AND THE DOOR IS DE-ENERGISED AND UNLOCKED.
7. FOR EMERGENCY ACCESS, THE DOOR CAN ALSO BE OPENED FROM OUTSIDE BY A MASTER KEY.

NOTES:

1. THIS ELECTRICAL CONTRACTOR TO PROVIDE ALL WIRING, CONDUIT AND BACKBOXES AS REQUIRED FOR A COMPLETE AND FUNCTIONAL SYSTEM. WIRING SHALL BE RUN IN CONDUIT AS PER DOOR HARDWARE MANUFACTURER'S WIRING REQUIREMENTS.
2. COORDINATE WITH DOOR HARDWARE SUPPLIER FOR INSTALLATION OF ALL DEVICES..
3. COORDINATE EXACT LOCATIONS AND MOUNTING HEIGHTS OF ALL DEVICES AND PLATES WITH ARCHITECTURAL DRAWINGS AND LOCAL INSPECTOR PRIOR TO ROUGH-IN.
4. LETTERS FOR SIGNAGE SHALL BE AT LEAST 25mm HIGH WITH A 5mm STROKE, WITH SIGN POSTED ABOVE THE EMERGENCY BUTTON.
5. SYSTEM SHALL BE CAMDEM CAT.# CX-WEC SERIES TO BE SUITABLE FOR USAGE WITH DOOR OPERATOR AND CONTROL KIT, OR APPROVED EQUAL.



4 Planter South Elevation - Addendum 02
1 : 20



7 Planter bench detail - Addendum 02
1 : 5

No.	Date	Revision
1	12 Oct 2017	Issued for Addendum 02

IREDALE
ARCHITECTURE

PWRC
MULTI-PURPOSE
BUILDING

5421 ROBERTSON ROAD,
WESTHAM ISLAND, DELTA, BC

Drawing Title
Addendum 02

Scale @ 11"x17"
As indicated

Drawn	Check	Partner
GBE	JSE	JSE

Project No.
16063

Phase No.
5

Sheet No.
SK01

PRODUCT DATA

W. R. MEADOWS. SEALTIGHT

DATA SHEET NO. 7100-522

MEL-ROL® LM

Single-Component, Water-Based, Polymer-Modified, Cold-Applied, Waterproofing Membrane

DESCRIPTION

MEL-ROL LM is a single-component, polymer-modified, cold-applied, water-based, liquid waterproofing membrane ideal for below-grade vertical seamless waterproofing applications. We have taken the same high quality rubber polymers found in MEADOWS' successful MEL-ROL "peel and stick" membrane and converted them into a heavy-bodied, high solids, quick drying liquid membrane.

With MEL-ROL LM, installation time is reduced, utilizing either a spray or roller application. A variety of different protection courses, insulation boards, or drainage boards can be imbedded into the membrane to create a superior waterproofing system. With the application of PERMINATOR® vapour barrier over the membrane, a composite system can be created that has the combined advantages of both "peel and stick" and liquid-applied membranes.

USES

MEL-ROL LM can be used on new and remedial waterproofing applications on concrete or masonry block substrates. Since the formula is water-based, MEL-ROL LM can also be used on both ICFs and "green concrete" applications.

FEATURES/BENEFITS

- Waterproof – very low vapour permeability (perm rating).
- Superior elongation – bridges minor cracks; will not become brittle with age.
- Fully bonded – water will not run beneath the membrane.
- High solids, single-component, fast drying formulation – easy to apply, low cost application equipment; eliminates two-component mixing problems
- Cold-applied/water-based – will not adversely affect insulated forms (ICFs) or various protection board options. Allows for application to damp or "green" concrete.
- VOC content is 0.0 g/L. Produces no noxious odours.
- Easy application – no heating necessary. Eliminates fire hazards associated with heating kettles. Apply with roller or airless sprayer.

PACKAGING

18.9 Litre (5 U.S. Gallon) Pails
208.2 Litre (55 U.S. Gallon) Drums*
*special order only

COVERAGE

0.49 – 0.61m²/L (20 - 25 ft.²/U.S. gal.) @ 60 mils. Coverage dependant on substrate type, weather, and application conditions.

SHELF LIFE

When stored indoors in original, unopened containers at temperatures between 4° - 32° C (40° - 90° F), shelf life is six months from date of manufacture.

SPECIFICATIONS

Complies with Canada VOC Concentration Limits for Architectural Coatings Regulations.

TECHNICAL DATA

Membrane		
Property	**Typical Value**	**Test Method**
Colour	Black	
Solids	70%	
VOC Content	0 g/L	
Total Cure Time	16 – 24 hours	
Service Temperature	-29° - 60° C (-20° -140° F)	
Application Temperature	4.4° C (40° F) minimum	
Shore "00" Hardness	Passes	ASTM C 836
Stability	Exceeds	ASTM C 836
Elongation	1500%	ASTM D 412
Water Absorption	0.7%	ASTM D 1970
WVT	0.03 Perms	ASTM E 96, B
Composite (55 Mil Membrane/10 Mil PERMINATOR)		
Peel Adhesion	125 g/mm (7 lb./in.)	ASTM C 794
Tensile Strength (Film)	36 MPa (5000 psi)	ASTM D 412 (Die C)
Elongation	900%	ASTM D 412 (Die C)
Water Vapor Permeability	0.013 g/m²/24 h (0.02 Perms)	ASTM E 96, B
Water Absorption	0.1%	ASTM D 1970
Resistance to Hydrostatic Head	0.3 MPa (48 psi)	ASTM D 751
Puncture Resistance	98 N (22 lbf)	ASTM D 4833

Continued over …

W. R. MEADOWS OF CANADA
70 Hannant Court, Milton, ON L9T 5C1
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Montreal Sales: (877) 405-5186

Hampshire, IL / Cartersville, GA / York, PA / Fort Worth, TX
Benicia, CA / Pomona, CA / Goodyear, AZ / Milton, ON
St. Albert, AB
www.wrmeadows.com

APPLICATION

Surface Preparation … All surfaces must be clean (free of all coatings and curing compounds), free of frost, relatively smooth, and structurally sound. Patch any bug holes, tie holes, large gaps, or cracks with MEADOW-PATCH® 5 or MEADOW-PATCH 20 from W. R. MEADOWS. All loose laitance on the substrates, such as dirt, dust, loose stones, and debris, should be either swept or blown clean.

All shrinkage cracks less than 1.6 mm (1/16") should be pre-treated with a 60-mil coat of MEL-ROL LM 15 cm (6") wide. All cracks greater than 1.6 mm (1/16") should be pre-treated with DETAIL STRIP from W. R. MEADOWS prior to application of the membrane. For specific project recommendations, please contact W. R. MEADOWS technical services.

Mixing … MEL-ROL LM is designed to be used from the pail or drum with little or no mixing. However, if water appears on the surface, mix thoroughly with a low speed mechanical mixer prior to application.

Priming … To reduce blistering on concrete surfaces, a thin coat of MEL-ROL LM diluted with water may be required. (Approximate dilution ratio of MEL-ROL LM to water is between 4:1 and 5:1.)

Thoroughly mix primer with a mechanical mixer. Prime the entire concrete surface to be waterproofed by spraying or rolling on a single coat at a coverage rate of 2.45 – 3.68 m^2/L (100 - 150 $ft.^2$/U.S. gallon). Allow primer to dry (approximately one hour, depending on climatic conditions).

Detailing … After surface preparations are complete, detailing should be addressed. The desired thickness of membrane coverage is 120 mils for inside/outside corners and non-moving and hairline cracks, as well as around drains and penetrations. Request and view the W. R. MEADOWS WATERPROOFING CONTRACTORS HANDBOOK for additional information.

Roller Application … MEL-ROL LM can be applied directly from the container using a 19 mm (3/4") nap roller. Apply in two coats, each 30 mils thick, allowing first coat to reach initial set prior to application of second coat.

Spray Application … MEL-ROL LM may be sprayed on vertical surfaces at the minimum coverage thickness of 60 mils wet (45 mils dry). A single coat may achieve desired coating thickness. However, if material slumps due to temperature or substrate conditions, two coats (30 mils wet) may be necessary. Apply the second coat after the first coat has dried (approximately one to two hours).

Spraying Equipment … MEL-ROL LM is most effectively applied by using the Graco HydraMax 350 or the Graco GH833 Big Rig.

The Graco heavy-duty texture gun is recommended for use with the following tips. For best results, use the 0.051" (Graco GHD551) heavy-duty switch tip. For spraying of primer coat, a smaller orifice tip such as the 0.035" (Graco GHD635) can be used. Tips should be reversible types for easy clean out.

Horizontal Application … For horizontal applications, use HYDRALASTIC 836 from W. R. MEADOWS.

Thickness Control … Frequently inspect surface area with a wet mil gauge to ensure desired consistent thickness is achieved. Porous substrates or masonry block walls may require additional coats to obtain desired thickness.

Cleanup … Material should not be left in the pump, lines, or gun when finished spraying. CAUTION: Solvents must not come in contact with LM in the sprayer, as they will break the emulsion and plug up the entire sprayer system. After spraying, promptly flush water only (no soap) through the system until pump and hose are clear [approximately 18.9 litres (5 U.S. gal.)]. Aromatic solvents, such as xylene or toluene [approximately 7.6 litres (2 U.S. gal.)], should be used for final flushing after water is flushed through the pump and lines.

Mineral spirits, paint thinner, gasoline, etc., must not be used to flush system. NOTE: Water must be flushed through the machine to remove any solvents prior to spraying of MEL-ROL LM.

Protection … Cover vertical applications with PROTECTION COURSE (VIBRAFLEX® PC), MEL-DRAIN™ or 10-mil PERMINATOR from W. R. MEADOWS. Surfaces must be covered within 45 days.

Backfilling … Allow 24 hours for complete cure of membrane prior to backfilling.

PRECAUTIONS

Do not freeze. Do not apply MEL-ROL LM on vertical projects if rainfall is forecast or imminent within 12 hours. Do not apply MEL-ROL LM or primer when air, material, and surface temperatures are expected to fall below 4.4º C (40° F) within four hours of completed application. Sprayed urethane foams applied over MEL-ROL LM can melt the membrane and cause delamination and failure due to the exothermic reaction that takes place after spraying the foam. These foams should not be sprayed over MEL-ROL LM. The use of MEL-ROL LM does not negate the need for relief of hydrostatic heads. A complete drain tile system should be placed around the exterior of footing and under slabs, as required.

MASTERFORMAT NUMBER AND TITLE

07 14 16 Cold Fluid-Applied Waterproofing

LEED INFORMATION

May help contribute to LEED credits:

- EA Credit 1: Optimize Energy Performance
- IEQ Credit 3.1: Construction Indoor Air Quality Management Plan: During Construction
- IEQ Credit 4.2: Low-Emitting Materials: Paints & Coatings
- MR Credit 2: Construction Waste Management
- MR Credit 5: Regional Materials

For CAD details, most recent data sheet, further LEED information, and MSDS, visit www.wrmeadows.com.

PRODUCT DATA

W. R. MEADOWS. SEALTIGHT

DATA SHEET NO. 7110-501

501 FOUNDATION COATING

DESCRIPTION

501 FOUNDATION COATING solvent-type dampproofing is an asbestos-free, fibered and non-fibered asphalt compound containing an exclusive wetting agent to convert a naturally hydrophobic surface to a hydrophilic surface to assure proper coating adhesion. 501 FOUNDATION COATING is flexible and will span small holes and hairline cracks. The product will withstand temperature changes and will not crack under normal expansion and contraction.

USES

501 FOUNDATION COATING solvent-type dampproofing is ideal for reducing dampness and moisture infiltration through foundation walls, parapets, fire walls, tanks, culverts, cisterns, and bridge abutments. The product is also applicable for stone-backing, above-grade cavity wall applications, and below-grade masonry wall dampproofing. 501 FOUNDATION COATING also helps to minimize internal structural damage from mildew and mold. With the addition of a reinforcing fabric, it can also be used as a waterproofing coating.

FEATURES/BENEFITS

- Ready to use … no heating or thinning required.
- Dries rapidly … fast and economical way to protect concrete and masonry foundation walls from moisture penetration.
- Easy to apply … no special equipment needed.

PACKAGING

18.9 Litre (5 U.S. Gallon) Pails
205 Litre (54 U.S. Gallon) Drums

COVERAGE

Coverage is 0.39 - 0.74 m^2/L (16 - 30 $ft.^2$/gal.) depending on porosity of the surface.

SHELF LIFE

When stored indoors in original, unopened containers at temperatures between 4° - 32° C, optimum performance and best use is obtained within two years of date of manufacture.

SPECIFICATIONS

- CGSB 37-GP-6Ma
- Complies with Canada VOC Concentration Limits for Architectural Coatings Regulations

TECHNICAL DATA

Appearance	Black
Solids	63%
Weight	0.93 kg/L (7.8 lb./U.S. gal.)
Drying Time	Touch dry: 4 hours @ 21˚ C
	Firm dry: 24 hours
Flammability	Wet: Flammable
	Dry: Burns
Water Content	1% Maximum

APPLICATION

Surface Preparation … All surfaces to be coated must be thoroughly cleaned of all scale, loose mortar, dust, rust, dirt, oil, grease, and other foreign matter. Use a wire brush, sandblast, or other methods in keeping with good construction practices. Before product application, fill voids, cracks, and holes in concrete with cement mortar and allow to dry. At temperatures below 4˚ C, use a prime coat of 600 ASPHALT PRIMER from W. R. MEADOWS, applied at a minimum rate of 4.1 m^2/L (200 $ft.^2$/U.S. gal.). Apply at least one coat of 501 FOUNDATION COATING at a minimum rate of 0.39 - 0.74 m^2/L (16 - 30 $ft.^2$/gal.). Do not apply in rain or when rain is threatening.

Continued over …

W. R. MEADOWS® OF CANADA
70 Hannant Court, Milton, ON L9T 5C1
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Montreal Sales: (877) 405-5186

Hampshire, IL / Cartersville, GA / York, PA / Fort Worth, TX
Benicia, CA / Pomona, CA / Goodyear, AZ / Milton, ON
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Backfilling … Backfilling should be done within 24 to 48 hours after application. Protect cured application from damage by using PROTECTION COURSE (VIBRAFLEX® PC) and MEL-DRAIN™ from W. R. MEADOWS. Prolonged exposure to ultraviolet sunrays should be minimized.

Cleanup … While still wet, material may be removed with mineral spirits. Once dried, the material can be removed with kerosene or petroleum naptha. Solvent manufacturer precautions should be adhered to when using a solvent for cleanup.

HEALTH AND SAFETY
Handle as a combustible product. Read and follow application information and precautions. Refer to Safety Data Sheet for complete health and safety information.

MASTERFORMAT NUMBER AND TITLE
07 11 13 - Bituminous Dampproofing

LEED INFORMATION
May help contribute to LEED credits:

- MRc9: Construction and Demolition Waste Management

For most current data sheet, further LEED information, and SDS, visit www.wrmeadows.com.

2017-03-03

February 20, 2017 Reference: VAN-00237567-A0

Environment and Climate Change Canada
2645 Dollarton Highway
North Vancouver, BC V7H 1B1 Email: nikolas.fehr@canada.ca

Attention: Nikolas Fehr, P.Eng., CEM

Re: Geotechnical Report
Programming and Preliminary Design, PWRC Multi-Purpose Building
Pacific Wildlife Research Centre, 5421 Robertson Road, Westham Island, Delta, BC

Dear Sir:

1.0 INTRODUCTION

Further to your authorization, **exp** Services Inc. has completed a geotechnical exploration for the proposed development at the above-referenced site. The exploration was carried out in accordance with **exp**'s proposal dated October 13, 2016 (Reference No. 999-00044544-PP), and was based on the information contained in your RFP dated September 7, 2016. The purpose of the exploration was to assess subsurface conditions at the site and provide recommendations regarding site development.

This report does not include an assessment of subsurface conditions related to environmental issues.

2.0 EXISTING SITE CONDITIONS AND PROPOSED DEVELOPMENT

The Pacific Wildlife Research Centre development is located at 5421 Robertson Road, Delta, BC, near the northwest corner of Westham Island. The complex consists of several buildings, including the Lodge (original central building), the Science wing, and the recently replaced Annex. The existing buildings are wood-framed with concrete foundations.

The complex is bordered to the north by the western part of Ewen Slough, and to the south by Fuller Slough. These sloughs have been closed off at the ends to form ponds. The site is bordered to the east by the eastern part of Ewen Slough. The eastern arm of Ewen Slough is open to the Fraser River and is tidal. The ground is flat and low-lying, and lies in the order of 1 to 1.5m above the water levels of these sloughs. The Ewen Slough shoreline was located about 18m from the proposed Multi-Purpose building location in a north-south direction, and 50m in an East-West direction.

We understand from the Architectural Drawings that the proposed development consists of a 111 sq. m, one-storey multi-purpose building, measuring about 6.5m by 16.5m. The building will contain an industrial walk-in freezer, mud room, laundry room, two washrooms, bicycle rack storage, and covered storage area for a boat and trailer. The proposed floor elevation would be set at Elevation 1.25m geodetic. This is raised slightly above the existing ground level of 1.0 to 1.1m around that location. The proposed development will be designed in accordance with the 2015 National Building Code.

3.0 FIELD EXPLORATION

The fieldwork for this project was conducted on January 30, 2017. The fieldwork consisted of:

- Four (4) auger testholes advanced using a track-mounted, solid stem auger drill rig. The auger holes were advanced to depths of 3m to 6.1m and were labelled AH17-01 to AH17-04.
- One (1) Cone Penetration Test, advanced to a depth of 20m. This was labelled CPT17-01.
- Laboratory testing consisted of moisture content determination.
- Surveying of test hole elevations using total stationing, referenced to points on the previous topographical survey.
- Depth measurements of Ewen Slough were made directly north of the proposed building, to develop a bottom profile for the slough. The water elevation was sounded, and used to develop a continuous north-south ground profile from the building to the north side of the slough. This profile was later used for slope stability analyses. An east-west profile was also developed from the existing topographical survey.
- The fieldwork was carried out under the supervision of **exp**'s geotechnical staff.

The approximate locations of all test holes are shown on the attached Site Plan (Figure 1). The slough depth profile is shown on the attached North-South Profile, Figure 2. The East-West Profile is shown on Figure 3. The test hole logs are attached to this report.

4.0 GENERAL SUBSURFACE CONDITIONS

The site is located near the outer edge of the Fraser River Delta. The soil conditions at this site consist of deltaic deposits that are expected to extend to depths in the order of 100m or more. The following table is a brief summary of the general subsurface soil conditions as encountered in the field exploration. The actual soil profiles may vary between the test hole locations and below the depth explored.

Layer	Soil Description	Thickness or depth in meters (typical)
FILL	Mixed gravelly sand, found at AH17-04 only.	About 0.8m thick, at AH17-04 only.
TOPSOIL	Surface sod layer.	About 0.2m thick.
SILTY CLAY	Frequent organics, grey, firm to stiff. Moisture content of 27% to 62%.	About 1m thick.
SAND	Generally loose to compact. Trace silt. Occasional silt/clay interbeds.	Extended to the bottom of the CPT at 20m depth.

The detailed descriptions of the soil conditions encountered in each test hole are presented in the attached test hole logs.

The groundwater level in the test holes was at approximately 1m depth measured at the time of drilling, as indicated by AH17-01, AH17-02, AH17-03 within the proposed building area. The groundwater level is expected to fluctuate depending on the season, and would be heavily influenced by the adjacent slough level. It is possible that ground water level occasionally reaches the ground surface.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 General

Design will largely be dictated by seismic considerations. The building area is underlain by a non-liquefiable thin silty clay crust, over liquefiable sand deposits. As such, relatively large vertical displacements may occur during a large magnitude earthquake.

Conventional footings supported on grade rely on the relatively thin silty clay crust to resist failure in event of liquefaction. This limits allowable loading of footings, and footings would be subject to large differential settlements during a seismic event. The structure must accommodate these movements.

A raft foundation may also be considered. The raft foundation is likely able to better tolerate the large vertical settlements, during a seismic event, resulting in improved post-seismic performance of the building.

Details are discussed in the remainder of the report.

5.2 Seismic Considerations

The seismic design requirements are outlined in the latest 2015 National Building Code (NBC 2015). The design earthquake of the NBC 2015 refers to a 2% probability of exceedance in 50 years (inferred magnitude of M7.0), and a firm ground peak horizontal acceleration (PGA) of 0.405g in Delta, BC.

Liquefaction analysis was used to assess the liquefaction potential of the underlying sand. The analysis indicated that essentially all of the underlying SAND layer has a high potential for liquefaction, to the explored depth of 20m. The silty clay was considered not susceptible to liquefaction.

Liquefaction would result in large vertical and horizontal displacements of the ground surface. The analyses indicate that liquefaction could cause vertical displacements in the order of 0.5m. In addition to this general area settlement, the building footings would experience additional shear induced settlement. The amount of additional shear induced settlement is dependent on building foundation design.

Differential settlements caused by liquefaction within the building envelope may be large and occur over short distances. For design purposes, differential vertical displacements in the order of 0.25m (and possibly higher, due to shear induced settlement resulting from footing loads) over the width of the building may occur.

Lateral spreading of the ground surface toward the slough may occur. It was estimated that lateral spreading may be in the order of 1.5 to 2m.

As liquefiable soils are identified, the subject site would be classified as Site Class F in accordance with NBC 2015. However, the NBC 2015 also states that “for structures with a fundamental period of vibration equal to or less than 0.5 seconds, that are built on liquefiable soils, Site Class and the corresponding values for site coefficients for spectral accelerations may be determined as described in Tables 4.1.8.4.A., 4.1.8.4.B., and 4.1.8.4.C., by assuming that the soils are not liquefiable.” On this basis, if the Structural Engineer determines that the proposed development for this project has a fundamental period of vibration equal to or less than 0.5 seconds, the Site Class and the corresponding site coefficients for spectral acceleration values at this site may be determined based on Site Class E.

5.3 Slope Stability Considerations

Slope stability analyses of the shoreline was carried out. Results of the analyses indicate that the edge of the proposed building should be set back at about 12m from the slough bank, to satisfy stability requirements for static and seismic conditions. The present building setback of approximately 18m is considered adequate from a stability viewpoint. It should be noted that some slumping and lateral spreading of the shoreline edge may occur during a design earthquake.

5.4 Foundation Design

The foundation design will be controlled by liquefaction issues. The non-liquefiable silty clay crust is relatively thin, and would be considered suitable only for support of lightly loaded conventional footings. Large vertical and horizontal displacements of grade supported foundations may be expected during seismic events.

Current design methods in the Fraser Delta would require conventional footings to be reinforced, and the footings to be interconnected, using tie-beams to connect isolated pad footings. This forms an interconnected foundation system that would limit vertical and horizontal displacements.

A raft or semi-raft type foundation is also used to provide a stiffer and more resilient foundation, more tolerant to movements, and may be a preferred alternative given the large vertical and horizontal displacements expected at this site during a seismic event.

Note that the existing silty clay crust is relatively thin, and would be partially removed if foundations were constructed significantly below existing grade. To preserve the silty clay crust for foundation support, the underside of the foundations should generally be at or above the level of the silty clay layer. Any necessary over-excavation of clay should be minimized (0.2m maximum), or adjustments to foundation design may be required.

5.4.1 Spread Footings

Spread footings supported directly on the silty clay should be designed based on a Factored Bearing Resistance under SLS conditions of 25 kPa. If the footings were underlain by a structural fill pad at least 0.6m thick (this requires raising grade to keep the clay crust intact), the Factored Bearing Resistance can be increased to 50kPa. The Factored Ultimate Bearing Resistance (ULS) can be taken as 1.5 times the SLS Factored Bearing Resistance.

Footings should be designed to prevent punching resistance in the event of liquefaction. A punching resistance of 10 kN per meter of footing perimeter should be used for footings resting directly on the silty clay. Spread and strip footings should be tied together using tie-beams if required, to control vertical and horizontal distortion.

The minimum width of strip and spread footings should be 450mm and 900mm, respectively. A minimum embedment depth of 450mm for exterior footings is recommended for frost protection and confinement considerations. This would need to be done by adding fill against the exterior of the footing walls.

5.4.2 Raft Foundation

This is the preferred option under seismic conditions from a geotechnical viewpoint. A raft type foundation is expected to be more superior than conventional footings in the event of a design earthquake.

The raft could be constructed at existing grade, on a structural fill pad. As a minimum, 100mm of 19mm x 10mm clear crushed gravel over a layer of non-woven geotextile (Nilex 4551 or equivalent), should be placed below the raft slab for subgrade protection and drainage purposes.

The raft foundation may be designed based on an average contact pressure of 15 kPa, a subgrade modulus of 8,000 kN/m^3 and a maximum contact pressure of 25 kPa. The underside of the raft foundation should be founded a minimum of 450mm below exterior grade for confinement and frost protection. For a raft constructed at grade, this could be accomplished by adding fill to the outside of a thickened edge slab.

5.5 Settlement Considerations

The underlying firm silty clay is subject to settlement when subjected to heavier loads than experienced in the past. This loading may be the result of footing loads, structural fill used to raise grade, fluctuation in the groundwater level, etc.

It was estimated that the building, with the floor slab constructed at 1.25m Elev. and a building area loading of about 10 kN/m^3, would experience settlements of 25 to 50mm.

Additional raising of the floor slab with structural fill will increase settlement proportionally.

If structural fill was placed, and allowed to settle for approximately 4 to 6 weeks, the fill induced settlement should be largely complete. Provided that foundation construction is delayed for six (6) weeks after fill placement, the settlement experienced by the building should be in the order of 25mm or less.

5.6 Subgrade Preparation

Existing fill, topsoil and organic rich soils, and grass sod should be stripped from the proposed building envelopes and pavement areas to expose the underlying native firm silty clay.

The subgrade is relatively weak and easily damaged; stripping to final grades should be carried out using an excavator equipped with a smooth cleanout bucket. Any water-softened or disturbed material should be stripped and removed. The excavator should progressively retreat from excavated areas as the stripping proceeds in order to prevent disturbance to the exposed subgrade. No construction equipment traffic should be allowed on the prepared subgrade. A protective granular layer consisting of 100mm of 19mm x 10mm clear crushed gravel, over a layer of non-woven geotextile (Nilex 4551 or equivalent), should be placed for subgrade protection and drainage purposes.

5.7 Structural Fill

Any areas where structural fills are required to support building foundations, slabs, or pavement, should be stripped and prepared in accordance with Section 5.6 (Subgrade Preparation) above.

Structural fill should consist of clean sand or 75mm minus, well graded sand and gravel containing no more than 5 percent fines (soil passing the 0.075mm sieve size). Structural fill should be placed in maximum

300mm lifts in loose thickness. Each lift should be compacted to at least 92% Modified Proctor maximum dry density before the next lift is placed. A representative of **exp** should review the placement and compaction of structural fill to confirm that the specified densities are being achieved. Compaction should be carried out using appropriate equipment and procedure to prevent subgrade damage.

Where subbase fill is required for minor paving work, it is suggested that subbase fill be at least 400mm thick to protect the subgrade.

5.8 Slab-on-Grade Floors for Conventional Footings

It is recommended that floor slabs be underlain with a minimum 100mm thickness of 19mm clear crushed gravel, for support and to act as a capillary break. The clear crushed gravel should be compacted to an equivalent of 92% of its Modified Proctor maximum dry density. Minimum 6 mil polyethylene sheeting should be provided beneath the slab-on-grade to reduce dampness in moisture sensitive areas.

5.9 Drainage

Perimeter drains should consist of perforated 100mm diameter PVC pipes placed around the exterior of the proposed building at footing level. The pipe should be surrounded by at least 150mm of 20mm clear crushed gravel. An additional 150mm thick layer of pea gravel, or a layer of filter cloth, should be placed over the clear crushed gravel to provide a filter against piping of fines from the general backfill.

5.10 Geotechnical Review during Building Construction

Geotechnical field review will be required to satisfy Letters of Assurance requirements that will need to be submitted to the Corporation of Delta for the building development, and to document that the recommendations of the geotechnical report are followed. It is expected that the following geotechnical field reviews will need to address the following issues:

- Confirm adequacy of stripped/excavated subgrade for building envelope areas.
- Confirmation of soil bearing pressure.
- Density testing of any structural fill placed under slabs-on-grade and footings.

6.0 CLOSURE

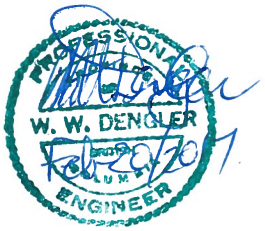
Please be advised that the contents of this report are based on information provided to **exp** by Environment and Climate Change Canada, and **exp**'s understanding of the proposed development as described in this report. If the development plans change or if during construction the soil conditions are noted to be different than those described in this report, **exp** Services Inc. must be notified promptly and the recommendations on the geotechnical aspects of the proposed development reviewed and adjusted accordingly.

Also, note that this report was prepared for the exclusive use of **exp**'s client, Environment and Climate Change Canada, and their designated consultants and agents, and may not be used by other parties without written consent of **exp** Services Inc. **Exp**'s "Interpretation & Use of Study and Report Instructions" is attached. These instructions form an integral part of this report and should be included with any copies of this report.

Site Contractors should make their own assessment of subsurface conditions and select the construction means and methods most appropriate to the site conditions. This geotechnical report should not be included in contract specifications without suitable qualifications and prior review by **exp** Services Inc.

Sincerely,

exp Services Inc.



Reviewed by:

Walt Dengler, P.Eng.
Senior Geotechnical Engineer

J.Y. (Yoshi) Tanaka, P.Eng.
Geotechnical Engineer

Enclosures: Interpretation & Use of Study and Report
Auger Hole & CPT Logs: AH17-01 to -04 & CPT17-01
Figures 1A and 1B: Site Plans
Figures 2 and 3: North-South Profile, East-West Profile
Figure 4: Liquefaction Analysis Results
Figures 5, 6, 7: Slough Slope Stability Analyses

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Attachments

Interpretation & Use of Study and Report

Auger Hole & CPT Logs

AH17-01 to -04 & CPT17-01

Figures

Site Plan, Figures 1A & 1B

North-South Profile, Figure 2

East-West Profile, Figure 3

Liquefaction Analysis Results, Figure 4

Slough Slope Stability Analyses, Figures 5 to 7

INTERPRETATION & USE OF STUDY AND REPORT

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering consulting practices in this area. No other warranty, expressed or implied, is made. Engineering studies and reports do not include environmental consulting unless specifically stated in the engineering report.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF THE REPORT

The Report has been prepared for the specific site, development, building, design or building assessment objectives and purpose that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document are only valid to the extent that there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT. WE WILL CONSENT TO ANY REASONABLE REQUEST BY THE CLIENT TO APPROVE THE USE OF THIS REPORT BY OTHER PARTIES AS “APPROVED USERS”. The contents of the Report remain our copyright property and we authorise only the Client and Approved Users to make copies of the Report only in such quantities as are reasonably necessary for the use of the Report by those parties. The Client and Approved Users may not give, lend, sell or otherwise make the Report, or any portion thereof, available to any party without our written permission. Any use which a third party makes of the Report, or any portion of the Report, are the sole responsibility of such third parties. We accept no responsibility for damages suffered by any third party resulting from unauthorised use of the Report.

5. INTERPRETATION OF THE REPORT

a. Nature and Exactness of Descriptions: Classification and identification of soils, rocks, geological units, contaminant materials, building envelopment assessments, and engineering estimates have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature and even comprehensive sampling and testing programs, implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations, or building envelope descriptions, utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarising such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and all persons making use of such documents or records should be aware of, and accept, this risk. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b. Reliance on Provided information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the report as a result of misstatements, omissions, misrepresentations or fraudulent acts of persons providing information.

c. To avoid misunderstandings, **exp** Services Inc. (**exp**) should be retained to work with the other design professionals to explain relevant engineering findings and to review their plans, drawings, and specifications relative to engineering issues pertaining to consulting services provided by **exp**. Further, **exp** should be retained to provide field reviews during the construction, consistent with building codes guidelines and generally accepted practices. Where applicable, the field services recommended for the project are the minimum necessary to ascertain that the Contractor’s work is being carried out in general conformity with **exp**’s recommendations. Any reduction from the level of services normally recommended will result in **exp** providing qualified opinions regarding adequacy of the work.

6.0 ALTERNATE REPORT FORMAT

When **exp** submits both electronic file and hard copies of reports, drawings and other documents and deliverables (**exp**’s instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by **exp** shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancy, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by **exp** shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of **exp**’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except **exp**. The Client warrants that **exp**’s instruments of professional service will be used only and exactly as submitted by **exp**.

The Client recognizes and agrees that electronic files submitted by **exp** have been prepared and submitted using specific software and hardware systems. **Exp** makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

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RECORD OF AUGERHOLE : AH17-01

PROJECT NUMBER VAN-00237567-A0
PROJECT NAME PWRC Multi-Purpose Building
DRILLING DATE 2017-01-30
DRILLING CONTRACTOR Southland Drilling Co. Ltd.
DRILLING METHOD Solid Stem Auger
EQUIPMENT TYPE Truck Mounted Auger Drill
LOGGED BY DGS **CHECKED BY** WD

CLIENT Environment and Climate Change Canada
PROJECT LOCATION 5421 Robertson Road, Delta, BC
AUGERHOLE LOCATION
ELEVATION Geodetic 1.17m
GROUND WATER LEVELS: **AT TIME OF DRILLING** 1.1m inferred
AT END OF DRILLING ---
AFTER DRILLING ---

DEPTH (m)	STRATA	SOIL DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY %	SPT N VALUE BLOWS/0.3m ▲ 20 40 60 80 / DYNAMIC CONE BLOWS/0.3m 20 40 60 80	POCKET PEN. (kPa) ⊙ 100 200 300 400 / FIELD VANE SHEAR (kPa) Peak ● Remold ○ 40 80 120 160	FINES CONTENT (%) □ 20 40 60 80 / PLASTIC & LIQUID LIMIT MOISTURE CONTENT PL MC LL 20 40 60 80
		TOPSOIL	1.0						
		SILT, some sand, some gravel, some clay, trace rootlets, brownish grey with rust seams, damp, (firm to stiff)	0.2	S1	AU				40
		SILTY CLAY, some roots and rootlets, grey with rust seams, damp, (firm to stiff) plastic	0.9 0.3						
1		▽	0.1	S2	AU				62
		SAND, trace silt, grey and brown, wet, (loose to compact) fine to medium grained	1.1	S3	AU				
2									
		-becomes some silt		S4	AU				
3									
4									
				S5	AU				
		-becomes grey							
5									
				S6	AU				
6			-4.9						

Bottom of hole at 6.1m.

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RECORD OF AUGERHOLE : AH17-02

PROJECT NUMBER VAN-00237567-A0
CLIENT Environment and Climate Change Canada
PROJECT NAME PWRC Multi-Purpose Building
PROJECT LOCATION 5421 Robertson Road, Delta, BC
DRILLING DATE 2017-01-30
AUGERHOLE LOCATION
DRILLING CONTRACTOR Southland Drilling Co. Ltd.
ELEVATION Geodetic 1.19m
DRILLING METHOD Solid Stem Auger
GROUND WATER LEVELS: ▽ **AT TIME OF DRILLING** 1.1m inferred
EQUIPMENT TYPE Truck Mounted Auger Drill
▼ **AT END OF DRILLING** ---
LOGGED BY DGS **CHECKED BY** WD
▽ **AFTER DRILLING** ---

DEPTH (m)	STRATA	SOIL DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY %	SPT N VALUE BLOWS/0.3m ▲ 20 40 60 80 / DYNAMIC CONE BLOWS/0.3m 20 40 60 80	POCKET PEN. (kPa) ⊙ 100 200 300 400 / FIELD VANE SHEAR (kPa) Peak ● Remold ○ 40 80 120 160	FINES CONTENT (%) □ 20 40 60 80 / PLASTIC & LIQUID LIMIT MOISTURE CONTENT PL MC LL 20 40 60 80
		TOPSOIL	1.0						
		GRAVELLY SAND & SILT, grey, damp, (compact) (FILL)	0.2	S7	AU				
		SILTY CLAY, frequent organics, grey with rust seams, moist, (firm to stiff) plastic	0.9 0.3	S8	AU				47 ⬠
1		▽	0.1						
		SAND, trace silt, occasional clayey silt seams, brownish grey, wet, (loose to compact) fine to medium grained	1.1	S9	AU				
2									
				S10	AU				
3		-becomes medium to coarse grained							
4				S11	AU				
5									
				S12	AU				
6			-4.9						

Bottom of hole at 6.1m.

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RECORD OF AUGERHOLE : AH17-03

PROJECT NUMBER VAN-00237567-A0
CLIENT Environment and Climate Change Canada
PROJECT NAME PWRC Multi-Purpose Building
PROJECT LOCATION 5421 Robertson Road, Delta, BC
DRILLING DATE 2017-01-30
AUGERHOLE LOCATION
DRILLING CONTRACTOR Southland Drilling Co. Ltd.
ELEVATION Geodetic 1.13m
DRILLING METHOD Solid Stem Auger
GROUND WATER LEVELS: ▽ **AT TIME OF DRILLING** 1.0m inferred
EQUIPMENT TYPE Truck Mounted Auger Drill
▼ **AT END OF DRILLING** ---
LOGGED BY DGS **CHECKED BY** WD
▽ **AFTER DRILLING** ---

DEPTH (m)	STRATA	SOIL DESCRIPTION	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY %	SPT N VALUE BLOWS/0.3m ▲ 20 40 60 80 / DYNAMIC CONE BLOWS/0.3m 20 40 60 80	POCKET PEN. (kPa) ⊙ 100 200 300 400 / FIELD VANE SHEAR (kPa) Peak ● Remold ○ 40 80 120 160	FINES CONTENT (%) □ 20 40 60 80 / PLASTIC & LIQUID LIMIT MOISTURE CONTENT PL MC LL 20 40 60 80
		TOPSOIL	0.9						27
		GRAVEL, SAND, & SILT, grey, damp, (loose to compact) (FILL)	0.2	S13	AU				
		SILTY CLAY, frequent organics, light brownish grey with rust, moist, (firm to stiff) plastic	0.7 0.4						39
1		▽	0.1	S14	AU				
		SAND, trace silt, grey, wet, (loose to compact) fine to medium grained -frequent layers of silty clay for first 300mm of strata	1.0						
2				S15	AU				
3			-1.9	S16	AU				

Bottom of hole at 3.0m.

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RECORD OF AUGERHOLE : AH17-04

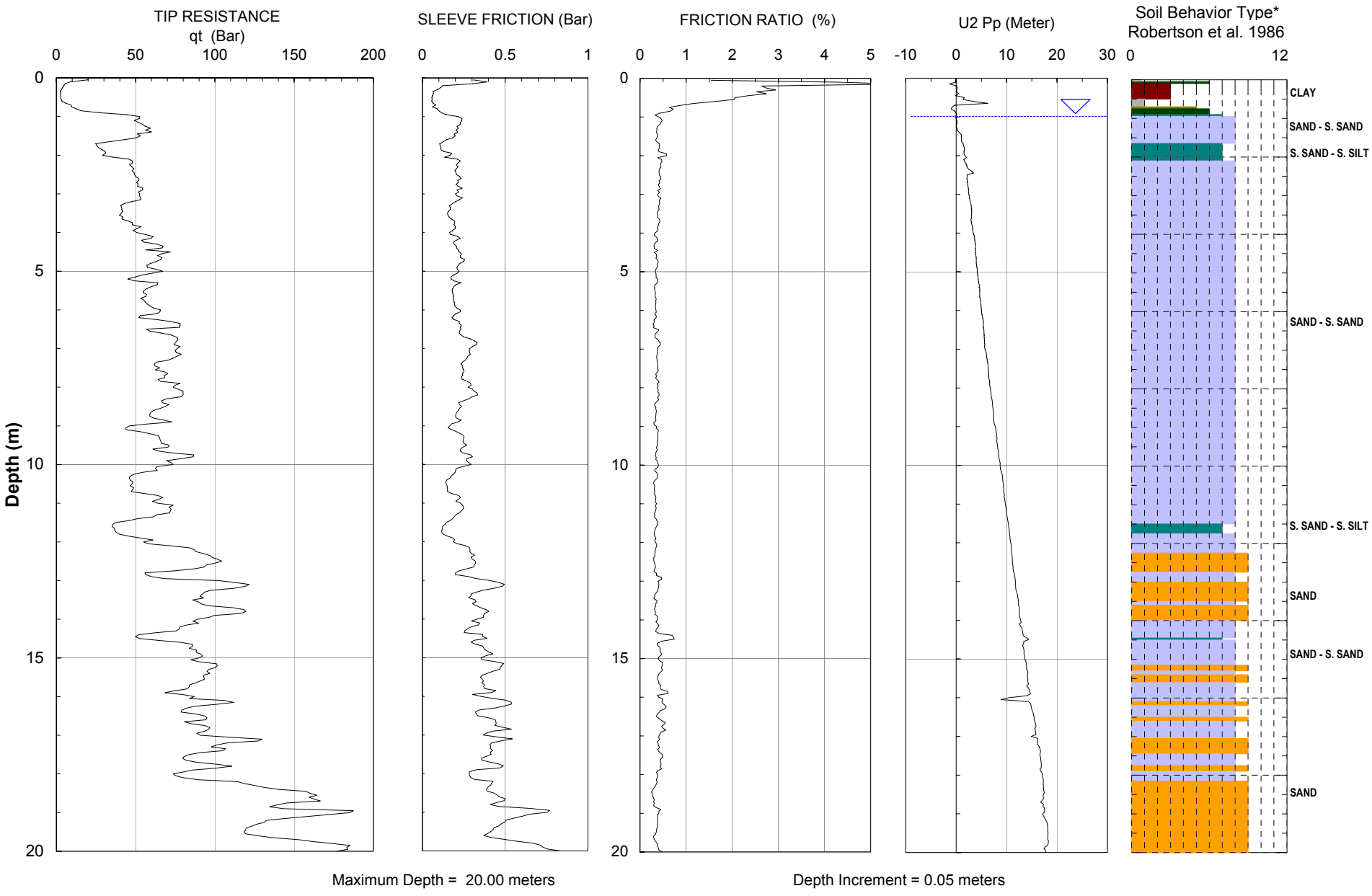
PROJECT NUMBER VAN-00237567-A0
CLIENT Environment and Climate Change Canada
PROJECT NAME PWRC Multi-Purpose Building
PROJECT LOCATION 5421 Robertson Road, Delta, BC
DRILLING DATE 2017-01-30
AUGERHOLE LOCATION N: 5438748 E: 487551
DRILLING CONTRACTOR Southland Drilling Co. Ltd.
ELEVATION Geodetic 1.75m
DRILLING METHOD Solid Stem Auger
GROUND WATER LEVELS: ▽ **AT TIME OF DRILLING** 1.7m inferred
EQUIPMENT TYPE Truck Mounted Auger Drill
▼ **AT END OF DRILLING** ---
LOGGED BY DGS **CHECKED BY** WD
▽ **AFTER DRILLING** ---

DEPTH (m)	STRATA	SOIL DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY %	SPT N VALUE BLOWS/0.3m ▲ 20 40 60 80 / DYNAMIC CONE BLOWS/0.3m 20 40 60 80	POCKET PEN. (kPa) ⊙ 100 200 300 400 / FIELD VANE SHEAR (kPa) Peak ● Remold ○ 40 80 120 160	FINES CONTENT (%) □ 20 40 60 80 / PLASTIC & LIQUID LIMIT MOISTURE CONTENT PL MC LL 20 40 60 80
		SILTY GRAVELLY SAND, frequent wood and leaves, brown and grey, damp, (compact) (FILL)	1.4	S17	AU				
		SILTY GRAVEL & SAND, light grey, damp, (compact) gravel was angular (FILL)	0.4	S18	AU				
		SAND, some silt, orangish brown, moist, (compact) fine grained (FILL)	1.2						
1		WOOD REMNANTS/LOG	0.5						
		SILTY CLAY, frequent organics, grey, moist, (firm to stiff) plastic	1.0						58
			0.8	S19	AU				
			0.8						
			0.9						
			0.1						
2		SAND, trace silt, occasional layers of silty clay, grey, wet, (loose to compact) fine grained	1.7	S20	AU				
				S21	AU				
3			-1.3						

Bottom of hole at 3.0m.

exp.	Operator: Schwartz Soil Technical Sounding: CPT17 - 01 Cone Id: DPG1236	Date: January 30, 2017 Site: 5421 Robertson Rd, Delta Exp Project Number: 237567

Schwartz SOIL TECH



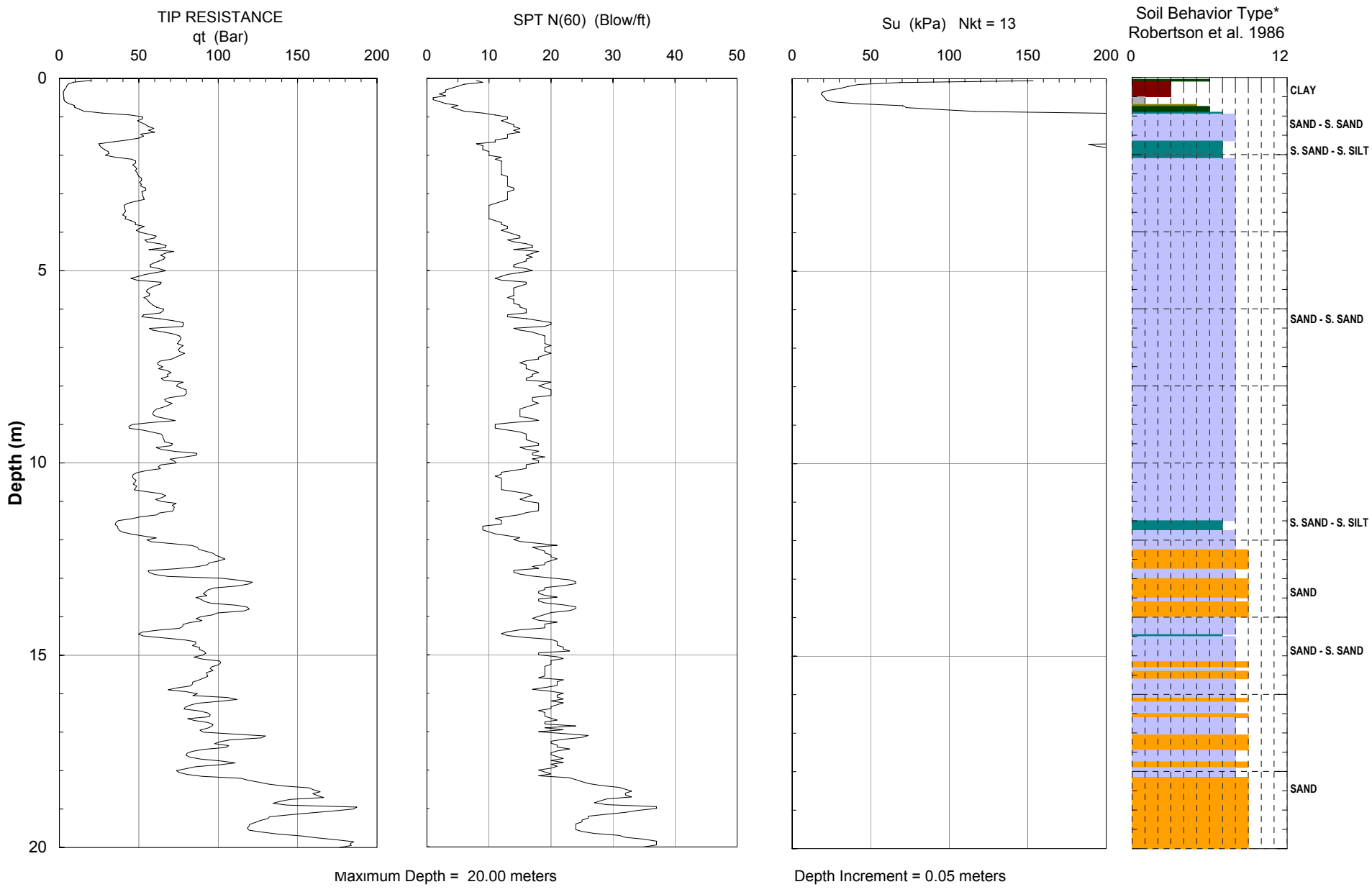
Maximum Depth = 20.00 meters

Depth Increment = 0.05 meters

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Operator: Schwartz Soil Technical
Sounding: CPT17 - 01
Cone Id: DPG1236

Date: January 30, 2017
Site: 5421 Robertson Rd, Delta
Exp Project Number: 237567



Maximum Depth = 20.00 meters

Depth Increment = 0.05 meters

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

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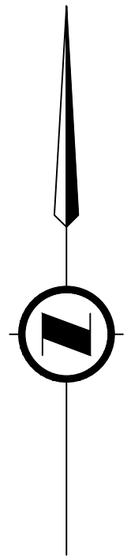
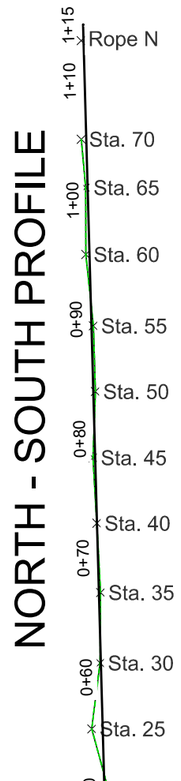
DFTR.	REVISIONS		
PDL	No.	DESCRIPTION	DATE
DSGN.			
CHK.			
WD			

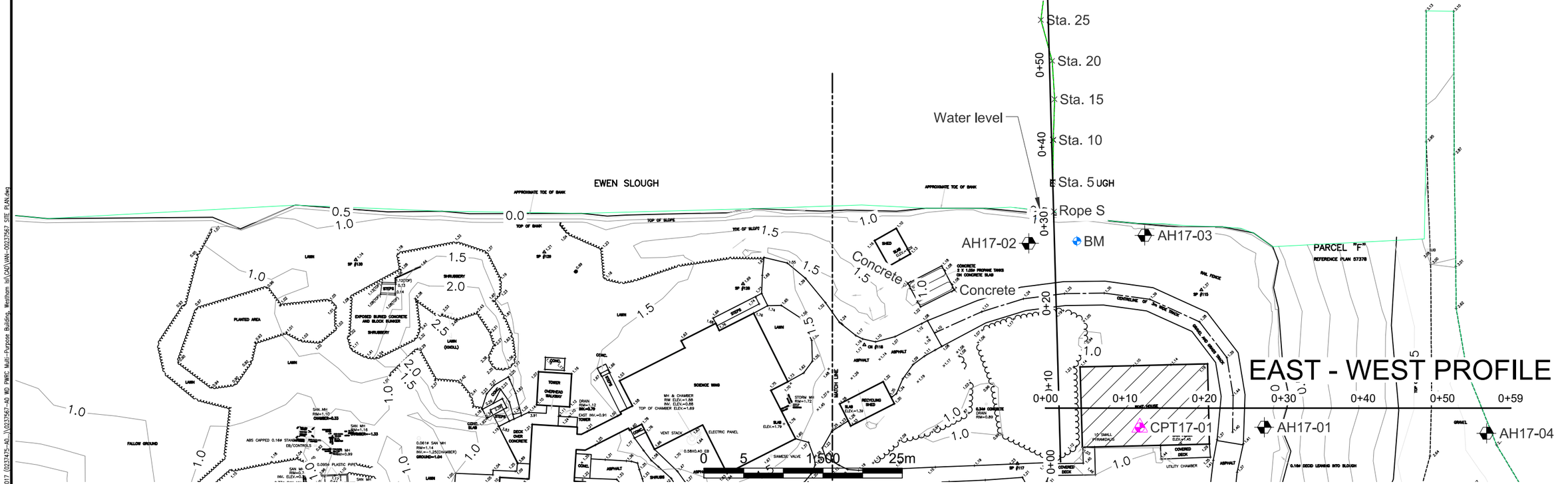
CLIENT	ENVIROMENT AND CLIMATE CHANGE CANADA
PROJECT	MULTI-PURPOSE BUILDING 5421 ROBERTSON RD., DELTA, B.C.
PROJECT NO.	VAN-00237567-A0

TITLE:		
SITE PLAN		
DATE	SCALE:	DWG NO.
2017-01-31	1:500	FIGURE 1A

Feb 16, 2017 - 5:18pm L:\2017 (0237475-A0...)\00237567-A0 WD PWRC Multi-Purpose Building, Westhorn ist\CAD\VAN--00237567 SITE PLAN.dwg







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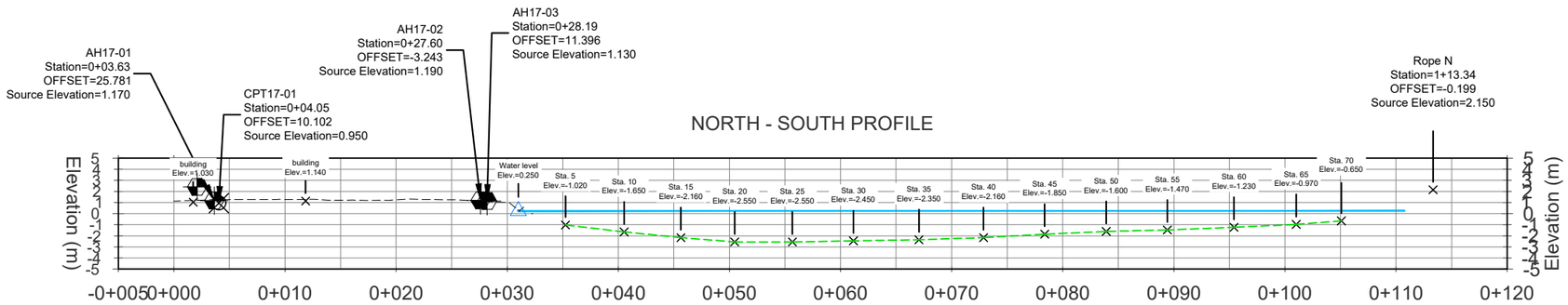
DFTR. PDL	CLIENT ENVIROMENT AND CLIMATE CHANGE CANADA	TITLE: SITE PLAN	
DSGN.	PROJECT MULTI-PURPOSE BUILDING 5421 ROBERTSON RD., DELTA, B.C.		
CHK. WD	PROJECT NO. VAN-00237567-A0	DATE 2017-01-31	SCALE: 1:500
			DWG NO. FIGURE 1B

REVISIONS

No.	DESCRIPTION	DATE

Feb 16, 2017 - 5:18pm L:\2017 (0237475–A0...)\0237567–A0 WD PWRC Multi–Purpose Building, Westham Isl\CAD\VAN–00237567 SITE PLAN.dwg



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exp Services Inc.
275–3001 Wayburne Drive
Burnaby, BC V5G 4W3
Telephone: 604–874–1245
Fax: 604–874–2358
www.exp.com

DFTR.	REVISIONS		
PDL	No.	DESCRIPTION	DATE
DSGN.			
CHK.			
WD			

CLIENT: ENVIROMENT AND CLIMATE CHANGE CANADA

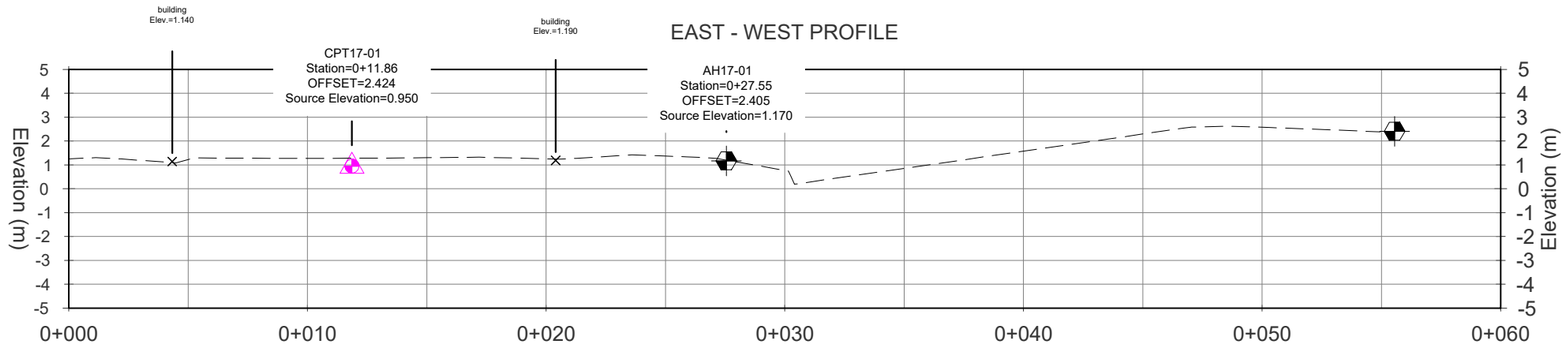
PROJECT: MULTI-PURPOSE BUILDING
5421 ROBERTSON RD., DELTA, B.C.

PROJECT NO.: VAN-00237567-A0

TITLE: NORTH - SOUTH PROFILE

DATE	SCALE:	DWG NO.
2017-01-31	1:500	FIGURE 2

EAST - WEST PROFILE



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Telephone: 604–874–1245
Fax: 604–874–2358
www.exp.com

DFTR. PDL	REVISIONS	CLIENT ENVIROMENT AND CLIMATE CHANGE CANADA	TITLE: EAST - WEST PROFILE
DSGN.	No. / DESCRIPTION / DATE	PROJECT MULTI-PURPOSE BUILDING 5421 ROBERTSON RD., DELTA, B.C.	
CHK. WD		PROJECT NO. VAN-00237567-A0	DATE 2017-01-31 · SCALE: 1:250 · DWG NO. FIGURE 3

FIGURE 4 Liquefaction Analysis Results - CPT17-01

Job No: VAN-237567-A0 **Date:** February 6, 2017
Location: PWRC Multi-Purpose Building **CPT Hole:** CPT17-01

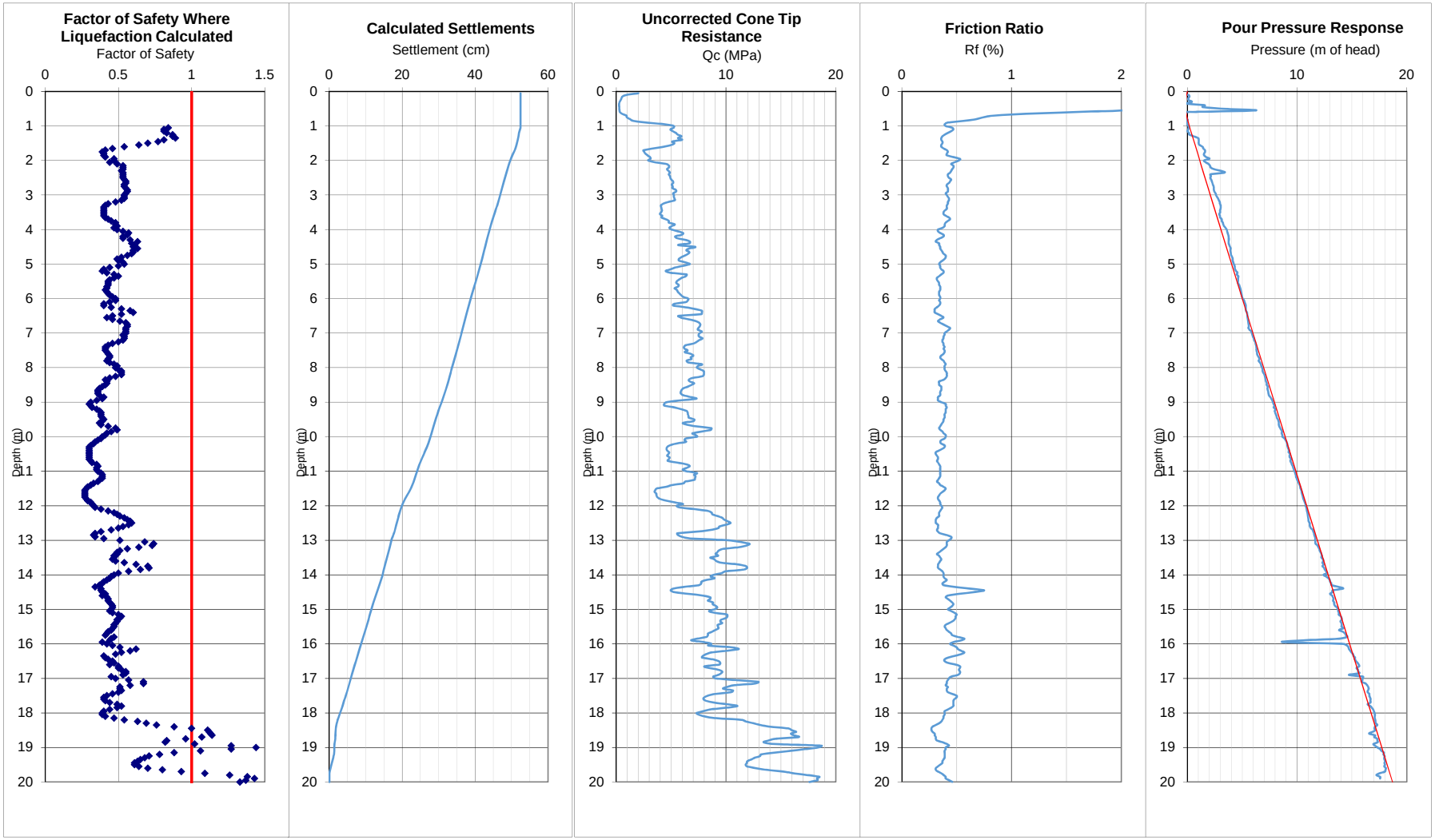

FIGURE 5 Slough Slope Stability Analysis - Static Condition

Job No: VAN-237567-A0 **Date: February 6, 2017**
Location: PWRC Multi-Purpose Building

exp Services Inc.
Project: PWRC Multi-Purpose Building (VAN-00237567-A0)
Created By: James Jin Date: 2/6/2017
Slope Stability Analysis Method: Morgenstern-Price
Software: SLOPE/W v8.13.1.9253

PWRC Multi-Purpose Building
North - South Profile
Analysis Type: Static

Name: Silt Crust Model: Mohr-Coulomb Unit Weight: 17.5 kN/m³ Cohesion': 20 kPa Phi': 0 ° Phi-B: 0 ° Piezometric Line: 1
Name: Upper Sand Model: Mohr-Coulomb Unit Weight: 17.5 kN/m³ Cohesion': 0 kPa Phi': 32 ° Phi-B: 0 ° Piezometric Line: 1
Name: Lower Sand Model: Mohr-Coulomb Unit Weight: 18 kN/m³ Cohesion': 0 kPa Phi': 33 ° Phi-B: 0 ° Piezometric Line: 1

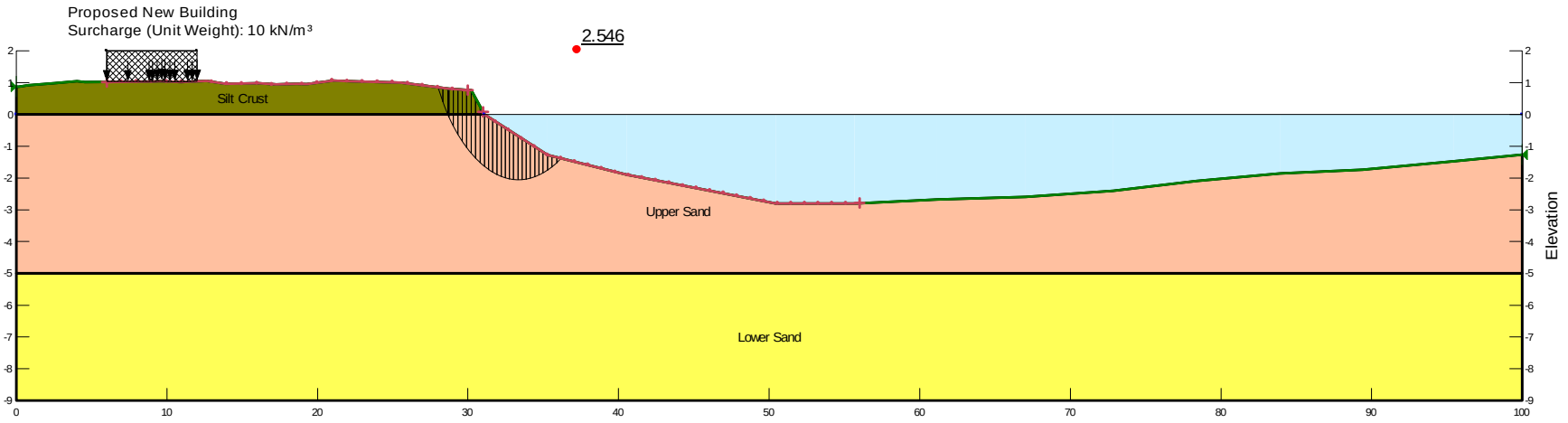

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FIGURE 6 Slough Slope Stability Analysis - Seismic Condition

Job No: VAN-237567-A0 **Date: February 6, 2017**
Location: PWRC Multi-Purpose Building

exp Services Inc.
Project: PWRC Multi-Purpose Building (VAN-00237567-A0)
Created By: James Jin Date: 2/6/2017
Slope Stability Analysis Method: Morgenstern-Price
Software: SLOPE/W v8.13.1.9253

PWRC Multi-Purpose Building
North - South Profile
Analysis Type: Seismic
Horz Seismic Coef.: 0.3

Name: Silt Crust Model: Mohr-Coulomb Unit Weight: 17.5 kN/m³ Cohesion': 20 kPa Phi': 0 ° Phi-B: 0 ° Piezometric Line: 1
Name: Upper Sand Model: Mohr-Coulomb Unit Weight: 17.5 kN/m³ Cohesion': 0 kPa Phi': 32 ° Phi-B: 0 ° Piezometric Line: 1
Name: Lower Sand Model: Mohr-Coulomb Unit Weight: 18 kN/m³ Cohesion': 0 kPa Phi': 33 ° Phi-B: 0 ° Piezometric Line: 1

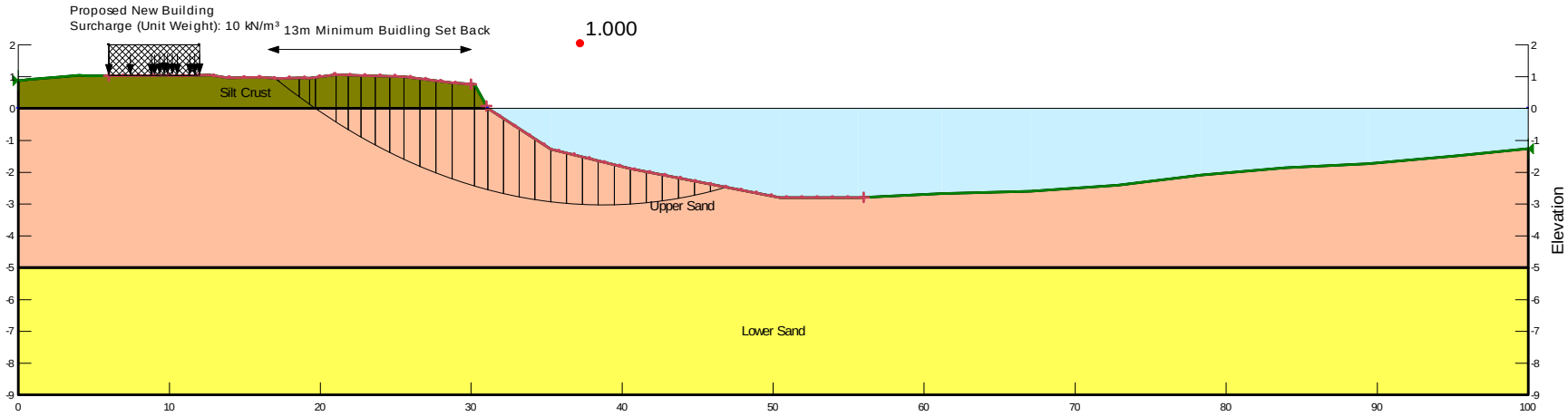

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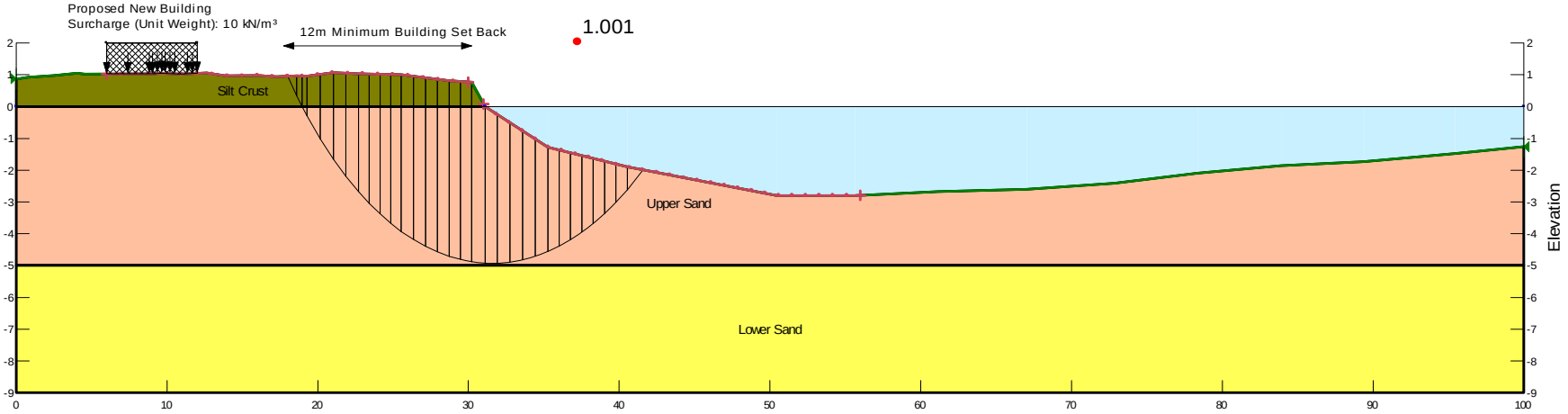
FIGURE 7 Slough Slope Stability Analysis - Post Liquefaction Condition

Job No: VAN-237567-A0 **Date: February 6, 2017**
Location: PWRC Multi-Purpose Building

exp Services Inc.
Project: PWRC Multi-Purpose Building (VAN-00237567-A0)
Created By: James Jin Date: 2/6/2017
Slope Stability Analysis Method: Morgenstern-Price
Software: SLOPE/W v8.13.1.9253

PWRC Multi-Purpose Building
North - South Profile
Analysis Type: Post-Liquefaction

Name: Silt Crust Model: Mohr-Coulomb Unit Weight: 17.5 kN/m³ Cohesion': 20 kPa Phi': 0 ° Phi-B: 0 ° Piezometric Line: 1
Name: Upper Sand Model: Mohr-Coulomb Unit Weight: 17.5 kN/m³ Cohesion': 4 kPa Phi': 0 ° Phi-B: 0 ° Piezometric Line: 1
Name: Lower Sand Model: Mohr-Coulomb Unit Weight: 18 kN/m³ Cohesion': 8 kPa Phi': 0 ° Phi-B: 0 ° Piezometric Line: 1



Directory: V:\Canada\West\VAN\VAN-00237567-A0 PWRC Multi-Purpose Building\Slope Stability\