

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:
Public Works Government Services Canada- Bid
Receiving / Réception des soumissions
189 Prince William Street
Room 405
Saint John
New Brunswick
E2L 2B9

SOLICITATION AMENDMENT MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

Vendor/Firm Name and Address
Raison sociale et adresse du
fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution
Public Works Government Services Canada- Bid
Receiving / Réception des soumissions
189 Prince William Street
Room 405
Saint John
New Bruns
E2L 2B9

Title - Sujet DFO Lameque, Wharf Reconstruction	
Solicitation No. - N° de l'invitation EC015-151659/A	Amendment No. - N° modif. 003
Client Reference No. - N° de référence du client R.068072/073056	Date 2014-12-29
GETS Reference No. - N° de référence de SEAG PW-\$PWB-004-3523	
File No. - N° de dossier PWB-4-37132 (004)	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2015-01-13	Time Zone Fuseau horaire Atlantic Standard Time AST
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Doucet, Gisele PWB	Buyer Id - Id de l'acheteur pwb004
Telephone No. - N° de téléphone (506) 636-4541 ()	FAX No. - N° de FAX (506) 636-4376
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction:	

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée	Delivery Offered - Livraison proposée
Vendor/Firm Name and Address Raison sociale et adresse du fournisseur/de l'entrepreneur	
Telephone No. - N° de téléphone Facsimile No. - N° de télécopieur	
Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)	
Signature	Date

Solicitation No. - N° de l'invitation

EC015-151659/A

Client Ref. No. - N° de réf. du client

R.068072/073056

Amd. No. - N° de la modif.

003

File No. - N° du dossier

PWB-4-37132

Buyer ID - Id de l'acheteur

pwb004

CCC No./N° CCC - FMS No/ N° VME

This Solicitation Amendment No. Three (3) is raised to include the following addendum no.3

The following addendum to the tender documents is effective immediately. This addendum shall form part of the contract documents.

All other terms and conditions remain the same.

Addendum 3.

QUESTIONS AND ANSWERS

- Q1: We would like to request for UCAN FR5 adhesive to be accepted as an equal to the listed products for above water. Section 03 30 00 clause 2.1.12, Anchorage Adhesive (Above Water): to ASTM C881/C881M, Type IV, Grade 3, Class A, B, and C. This product can be used both above or under water.
- A1: We have reviewed the technical data and find the proposed UCAN FR5 Adhesive to be an acceptable alternate to the listed products for above water.
- Q2: We request that UCAN FR5 epoxy adhesive be approved as an equal to Epcon Ceramic 6. Div 03 2.1.13.
- A2: The UCAN FR5 Epoxy Adhesive is also an acceptable alternate to Epcon Ceramic 6 as specified under Division 03 Art. 2.1.13.
- Q3: What is the composition of the seabed material to be excavated on wharf 408 on the harbour side, see plan M1/ of 18 section A-1/1?
- A3: The original referenced plans for Structure 408. are (Plan No. C-143 - 1959).
- These show boreholes No. 5, 6, 7, and 8 along the SSP wharf harbour side. Material description varies from a soft sand and silt to a silt and sand-packed, to a clay and sand packed at the level where excavation would be required.
- The contractor can view the existing drawings at PWGSC and it may be best for him to make his own assessment of conditions based on the referenced drawings.
- Q4: After reviewing the documentation I was unable to locate the quantity of H-Piles required. I did find that 118 units were required on the tender document but I am unsure of the unit of measure. Would it be meters?
- A4: The unit of measure is by unit.
- Q5: Drawing C1, there is no elevation showing the existing water line (at note 1), what elevation can we assume so we can have the correct length of valve box ordered?
- Drawing C2 detail below, we are missing line or info of all the pieces, where they go. Could you clarify? Is it all in HDPE? What is the fitting that goes below the main line? How do we connect everything up? Would we use a cross on the main line?
- Drawing C2 detail below, we are missing line or info of all the pieces, where they go. Could you clarify? Would we required any bedding for the services?
- A5: We don't know the depth of the existing watermain. It should be confirmed by the contractor. Should be approx. 1.8m standard depth.

All piping before the wharf are pvc dr18 and all piping on the wharf are hdpe as shown on C01.

All buried pipes shall have bedding including services.

- Q6: On drawing E3 and/or M16, there is no detail about the anchoring of the stud wall to the foundation. Could you specify and/or clarify?
There is a location for insulation, and the wall seem offset from the side of the wall.
- A6: Install 12.7mm diameter galvanized anchors spaced at maximum 1200 mm on centre and at corners.

Anchor to be embedded 300 mm into concrete, 50 mm clear from outside edge. Bottom to be hooked 50 mm.
- Q7: On drawing E3, the detail showing typical wall seems to indicate there could be a layer of gypsum board, but it is not indicated in the typical wall description. Could you check this up?
- A7: Gypsum board is not to be installed, just 19 mm marine grade plywood. See typical wall construction notes on page E3 of/de 11.
- Q8: Item number 11 on the "Bid and Acceptance Form" is 213 Type "A" precast concrete panels. We have reviewed the project drawings and can only count 211 Type "A" panels. Can you please confirm the correct number of the Type "A" panels.
- A8: There are 211 Type 'A' Panels. The unit price table shall be modified to reflect this quantity.
- Q9: Could we have more detail of the connection holding electrical system beneath wharf 411?
- A9: On wharf 411 conduit support details K-K and L-L are to be 13 mm threaded rods fastened to tap-con screws in concrete deck with channel supports on end of threaded rods to Section 26 05 29. Revise Section 26 05 29.3.1.8 so that all channel spacing is a maximum of 1.0 metres. All channels, rods, tap-con, and hardware are to be 316 grade stainless steel. Use double back-to back channels in all cases for added strength.
- Q10: 1) On structure 406/409 there is no detail for the 325mm slab thickening at the electrical shrouds. I am wondering if there is additional reinforcing required similar to the 400mm slab thickenings detail D51/M17 or will the 15M @350 T&B E.W. deck reinforcing be sufficient in the 325mm slab thickenings?

2) On drawing E6 trench details F-F, G-G, & H-H show 20M @200 E.W.T&B which differs from the deck reinforcing shown in detail D38/M12 15M@350 E.W. T&B. Will the 20M be additional steel required at the conduit or will it replace the 15M at the conduit or is this just a typo?

3) Detail F-F on drawing E4 is cut in the section of wharf which will require new asphalt pavement however the detail for F-F on drawing E6 represents a reinforced concrete deck. Should this represent a buried concrete ductbank?

A10: 1) This is covered in the typical slab detail D38. Same reinforcing but increased clearance between top and bottom mats to allow for crossover of conduits.

2) This is a typo. Deck reinforcing is as per Structural drawings.

3) In areas to be paved, a buried electrical ductbank would be applicable.

Q11: Do you know if the geotech report as per drawing M18 is available? If not, is this something you could request?

A11: Please find enclosed the Geotechnical reports that would apply to this project. These cover the borehole logs shown on the plans.

Q12: On page M8 bottom right, there is a detail about a waler tie detail, do I consider that waler to be all long both side of the wharf? There is no more detail showing this piece.

A12: The locations and extent of the waler ties are as shown on drawing M6.



**REVISED Geotechnical Investigation
North Wharf (Structure 406)**

Lamèque, New Brunswick
12 August 2014

Prepared for Valron Engineers Inc.
Project No. 737.15-R01(Revised 2014)





GEMTEC

CONSULTING ENGINEERS
AND SCIENTISTS

GEMTEC Limited tel: 506.858.7180
77 Rooney Crescent fax: 506.858.0742
Moncton, NB gemtec@gemtec.ca
E1E 4M4 www.gemtec.ca

12 August 2014

File: 737.15 – R01 (REVISED 2014)

Valron Engineers Inc.
83 Botsford Street
Moncton, NB
E1C 4X2

Attention: Robert Vale, P.Eng

Re: REVISED Geotechnical Investigation, North Wharf (Structure 406)
Lamèque Wharf, New Brunswick

Enclosed is our REVISED geotechnical report for the above noted project. The elevations referenced in the report and on the attached borehole logs were adjusted by +0.53 metres to reflect chart datum as opposed to geodetic datum.

If you have any questions concerning this report or require further details, please contact the undersigned.



Serge Bourque, M.Sc.E, P.Eng.
GEMTEC Limited

SB/jml

Enclosures

N:\Files\0700\0737.15\2010jml0603R01 (REVISED 2014).doc



**REVISED Geotechnical Investigation
North Wharf (Structure 406)
Lamèque, New Brunswick**

Table of Contents

Appendices	ii
List of Figures	ii
1.0 Introduction	1
2.0 Site Conditions	3
3.0 Soil and Bedrock Conditions.....	3
3.1 Soil	3
3.2 Bedrock	3
4.0 Discussion and Recommendations.....	4
5.0 General	5

Appendices

- A Descriptive Terms, CPT and Detailed Borehole Logs
- B Laboratory Index Test Results
- C Rock Core Photos

List of Figures

Figure 1 Site Plan	2
--------------------------	---

**REVISED Geotechnical Investigation
North Wharf (Structure 406)
Lamèque, New Brunswick**

1.0 Introduction

GEMTEC Limited was retained by Valron Engineers Inc. to undertake a geotechnical investigation for the proposed replacement of the north wharf (structure 406) in Lamèque, New Brunswick. The proposed wharf design will consist of two Berlin Wall structures tied together with a slab-on-grade deck.

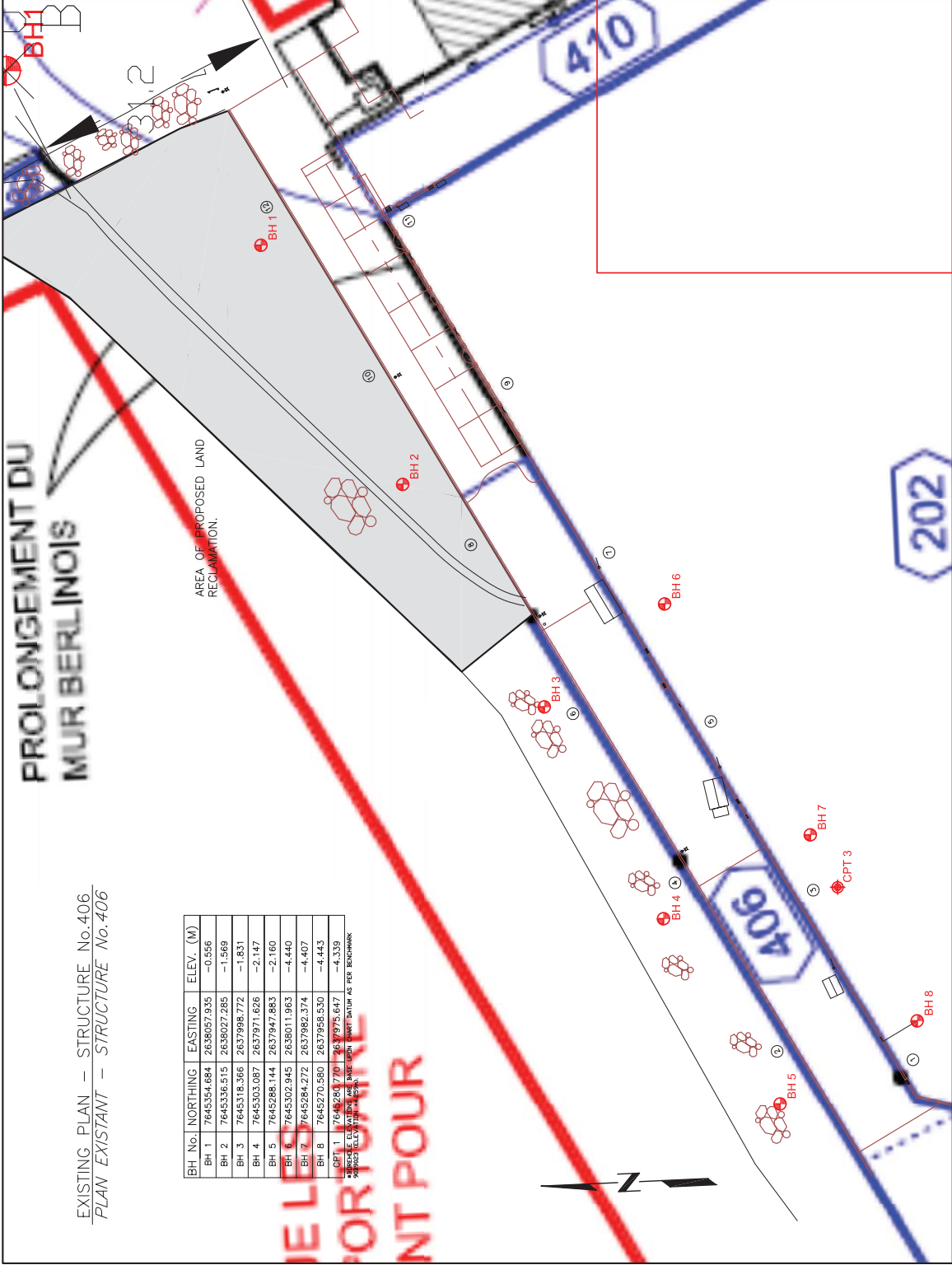
In order to assess the soil and bedrock conditions, eight boreholes (BH) were put down from 25 to 30 May 2010 using geotechnical drill rig mounted on a barge. Six boreholes were put down along the perimeter of the proposed wharf reconstruction and two were placed within the proposed land reclamation area. A cone penetration test (CPT) was also carried out within the inner harbour, adjacent to the wharf.

A site plan showing BH and CPT locations is presented in Figure 1. Boreholes were surveyed by GEMTEC Limited and reference Benchmark 90B9023, which has Chart Datum elevation of +4.259 metres.

**PROLONGEMENT DU
MUR BERLINOIS**

AREA OF PROPOSED LAND RECLAMATION.

2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 2616 2617 2618 2619 2620 2621 2622 2623 2624 2625 2626 2627 2628 2629 2630 2631 2632 2633 2634 2635 2636 2637 2638 2639 2640 2641 2642 2643 2644 2645 2646 2647 2648 2649 2650 2651 2652 2653 2654 2655 2656 2657 2658 2659 2660 2661 2662 2663 2664 2665 2666 2667 2668 2669 2670 2671 2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685 2686 2687 2688 2689 2690 2691 2692 2693 2694 2695 2696 2697 2698 2699 2700 2701 2702 2703 2704 2705 2706 2707 2708 2709 2710 2711 2712 2713 2714 2715 2716 2717 2718 2719 2720 2721 2722 2723 2724 2725 2726 2727 2728 2729 2730 2731 2732 2733 2734 2735 2736 2737 2738 2739 2740 2741 2742 2743 2744 2745 2746 2747 2748 2749 2750 2751 2752 2753 2754 2755 2756 2757 2758 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2769 2770 2771 2772 2773 2774 2775 2776 2777 2778 2779 2780 2781 2782 2783 2784 2785 2786 2787 2788 2789 2790 2791 2792 2793 2794 2795 2796 2797 2798 2799 2800 2801 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818 2819 2820 2821 2822 2823 2824 2825 2826 2827 2828 2829 2830 2831 2832 2833 2834 2



BOREHOLE LOCATION - MAY 2010
BOREHOLE LOCATION - FEB 1955
(APPROX. LOCATION)
CPT LOCATION - MAY 2010

Drawn By	TDS	Checked By
Calculations By		Checked By

Date	AUGUST 2014
------	-------------

Project

Drawing

BOREHOLE AND CPT LOCATION PLAN
(REVISED)

Scale 1:500



0 10 20 30m

File No.	Drawing	Revision No.
07371501	D01	0



GEMTEC
CONSULTING ENGINEERS
AND SCIENTISTS

2.0 Site Conditions

The existing wharf consists of a timber crib structure founded on timber piles with a concrete panel deck. The existing concrete deck elevation is at +2.89 metres \pm . The elevation at the bottom of the inner harbour, adjacent to the wharf, is at about -4.5 metres \pm . The elevation at the bottom of the outside face of the harbour ranges from -0.5 to -2.2 metres.

3.0 Soil and Bedrock Conditions

The soil and bedrock encountered generally consists of a layer of marine silt/sand underlain by glacial till to bedrock.

3.1 Soil

The compactness of the marine silt/sand ranges from very loose to medium based on standard penetration test (SPT) N-values that range from 0 to 17, averaging 4. The results of four moisture content and grain size analyses shows that the silt/sand layer has a natural moisture content that ranges from 18.1 to 69.4% averaging 33.2%, and contains 7 to 23% gravel, 23 to 68% sand and 10 to 71% silt and clay sized particles. Detailed laboratory index tests are appended (Appendix B).

The glacial till consists of reddish brown silt and sand with some gravel and sandstone cobbles. The till was encountered at depths ranging from 1.1 to 5.0 metres, averaging 2.4 metres below the harbour bottom. The compactness of the till ranges from loose to very dense based on SPT N-values that range from 7 to 60, averaging 22. The results of one moisture content and grain size analysis shows that the till layer has a natural moisture content of 12.6%, and contains 10% gravel, 37% sand and 53% silt and clay sized particles.

The result of the CPT test shows that the upper 1 metre (\pm) of soil below the harbour bottom is very loose based on a CPT tip stress of about 100 kPa. Below this, a medium to dense silt/sand was encountered with a tip stress of about 3500 kPa on average. Detailed CPT log is appended (Appendix A)

3.2 Bedrock

Weathered mudstone bedrock was encountered at depths ranging from 2.3 to 7.4 metres, averaging 4.1 metres below the harbour bottom. The mudstone quality is very poor based on rock quality designation (RQD) of 0%.

Siltstone bedrock was encountered at BH 1, 2, 3, and 6 at depths ranging from 3.94 to 6.83 metres, averaging 5.5 metres below the harbour bottom. The siltstone quality is very poor based on RQD of 0%.

Sandstone bedrock was encountered at depths ranging from 4.6 to 8.2 metres, averaging 6.7 metres below the harbour bottom. The sandstone quality is very poor to poor based on RQD values that range from 0 to 28%, averaging 10%.

Refer to borehole logs for detailed soil and bedrock stratigraphy (Appendix A)

Digital photos of the bedrock core samples are appended (Appendix C)

4.0 Discussion and Recommendations

We understand that the new wharf will consist of a double Berlin wall design. This design consists of steel H piles driven into bedrock with pre-cast concrete panels installed between the piles.

Wharf Replacement

At this time we provide the following design recommendations:

- Steel H piles may be driven about 3 metres into the mudstone bedrock provide that piles are driven to refusal (i.e. > 10 blows per 25 mm) using a hammer with a rated energy of at least 2000 ft-lbs/in² of steel cross sectional area. In addition, piles should be equipped with a driving shoe.
- The highly weathered mudstone/siltstone/sandstone may behave as a stiff soil. For design purposes, the passive resistance of the bedrock could be estimated using an undrained shear strength (C_u) of 150 kPa. In addition, the upper 1 metre of the bedrock should not be taken into account for passive resistance.
- The Berlin wall should be backfilled using NBDOT 75 mm minus crushed rock or gravel subbase placed in 300 mm thick lifts and compacted to 95% of the maximum dry density as determined by ASTM D698 (Standard Proctor).
- A 150 mm thick layer of NBDOT 31.5 mm minus crushed rock or gravel base should be placed directly below the slab-on-grade. This layer should be compacted to 95% of standard proctor.
- The friction angle and bulk unit weight of the compacted crushed rock backfill may be taken as 36 degrees and 22 kN/m³, respectively. Therefore, the active (K_a), passive (K_p) and at-rest (K_o) pressure coefficients may be taken as; $K_a = 0.26$, $K_p = 2.43$ and $K_o = 0.41$.
- During construction, a geotechnical engineer should assess the bottom of the timber crib wharf excavation to ensure that the remaining timber crib and sandstone fill is suitable to support the new granular backfill. Some isolated settlement may occur if voids are

present within the existing sandstone fill or if the remaining timber crib decays significantly over the years. The reinforced concrete slab-on-grade deck should be designed to bridge some minor localized settlements.

Proposed Land Reclamation

The harbour bottom at BH 1 and BH 2, within the proposed land reclamation area, is at elevation -0.6 and -1.6 metres, respectively. Therefore, about 3 to 4 metres of fill would be required to raise the area to elevation of $+2.89$ metres (existing wharf deck).

Based on a 1.5 and 1.9 metre thick layer of loose to medium dense silt and sand at BH 1 and BH 2 we would anticipate about 150mm of settlement under fill loading.

For preliminary design purposes, we would recommend 3H:1V side sloped. The steepness of the slope is a function of the infill soil type and thickness. Once the design of the proposed land reclamation area is finalized, GEMTEC Ltd. would be pleased to review the stability of the final geometry.

We understand that others will design the armour stone.

5.0 General

This report solely addresses the geotechnical aspects of the site and cannot be regarded as an environmental assessment of the site.

The boreholes and the CPT put down on this site were widely separated therefore soil and bedrock conditions may vary from those determined at the borehole locations. Although representative samples have been collected throughout the site, GEMTEC Limited should be contacted immediately if the soil and bedrock encountered during excavation differs from those encountered in our geotechnical investigation in order to reassess our recommendations.

Appendix A

Descriptive Terms, CPT and Detailed Borehole Logs



GEMTEC

CONSULTING ENGINEERS
AND SCIENTISTS

FREDERICTON, MONCTON, BATHURST, GRAND FALLS, SAINT JOHN, NB

DESCRIPTIVE TERMS- BOREHOLE/TEST PIT LOG

SOILS

GRAIN SIZE

DESCRIPTIVE TERMINOLOGY

TRACE	SOME	ADJECTIVE	and > 35% noun > 35% and main fraction
trace clay, etc.	some gravel, etc.	silty, etc.	sand and gravel, etc.

COMPACTNESS
gravels, sands, tills

N, RANGE	0 - 4	4 - 10	10 - 30	30 - 50	> 50
DENSITY	V. LOOSE	LOOSE	MEDIUM	DENSE	V. DENSE

CONSISTENCY
silt, clay

S, KPa	< 12.5	12.5 - 25	25 - 50	50 - 100	100 - 200
CONSISTENCY	V. SOFT	SOFT	MEDIUM	STIFF	V. STIFF

ROCK

RQD

0 - 25

25 - 50

50 - 75

75 - 90

90 - 100

OVERALL QUALITY

VERY POOR

POOR

FAIR

GOOD

EXCELLENT

FRACTURE SPACING

VERY CLOSE 20 - 60 mm

CLOSE 60 - 200 mm

MODERATE 200 - 600 mm

WIDE 600 - 2000 mm

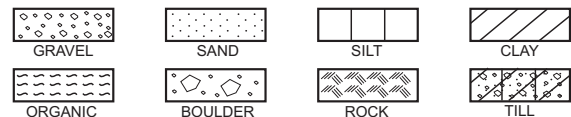
VERY WIDE 2 - 6 m

COMP. STR. MPa	1 - 5	5 - 25	25 - 50	50 - 100	100 - 250
DESCRIPTION	V. WEAK	WEAK	MODERATE	STRONG	V. STRONG

SAMPLE TYPES (location to scale on log)

S SPLIT TUBE G SHOVEL
 T SHELBY TUBE H CARVED BLOCK
 P PISTON K SLOTTED
 F AUGER V IN SITU VANE
 W WASH NR NO RECOVERY

LOG SYMBOLS



ROCK CORES A(30mm); B(41mm); N(54mm)



N - standard penetration test; blows by 475 J drop hammer to advance Std. 50mm O.D. split tube sampler 0.3m
 RQD - percent of core consisting of hard, sound pieces in excess of 100mm long (excluding machine breaks)
 RECOVERY - sample recovery expressed as percent or length
 S - shear strength, kPa; vane \oplus ; penetrometer \blacksquare ; unconfined \circ ; U_c unconfined compressive strength
 S_r - shear strength, remoulded; vane \otimes ; penetrometer \square
 Dd - dry density; t/m^3
 W - natural moisture content, percent *
 PL - plastic limit, percent —
 LL - liquid limit, percent —
 ND - non detect, total petroleum hydrocarbons (TPH) not detected in soil
 Groundwater Level ∇ ; Seepage ∇

BOREHOLE LOGS

Client				VALRON Engineers Inc		Proj No.		737.15		BOREHOLE	
Project				Geotechnical Investigation - North Wharf (Structure 406)		Date Drilled		28.May.2010		BH 1	
Location				Lameque Wharf, New Brunswick						Page 1 of 1	
Ground Level, m		Datum:		Chart		Logged By		TDS			
-0.56											

DEPTH m	SAMPLE				LOG	DESCRIPTION	
	No	TYPE	N (RQD)	REC (mm)			
0	1	S	10	450		Dark grey gravelly SAND, some organics, trace silt	
1	2	S	14	480			
	3	S	17	610			
2	4	S	101	620		Reddish brown silty sand, some gravel and sandstone cobbles, trace to some clay (GLACIAL TILL)	
	5	NQ	0	127		Highly weathered MUDSTONE BEDROCK	
	6	NQ	0	1270			
4							
	7	NQ	0	991		Highly weathered green to grey SANSTONE BEDROCK	
5							
	8	NQ	0	1118		Interbedded MUDSTONE/SILTSTONE BEDROCK with mud seams	
6							
	9	NQ	0	1118			
8							
9						End of borehole 9.02	

0 25 50 75 100

Undrained Shear Strength - kPa

○ Unconfined Compression
⊕ Field Vane Test
Water Content & Atterburg Limits
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m

■ Pocket Penetrometer
⊗ Remoulded

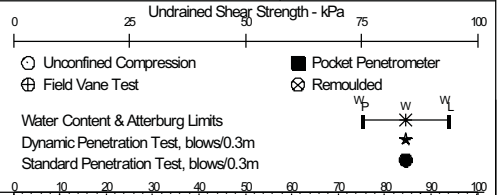
W_p W_L W_U

0 10 20 30 40 50 60 70 80 90 100

BOREHOLE LOGS

Client				VALRON Engineers Inc		Proj No.		737.15		BOREHOLE	
Project				Geotechnical Investigation - North Wharf (Structure 406)		Date Drilled		29.May.2010		BH 2	
Location				Lameque Wharf, New Brunswick						Page 1 of 1	
Ground Level, m				-1.57		Datum:		Chart		Logged By	
								TDS			

DEPTH m	SAMPLE				LOG	DESCRIPTION	
	No	TYPE	N (RQD)	REC (mm)			
0	1	S	0	300		Black SAND and SILT, some organics, trace gravel	
	2	S	2	580			
1	3	S	2	370			
					1.50	Reddish brown silty sand, some clay and sandstone cobbles, trace gravel (GLACIAL TILL)	-3.07
2	4	S	40	410		Highly weathered MUDSTONE BEDROCK	-3.87
	5	S	77	305			
3	6	NQ	0	787			
	7	NQ	0	813			
4							
	8	NQ	0	1270			
5							
6							
7					6.83	Highly weathered SILTSTONE BEDROCK	-8.40
	9	NQ	13	1321			
8					8.08	Grey, coarse grain SANDSTONE BEDROCK	-9.65
					8.99	End of borehole at 8.99 metres.	-10.56



BOREHOLE LOGS

Client					VALRON Engineers Inc		Proj No.		737.15		BOREHOLE			
Project					Geotechnical Investigation - North Wharf (Structure 406)		Date Drilled		29.May.2010		BH 3			
Location					Lameque Wharf, New Brunswick						Page 1 of 1			
Ground Level, m			Datum:			Chart			Logged By			TDS		
-1.83														

DEPTH m	SAMPLE				LOG	DESCRIPTION	
	No	TYPE	N (RQD)	REC (mm)			
0	1	S	1	310		Black silt, some organics (seashells)	
	2	S	3	500		- some clay	
1	3	S	0	350		- wood debris	
2	4	S	8	300		Reddish brown silty sand, some gravel and sandstone cobbles, trace to some clay (GLACIAL TILL)	
	5	S	22	250		Highly weathered MUDSTONE BEDROCK	
3	6	S	33	390			
4	7	S	29	200			
	8	S	74	300			
5	9	NQ	0	991			
6						Highly weathered SILTSTONE BEDROCK	
7	10	NQ	0	1448			
8						Grey, coarse to medium SANDSTONE BEDROCK with horizontal fractures	
	11	NQ	13	1524			
9							
						End of borehole at 9.93 metres.	

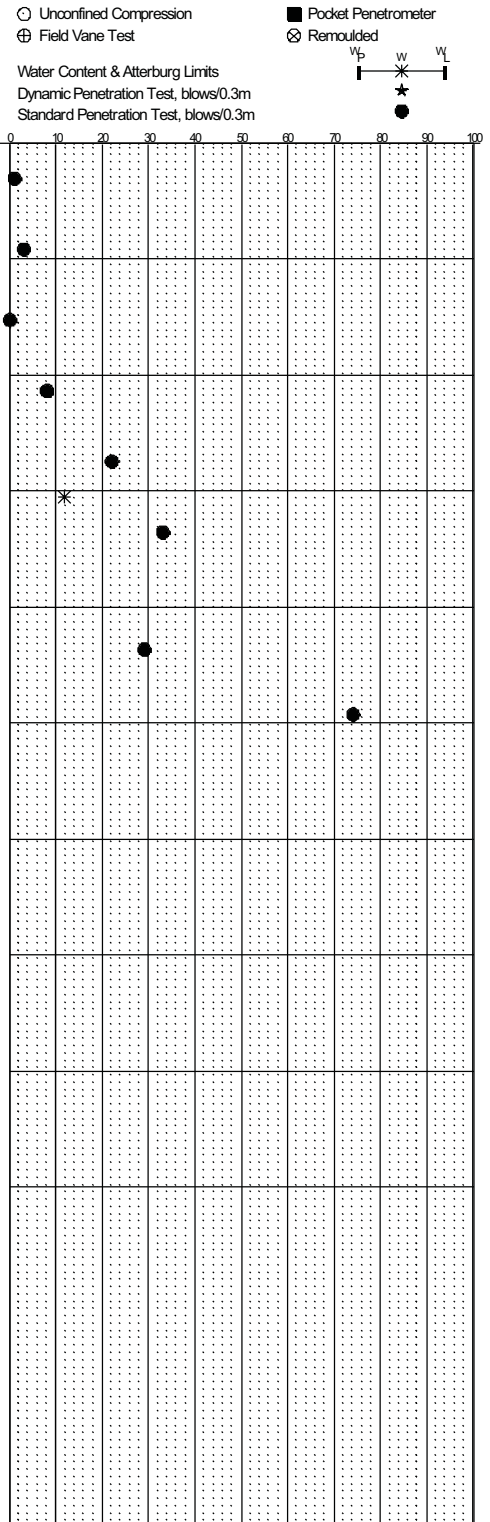
Undrained Shear Strength - kPa

0 25 50 75 100

○ Unconfined Compression
⊕ Field Vane Test
□ Remoulded

Water Content & Atterburg Limits
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m

W_p W_L W_U



BOREHOLE LOGS

Client					VALRON Engineers Inc					Proj No.		737.15		BOREHOLE			
Project					Geotechnical Investigation - North Wharf (Structure 406)					Date Drilled		28.May.2010		BH4			
Location					Lameque Wharf, New Brunswick									Page 1 of 1			
Ground Level, m					-2.15					Datum:		Chart		Logged By		TDS	
<div><div>DEPTH m</div><div>0</div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div><div>6</div><div>7</div><div>8</div><div>9</div><div>10</div><div>11</div></div> <div><div>SAMPLE</div><div>No</div><div>TYPE</div><div>N (RQD)</div><div>REC (mm)</div></div> <div><div>LOG</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>																	

BOREHOLE LOGS

Client					VALRON Engineers Inc					Proj No.		737.15		BOREHOLE	
Project					Geotechnical Investigation - North Wharf (Structure 406)					Date Drilled		29.May.2010		BH 5	
Location					Lameque Wharf, New Brunswick									Page 1 of 1	
Ground Level, m					Datum: Chart					Logged By TDS					
-2.16															
DEPTH m	SAMPLE				LOG	DESCRIPTION									
	No	TYPE	N (RQD)	REC (mm)											
0	1	S	0	130											
1	2	S	2	250											
	3	S	1	400											
2	4	S	4	410											
	5	S	5	0											
	6	S	7	300											
3															

BOREHOLE LOGS

Client VALRON Engineers Inc

Proj	737.15
No.	

BOREHOLE

Project	Geotechnical Investigation - North Wharf (Structure 406)
---------	--

Date Drilled 27.May.2010

BH 6

Page 1 of 1

Location	Lameque Wharf, New Brunswick
----------	------------------------------

Ground Level, m

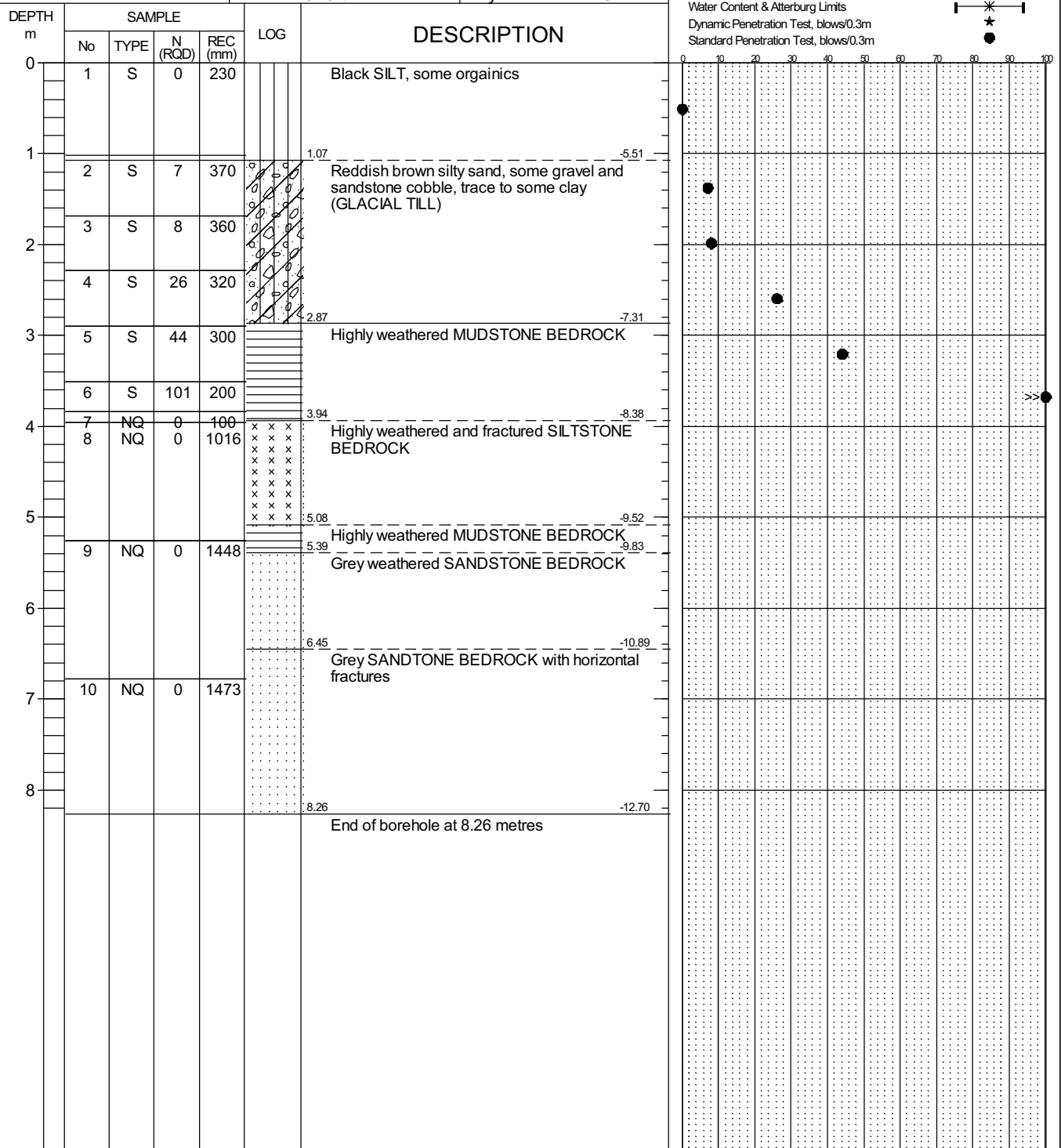
-4.44

Datum:

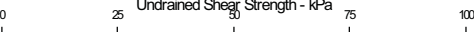
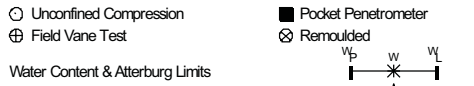
Chart

Logged

TDS



BOREHOLE LOGS

Client VALRON Engineers Inc						Proj No. 737.15		BOREHOLE BH 7																																																																																									
Project Geotechnical Investigation - North Wharf (Structure 406)						Date Drilled 27.May.2010		Page 1 of 1																																																																																									
Location Lameque Wharf, New Brunswick																																																																																																	
Ground Level, m -4.41		Datum: Chart		Logged By TDS																																																																																													
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DEPTH m</th> <th colspan="4">SAMPLE</th> <th rowspan="2">LOG</th> <th rowspan="2">DESCRIPTION</th> </tr> <tr> <th>No</th> <th>TYPE</th> <th>N (RQD)</th> <th>REC (mm)</th> </tr> </thead> <tbody> <tr><td>0</td><td>1</td><td>S</td><td>0</td><td>100</td><td></td><td>Black SILT, some organics</td></tr> <tr><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td>2</td><td>S</td><td>13</td><td>370</td><td></td><td>1.52</td></tr> <tr><td>3</td><td>3</td><td>S</td><td>16</td><td>510</td><td></td><td></td></tr> <tr><td>4</td><td>4</td><td>S</td><td>27</td><td>260</td><td></td><td></td></tr> <tr><td>5</td><td>5</td><td>S</td><td>101</td><td>370</td><td></td><td></td></tr> <tr><td>6</td><td>6</td><td>NQ</td><td>0</td><td>381</td><td></td><td>3.86</td></tr> <tr><td>7</td><td>7</td><td>NQ</td><td>0</td><td>1092</td><td></td><td></td></tr> <tr><td>8</td><td>8</td><td>NQ</td><td>7</td><td>1524</td><td></td><td>6.47</td></tr> <tr><td>9</td><td>9</td><td>NQ</td><td>0</td><td>1549</td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td>8.94</td></tr> </tbody> </table> </div> <div style="width: 65%;"> <p>Weathered MUDSTONE BEDROCK</p> <p>Grey coarse to medium grained SANDSTONE BEDROCK</p> <p>End of borehole 8.94 metres.</p> </div> </div>										DEPTH m	SAMPLE				LOG	DESCRIPTION	No	TYPE	N (RQD)	REC (mm)	0	1	S	0	100		Black SILT, some organics	1							2	2	S	13	370		1.52	3	3	S	16	510			4	4	S	27	260			5	5	S	101	370			6	6	NQ	0	381		3.86	7	7	NQ	0	1092			8	8	NQ	7	1524		6.47	9	9	NQ	0	1549			10						8.94
DEPTH m	SAMPLE				LOG	DESCRIPTION																																																																																											
	No	TYPE	N (RQD)	REC (mm)																																																																																													
0	1	S	0	100		Black SILT, some organics																																																																																											
1																																																																																																	
2	2	S	13	370		1.52																																																																																											
3	3	S	16	510																																																																																													
4	4	S	27	260																																																																																													
5	5	S	101	370																																																																																													
6	6	NQ	0	381		3.86																																																																																											
7	7	NQ	0	1092																																																																																													
8	8	NQ	7	1524		6.47																																																																																											
9	9	NQ	0	1549																																																																																													
10						8.94																																																																																											

BOREHOLE LOGS

Client				VALRON Engineers Inc		Proj No.		737.15		BOREHOLE	
Project				Geotechnical Investigation - North Wharf (Structure 406)		Date Drilled		26.May.2010		BH 8	
Location				Lameque Wharf, New Brunswick						Page 1 of 1	
Ground Level, m		Datum:		Chart		Logged By		TDS			
-4.44											

DEPTH m	SAMPLE				LOG	DESCRIPTION	
	No	TYPE	N (RQD)	REC (mm)			
0	1	S	0	550		Black SILT, some organics (seashells and wood)	
1	2	S	1	260			
2	3	S	7	470		1.70 Reddish brown SAND, trace gravel -6.14	
	4	S	5	390		2.04 Light brown clayey SILT, some pebbles and gravel -6.48	
3	5	S	23	450		3.05 Reddish brown SILT and SAND, some gravel and sandstone cobbles, trace to some clay (GLACIAL TILL) -7.49	
4	6	S	60	400			
	7	S	24	410			
5	8	S	28	310			
	9	S	101	230			
6	10	NQ	0	580		5.77 Grey coarse to medium grained SANDSTONE BEDROCK -10.21	
	11	NQ	14	1470			
7							
8	12	NQ	27	1520			
9							
						9.45 End of borehole at 9.45 metres. -13.89	

0 25 Undrained Shear Strength - kPa 75 100

○ Unconfined Compression ■ Pocket Penetrometer

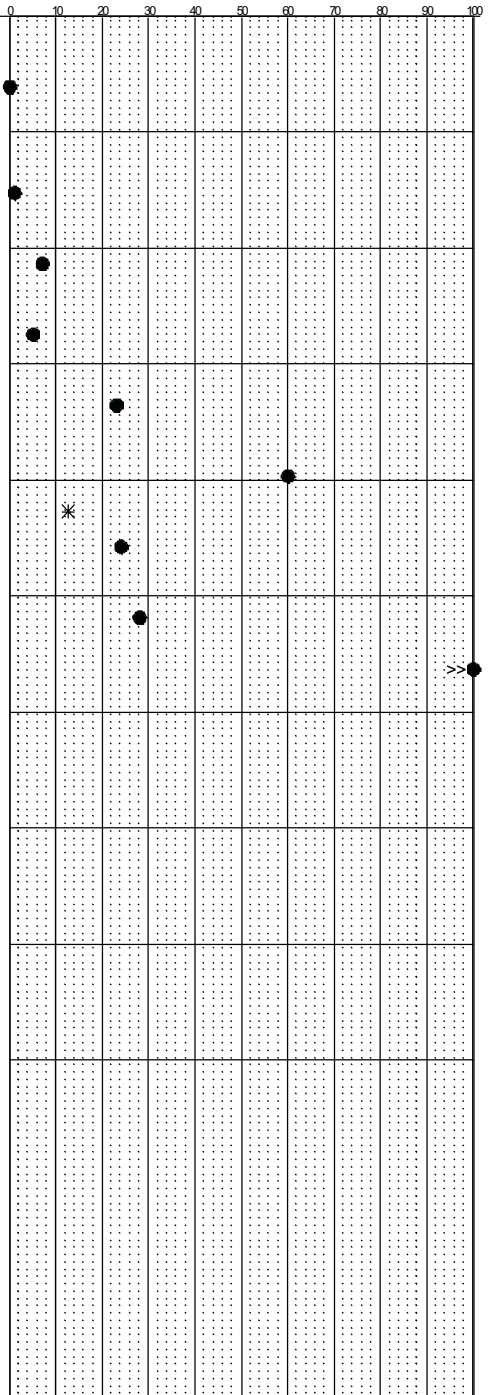
⊕ Field Vane Test ⊗ Remoulded

Water Content & Atterburg Limits

Dynamic Penetration Test, blows/0.3m

Standard Penetration Test, blows/0.3m

W_p W_L W_U



Appendix B
Laboratory Index Test Results



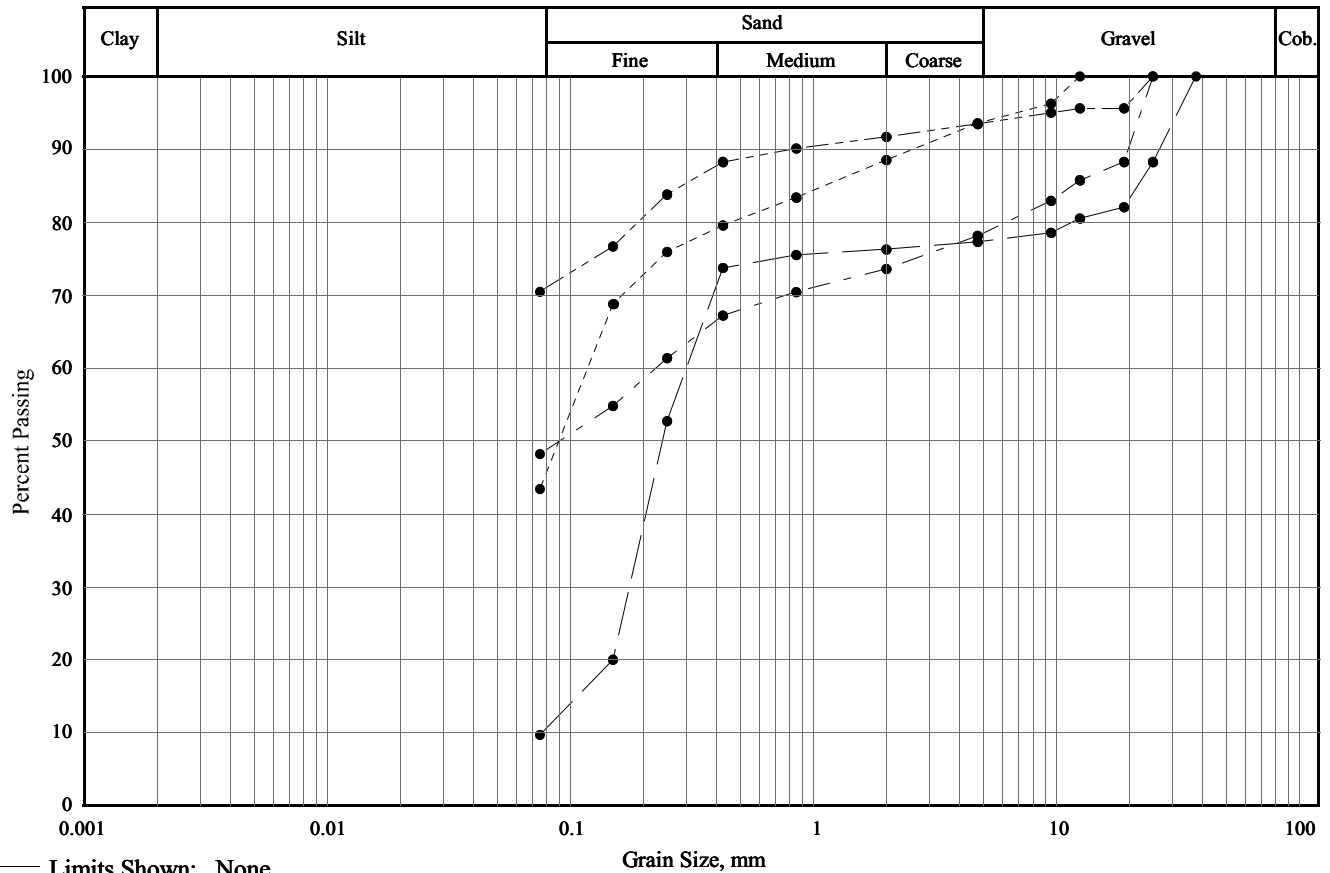
GEMTEC LIMITED
GROUND ENGINEERING
& MATERIALS TECHNOLOGY

Client: VALRON Engineers Inc.

Project: Geotechnical Investigation, Lamèque Wharf Structure No

Project #: 073715

Soils Grading Chart



Line Symbol	Description	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay	Date Sampled
— — — —		1	2	.91-1.52m	22.7	67.6	9.7		02/06/2010
- - - - -		2	2	.61-1.22m	6.5	50.1	43.4		02/06/2010
- . - . -		3	6	3.05-3.66m	21.9	30.0	48.2		02/06/2010
.		4	5	3.20-3.81m	6.5	23.0	70.5		02/06/2010

Line Symbol	Sample Description	AASHTO	D ₁₀	D ₁₅	D ₅₀	D ₈₅	% 5-75µm
— — — —	Gravelly sand , trace silt	A-2-4	0.0765	0.1072	0.2397	21.6663	---
- - - - -	Sand and silt , trace gravel	A-4 to A-7	---	---	0.0898	1.1166	---
- . - . -	Gravelly sandy silt	A-4 to A-7	---	---	0.0906	11.6437	---
.	Sandy silt , trace gravel	A-6(6)	---	---	---	0.2884	---



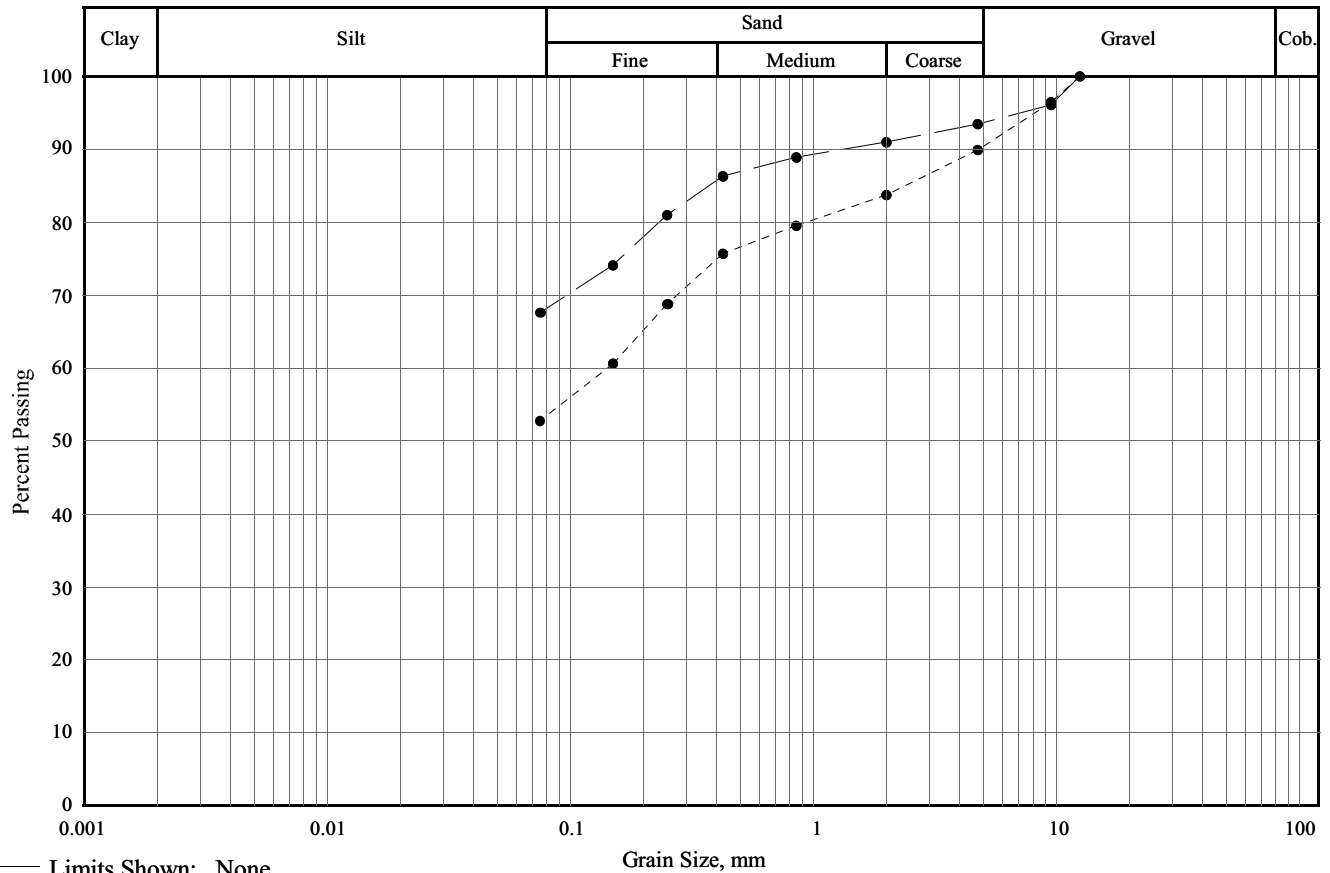
GEMTEC LIMITED
GROUND ENGINEERING
& MATERIALS TECHNOLOGY

Client: VALRON Engineers Inc.

Project: Geotechnical Investigation, Lamèque Wharf Structure No

Project #: 073715

Soils Grading Chart



Line Symbol	Description	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay	Date Sampled
— — —		5	7	4.06-4.67m	6.6	25.9	67.6		02/06/2010
- - - - -		8	7	4.27-4.88m	10.1	37.1	52.7		02/06/2010

Line Symbol	Sample Description	AASHTO	D ₁₀	D ₁₅	D ₅₀	D ₈₅	% 5-75µm
— — —	Sandy silt , trace gravel	A-6(7)	---	---	---	0.3736	---
- - - - -	Silt and sand , some gravel	A-4 to A-7	---	---	---	2.4021	---



GEMTEC LIMITED
GROUND ENGINEERING
& MATERIALS TECHNOLOGY

Client VALRON Engineers Inc.

Project: Geotechnical Investigation, Lamèque Wharf Structure No

Project #: 073715

Atterberg Limits

Description:

Borehole/Test Pit: 4

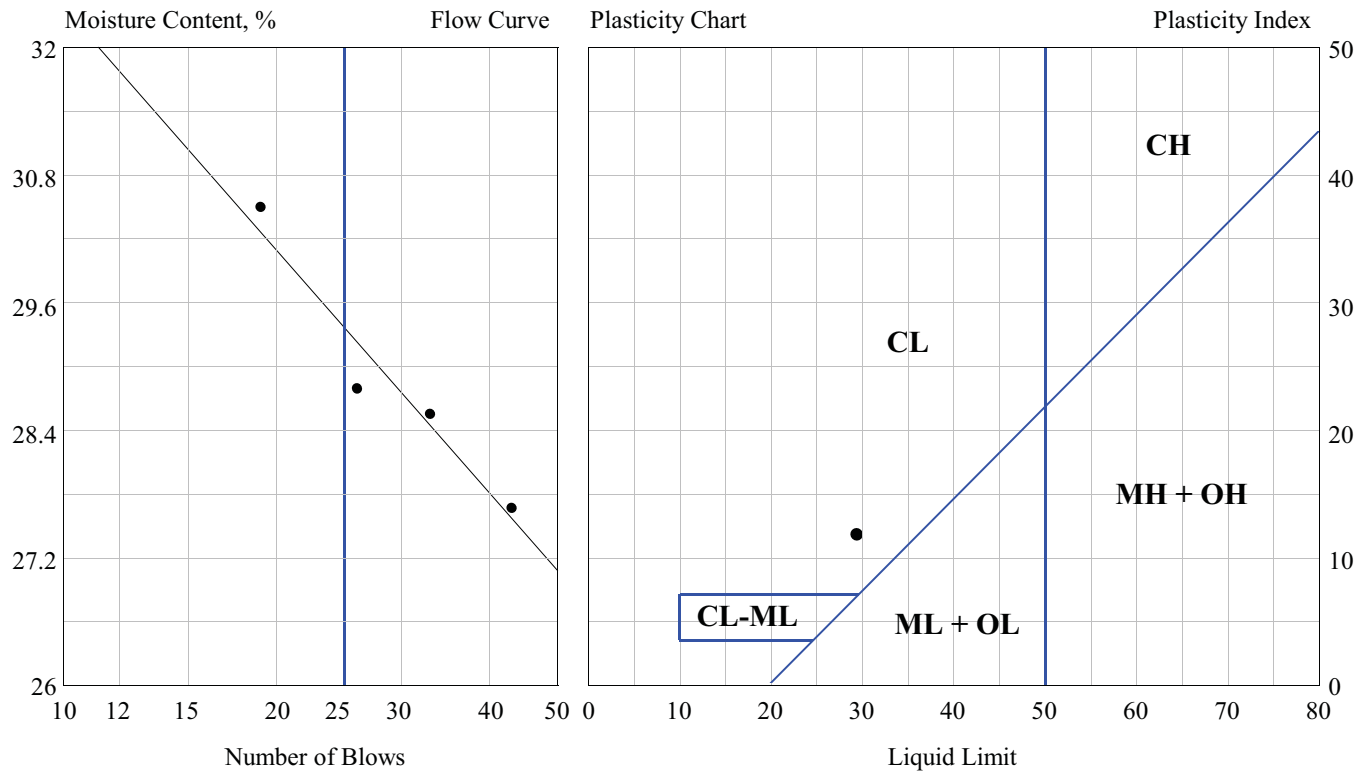
Sample Number: 5

Depth: 3.20-3.81m

Date Sampled: 02/06/2010

Date Tested: 07/06/2010

Liquid Trial #	1	2	3	4	5	6
Number of blows:	43	33	26	19		
Mass of cont. + wet soil, g:	23.02	22.95	26.74	23.99		
Mass of cont. + dry soil, g:	20.74	20.50	24.16	21.37		
Mass of container, g:	12.50	11.92	15.20	12.78		
Moisture content, %:	27.7	28.6	28.8	30.5		
Plastic Trial #	1	2	3			
Mass of cont. + wet soil, g:	15.09	17.21	17.98			
Mass of cont. + dry soil, g:	14.68	16.85	17.62			
Mass of container, g:	12.30	14.87	15.52			
Moisture content, %:	17.2	18.2	17.1			
Liquid Limit:	29.4					
Plastic Limit:	17.5	<input type="checkbox"/> NP				
Plasticity Index:	11.8					





GEMTEC LIMITED
GROUND ENGINEERING
& MATERIALS TECHNOLOGY

Client VALRON Engineers Inc.

Project: Geotechnical Investigation, Lamèque Wharf Structure No

Project #: 073715

Atterberg Limits

Description:

Borehole/Test Pit: 5

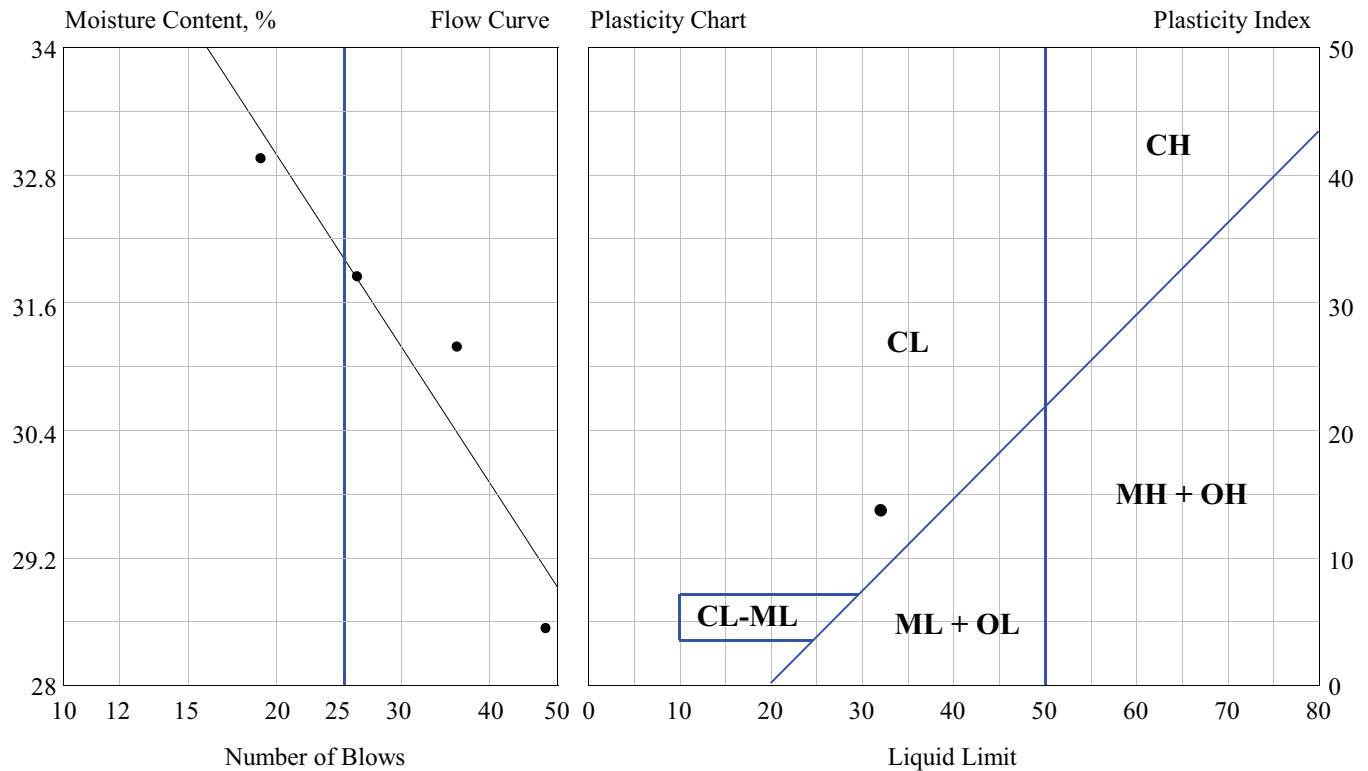
Sample Number: 7

Depth: 4.06-4.67m

Date Sampled: 02/06/2010

Date Tested: 07/06/2010

Liquid Trial #	1	2	3	4	5	6
Number of blows:	48	36	26	19		
Mass of cont. + wet soil, g:	25.85	21.80	23.30	23.48		
Mass of cont. + dry soil, g:	23.31	19.57	21.30	20.54		
Mass of container, g:	14.41	12.42	15.02	11.62		
Moisture content, %:	28.5	31.2	31.8	33.0		
Plastic Trial #	1	2	3			
Mass of cont. + wet soil, g:	14.76	17.79	15.07			
Mass of cont. + dry soil, g:	14.32	17.34	14.63			
Mass of container, g:	11.92	14.91	12.18			
Moisture content, %:	18.3	18.5	18.0			
Liquid Limit:	32.0					
Plastic Limit:	18.3	<input type="checkbox"/> NP				
Plasticity Index:	13.7					





GEMTEC LIMITED
GROUND ENGINEERING
& MATERIALS TECHNOLOGY

Client VALRON Engineers Inc.

Project: Geotechnical Investigation, Lamèque Wharf Structure N

Project # 073715

Moisture Content and Density

Borehole: 1	Date/Time Sampled: 10-06-02 4:22:00 PM	Mass of Cont. + Wet Soil, g:	858.60
Depth: .91-1.52m	Date/Time Tested: 10-06-07 4:23:22 PM	Mass of Cont. + Dry Soil, g:	728.20
Sample: 2		Mass of Container, g:	166.10
Description:		Moisture Content, %:	23.20
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	
Borehole: 2	Date/Time Sampled: 10-06-02 4:24:00 PM	Mass of Cont. + Wet Soil, g:	661.60
Depth: .61-1.22m	Date/Time Tested: 10-06-07 4:24:59 PM	Mass of Cont. + Dry Soil, g:	457.50
Sample: 2		Mass of Container, g:	163.20
Description:		Moisture Content, %:	69.35
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	
Borehole: 3	Date/Time Sampled: 10-06-02 4:26:00 PM	Mass of Cont. + Wet Soil, g:	765.70
Depth: 3.05-3.66m	Date/Time Tested: 10-06-07 4:26:56 PM	Mass of Cont. + Dry Soil, g:	706.30
Sample: 6		Mass of Container, g:	203.30
Description:		Moisture Content, %:	11.81
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	



GEMTEC LIMITED
GROUND ENGINEERING
& MATERIALS TECHNOLOGY

Client VALRON Engineers Inc.

Project: Geotechnical Investigation, Lamèque Wharf Structure N

Project # 073715

Moisture Content and Density

Borehole: 4	Date/Time Sampled: 10-06-02 9:16:00 AM	Mass of Cont. + Wet Soil, g:	629.10
Depth: 3.20-3.81m	Date/Time Tested: 10-06-07 4:20:31 PM	Mass of Cont. + Dry Soil, g:	545.40
Sample: 5		Mass of Container, g:	169.50
Description:		Moisture Content, %:	22.27
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	
Borehole: 5	Date/Time Sampled: 10-06-02 9:19:00 AM	Mass of Cont. + Wet Soil, g:	578.40
Depth: 4.06-4.67m	Date/Time Tested: 10-06-07 4:18:44 PM	Mass of Cont. + Dry Soil, g:	516.00
Sample: 7		Mass of Container, g:	170.40
Description:		Moisture Content, %:	18.06
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	
Borehole: 8	Date/Time Sampled: 10-06-02 4:29:00 PM	Mass of Cont. + Wet Soil, g:	697.70
Depth: 4.27-4.88m	Date/Time Tested: 10-06-07 4:30:35 PM	Mass of Cont. + Dry Soil, g:	638.60
Sample: 7		Mass of Container, g:	170.80
Description:		Moisture Content, %:	12.63
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	

Appendix C

Rock Core Photos



Figure 1 Borehole 1 (3.02 – 7.62 metres)



Figure 2 Borehole 1 (7.62 – 9.02 metres)



Figure 3 Borehole 2 (3.43 – 8.99 metres)



Figure 4 Borehole 2 (3.43 – 8.99 metres)



Figure 5 Borehole 3 (5.18 – 9.93 metres)



Figure 6 Borehole 4 (7.98 – 11.28 metres)



Figure 7 Borehole 5 (7.85 – 10.82 metres)



Figure 8 Borehole 6 (3.84 – 8.26 metres)



Figure 9 Borehole 7 (3.86 – 3.94 metres)



Figure 10 Borehole 7 (3.86 – 8.94 metres)



Figure 11 Borehole 8 (5.77 – 9.45 metres)