PRELIMINARY GEOTECHNICAL ASSESSMENT

JOHN ROBSON SCHOOL SITE

QUEENS AVENUE AND EIGHTH STREET

NEW WESTMINSTER, BC

File No. 091-02131

Prepared For:

School District No. 40 (New Westminster)
c/o Howard Bingham Hill Architects
#201 – 1444 Alberni Street
Vancouver, BC V6G 2Z4

2009 June 17

Prepared by:

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ISO 9001:2000 REGISTERED

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APPENDICES

1.0 INTRODUCTION

Trow Associates Inc. (Trow) has completed a preliminary geotechnical assessment for the proposed development of the John Robson School site. The scope of work was outlined in the proposal letter by Trow dated 2008 October 15.

This report presents the results of subsurface exploration and provides discussions and recommendations for geotechnical aspects of the proposed development.

The attached "Interpretation & Use of Study and Report" (Appendix A) contains instructions to readers and forms an integral part of this report and must be included with any copies of this report. This report does not include assessment of subsurface conditions with regards to environmental issues.

2.0 PROPOSED DEVELOPMENT, SITE DESCRIPTION AND HISTORICAL DATA

The proposed development is the subject of study alternatives ranging from upgrading and expansion of the existing buildings to a new school building alternative. The objective of the current geotechnical study is to provide basic geotechnical data about existing natural and fill strata, and groundwater conditions.

The proposed development site is located south of Queens Avenue, west of Eighth Street, north of Ontario Street and east of McInnis Street, in New Westminster, BC. The site is comprised of the existing school site to the north and City property to the south.

The existing site slopes/steps down from the north toward the south from a drained gravel field located near the intersection of Queens Avenue and Eighth Street to a playfield located in the centre portion of the site to an open field area near the intersection of McInnes Street and Ontario Street. Tennis courts are situated near the west portion of the site near the intersection of Queens Avenue and McInnes Street. The existing elementary school is situated on the east side of the site, south of the gravel field and midway between Queens and Royal Avenues, fronting on Eighth Street.

The following historical data has been reviewed for the current study:

- some records in New Westminster Archive Museum;
- circa 1885 photo of the site (looking west) showing a former jail and old Simcoe Street (right side in photo);
- 1897 Goad Fire Atlas Map showing the arrangement of Simcoe Street located along an east/west line, diagonal to Eighth Street and Queens Avenue;
- 1926 Block Plan showing a uniform contour topography slope down to the south, with a grade difference of 50 ft. from the intersection of Eighth Street and Queens Avenue down to Simcoe Street;

- aerial photos in 1938 and 1950 showing the school located north of old Simcoe Street. The old Simcoe street connected the intersections of Eighth Street and Royal Avenue, and McInnes Street and Queens Avenue.
- 1965 Plan by Justice and Webb Landscape Architect showing a playfield near the intersection of Queens Avenue and Eighth Street;
- recent site topography plans;
- recent utility drawings for exploration planning purposes.

It is inferred from the available data review that some cutting and filling has been done to establish current site grade. No evidence of buried natural ravines (former creeks) was found in the data for the site, but they have been found in the vicinity of the site.

3.0 GEOLOGICAL SETTING AND SITE CHARACTERIZATION

The surficial geology maps indicate the site is underlain by Vashon Drift and Capilano Sediments comprised of glacial and glaciofluvial deposits. Generally, the deposits consist of a till-like soil mixture of silt and sand, including some interbeds of glaciofluvial sand and glaciomarine stony silt.

Based on local experience, ground conditions have been generally outlined as follows:

Zone F	FILL, limited depths depending on historical land use, e.g., benches created by cut and fill
Zone A	SAND with some thin silty layers and till-like soils
Zone B	SILT, stiff
Zone C	SAND with some thin, silty layers and till-like soils

In general, the upper Zone A soils may have perched groundwater conditions, and possibly, local artesian conditions. The Zone B soils may form an aquaclude and the confining zone over Zone C soils, giving rise to some significant artesian groundwater condition within the Zone C soils.

4.0 FIELD AND LABORATORY WORK

The geotechnical exploration was conducted on 2009 June 6 and included:

- drilling of six auger holes (designated as AH09-1 to AH09-6) using a truck-mounted auger rig;
- five dynamic cone penetration test holes using truck mounted drill rig;

The machine auger holes were drilled to depths of about 15 to 25 ft. The approximate locations of the auger holes are shown on Figure 091-02131-1 in Appendix B. Soil descriptions of each test hole advanced at the site are included in the test hole logs in Appendix C.

The exterior fences, pathways and buried facilities restricted access for drilling purposes, and test holes were advanced in accessible areas.

Upon completion of drilling, the auger holes were generally backfilled with the auger cuttings and intermittent bentonite seals to meet the groundwater protection regulations. The geotechnical exploration was supervised by an engineer from Trow, who located the test holes, logged the subsurface conditions and gathered soil samples, which were returned to Trow's laboratory for visual classification and moisture content measurements.

The test holes indicated subsurface conditions only at the locations of test holes. The precision of the subsurface conditions indicated depends on the methods used, frequency of sampling, and the uniformity of the subsurface conditions. The spacing of the test holes, frequency of sampling, and the method of exploration have been selected to meet the needs of the project within constraints of the budget and schedule for preliminary geotechnical exploration purposes.

5.0 SOIL AND GROUNDWATER CONDITIONS

The test holes generally encountered the following soil types:

Zone F FILL

- sand, fine to medium, trace to some silt, some gravel
- loose
- encountered to depths of 3 to 7 ft.

Zone A SAND some silt to silty and some gravel, till-like soil

- some silt to silty, fine to medium grained with some gravel to gravelly
- thin silt layers encountered in three test holes
- compact near the surface to dense and very dense with greater depths

- moisture contents in range of 7 to 29%, except one sample 33%

At the time of the drilling, groundwater seepage was encountered in each test hole. At AH-09-1 and -3, saturated water conditions were noted at depth. Also, at AH09-1, seepage was noted to fluctuate, consistent with an upward seepage gradient. It should, however, be noted that groundwater may occur near the existing ground surface within the surficial granular fills and the more granular underlying native soils. The groundwater level may vary and fluctuate seasonally and in response to climatic conditions and local land use.

Subsurface conditions between test holes are inferred and may vary from conditions encountered at the test holes.

6.0 DISCUSSION AND RECOMMENDATIONS

6.1 General

The exploration test holes on site generally encountered surficial fill underlain by compact to very dense sand and silt till-like soil. It is considered feasible to support the proposed structures on conventional spread footings and floor slabs supported on the very dense sand and silt till-like soil. Existing fills are considered unsuitable for support of the proposed buildings. Permanent perimeter and underslab subsurface drainage systems are recommended. Conventional slab-on-grade floors and concrete basement walls are considered feasible.

The following outlines discussions and preliminary geotechnical recommendations. Additional foundation design analysis based on the proposed foundation arrangements are recommended for final design purposes, including the investigation of groundwater conditions. In particular, it is anticipated that significant groundwater inflow and/or artesian groundwater may be encountered at depth, e.g., deep basement into natural ground.

6.2 Foundations

6.2.1 Spread Footings

The dense to very dense sand and silt, till-like soil is considered an acceptable subgrade for support of the proposed building on strip and spread footing foundations.

For preliminary design, a maximum allowable bearing pressure (DL + LL) may be taken in the range of 4 to 6 ksf for strip and pad footings, respectively, placed on dense till-like natural soil. Footings supported on structural fill placed on dense natural soil may have a maximum allowable bearing pressure of 3 to 4 ksf.

The above preliminary design recommendations are based on underside of footings being placed at least 2 ft. (0.6m) below exterior finish grade for confinement and frost protection purposes. In

addition, for preliminary design purposes, the above allowable bearing pressures may be increased by a factor of 1.5 to obtain ultimate factored bearing resistance.

Strip and pad footings should have minimum base dimensions of at least 2 ft. and 5 ft., respectively. Footings located in proximity of buried service trenches and basements may have a reduced allowable bearing pressure, depending on temporary and finished grading configurations. For example, no temporary excavation should be taken into a zone below a footing defined by a gradient line taken at 2H:1V from the outside edge of the footing, so as to avoid disturbing the subgrade support for the footing.

6.2.2 Subgrade Preparation

The concrete foundations should be placed directly on undisturbed, dense till-like soil after removal of any loosened or weakened materials. If needed, structural concrete fill over dense till-like soil may be used to raise the design footing level. The geotechnical engineer should review the exposed subgrade in the field prior to placing concrete or formwork.

Sub-excavations for subgrade preparation purposes should be kept free of standing water. Any groundwater seepage, as well as surface run-off, would have to be controlled to avoid disturbing subgrades.

6.2.3 Settlement Estimates

Foundation settlement will primarily be due to elastic compression of the dense to very dense soils and any structural fill overlying the dense till-like soil under the applied loading of the structure. Elastic settlements will occur rapidly during and shortly after construction as dead load is applied. It is estimated that footings designed and built as outlined above would settle less than 1 inch total and less than about ¾ inch differentially over the typical 30 ft. width.

6.2.4 Seismic Considerations

The seismic design of the proposed building additions is to incorporate the 2006 BC Building Code (BCBC). The design earthquake refers to a 2% probability of exceedance in 50 years.

Based on the sub-surface profile as afore-mentioned, the average properties of the top 30m are consistent with very dense soils, which are considered to be non-liquefiable during the design earthquake events of the 2006 BCBC.

For building design complying 2006 BCBC, the subject site may be classified as Site Class C in accordance with 2006 BCBC (Table 4.1.8.4.A). This site classification may be used to determine the relevant design seismic parameters such as appropriate spectral response acceleration values Sa(T) for period T, as well as acceleration and velocity based site coefficients, Fa = 1.0 (for T = 0.2s) and Fv = 1.0 (for T = 1.0s), as per the 2006 BCBC (Table 4.1.8.4 B and C, respectively). In addition, a peak ground acceleration (PGA) of 0.49 may be used for the subject site, based on Appendix C, 2006 BCBC.

6.3 Slab-on-Grade

It is recommended that new slab-on-grade floors be placed on a drainage base layer consisting of at least 150mm thick of 19mm clear crushed gravel. The gravel bedding should be compacted to an equivalent of at least 95% of its Modified Proctor Maximum Dry Density. The underside of the slab should be provided with a vapour barrier, such as polyethylene sheeting, to inhibit migration of moisture. The drainage base layer should be hydraulically connected to a suitable sub-surface drainage system.

6.4 Structural Fill

Structural fill required to raise grade under footings may consist of concrete fill, placed on undisturbed, dense native soils after removal of any variable fills and loosened materials.

Granular structural fill required to raise grade beneath the proposed footings and slabs may consist of well-graded, free-draining sand and gravel (less than 5% fines) compacted to at least 95% of its Modified Proctor Maximum Dry Density. The structural fill should be placed on undisturbed, dense native soils after removal of any variable fills and loosened materials. However, reduced allowable bearing pressures would be recommended for footings placed on structural fills.

Based on the soils encountered in the auger drill holes, it is judged that most of the excavated on-site soils will generally not be suitable for re-use as structural fills for the proposed building as they contain significant fines contents. These soils are expected to be prone to poor workability especially under wet work conditions. However, further evaluation of re-use options at excavation areas may be warranted.

6.5 Drainage

It is recommended that a perimeter subsurface drainage system be provided, subject to further evaluation of groundwater and proposed development plans. It is estimated that a 150mm diameter, rigid PVC perforated pipe surrounded by granular drain rock placed around the perimeter of the new building foundations will be appropriate for a perimeter drainage system. The invert of the pipe should be located at least 300mm below finished slab grade. The underslab subsurface drainage base layer should be hydraulically connected to perimeter drain lines that discharge water to suitable disposal. Additional geotechnical guidelines for subsurface drainage would be provided once building plans have been developed, including at-grade as well as basement structures, and during construction, once existing conditions are exposed.

The subsurface water should be directed to pumped sumps or equivalent, separate from the surface water systems.

6.6 Basement Walls and Exterior Retaining Walls

6.6.1 Lateral Earth Pressures

The retaining walls and basement walls should be designed for lateral pressures, which would be applied by the backfill bearing against the outside of the wall and possible traffic pressures, assuming no hydrostatic pressures on the outside of the wall. The design lateral earth pressure may vary somewhat depending on the method of construction, the nature of the backfill soils and, in particular, on the amount of compaction in the backfill against the wall. It is recommended that only free-draining granular backfill materials be used against the retaining walls and basement walls.

The 2006 BCBC design lateral loads (static and seismic) for the retaining walls and basement walls are shown on the attached Figure No. 091-02131-2.

The geotechnical engineer should be given an opportunity to review the earth pressure used in the foundation wall design during the design stage, prior to construction.

6.6.2 Backfill

At areas where backfill is to be placed in an open cut between the proposed walls and a temporary excavation slope face, the backfilling should be carried out using free-draining sand and gravel (generally, less than 5% fines). The granular backfill should be compacted with vibratory equipment to achieve at least 95% of its Modified Proctor Maximum Dry Density. Backfill within the top 2 ft. should consist of silty soils to "seal" backfill at exterior areas to minimize surface water infiltration into the perimeter backfills and subsurface drainage system. The silty soils should be compacted to 90% Modified Proctor maximum dry density. Where the backfill is to support permanent structures such as pavement or landscaping walls, well-graded road base compacted to at least 95% Modified Proctor maximum dry density should be used as backfill within the top 2 ft. The exterior ground surface should be graded to encourage runoff away from the building.

6.7 Excavation

It is estimated that it would be practical to use conventional excavation equipment to excavate soils encountered in test holes at the site. Experience has shown that some ripping of hard zones may be required. In addition, large boulders may be encountered which may require splitting and/or blasting for removal. Based upon the test hole results, it is considered that excavations could be kept free of standing water using conventional pumping from sumps to facilitate excavation and/or shoring. However, requirements for excavation and permanent de-watering should be evaluated for final design purposes.

Temporary excavation slopes should be sloped back or, alternatively, suitable support systems should be provided.

6.8 Additional Study Considerations

Additional exploration and the installation of piezometers to measure groundwater conditions, may be appropriate depending on the proposed developments. In particular, groundwater conditions at the proposed basements, especially at the lower areas of the site should be evaluated for subsurface drainage design purposes.

It may also be appropriate to evaluate the stability of the proposed slopes in the proximity of the proposed development, once development plans are available.

Trow should be given the opportunity to review foundation plans provided by the structural engineer prior to final design and construction. Seismic design of footings may be provided on a site specific basis. The excavation design should be done by the geotechnical engineer.

6.9 Geotechnical Field Review

Field reviews should be carried out by the geotechnical engineer to confirm that site conditions are consistent with design assumptions. In particular, field review of excavation stability including any shoring, should be done during the work. Review of foundation subgrade soil should be done prior to placing concrete, skim coat or structural fills. Density tests should be done to confirm densities of structural fills and backfills and test results should be reviewed by the geotechnical engineer.

7.0 CLOSURE

This report is for the exclusive use of School District No. 40 (New Westminster) and their designated consultants for design of the development described and may not be used by others without the written consent of Trow.

We trust that this report will meet your present requirements. Please contact the undersigned if you have any questions, or require further assistance.

Prepared by:

Trow Associates Inc.

Don Sargent, P.Eng.
Senior Engineer

Reviewed by:

James Lau, P. Eng.
Senior Engineer

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Trow

Appendix A

Interpretation & Use of Study and Report

Trow

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, Trow Associates Inc. (Trow) 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 Trow. Further, Trow 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 Trow’s recommendations. Any reduction from the level of services normally recommended will result in Trow providing qualified opinions regarding adequacy of the work.

6.0 ALTERNATE REPORT FORMAT

When Trow submits both electronic file and hard copies of reports, drawings and other documents and deliverables (Trow’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 Trow 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 Trow shall be deemed to be the overall original for the Project.

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

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

Appendix B

Figures

- Testhole Location Plan
- Lateral Pressure for Basement Wall Design

Trow

LEGEND

AH09-3 — AUGERHOLE (APPROX. LOCATION)

SITE PLAN FROM HOWARD BINGHAM HILL DATED 2009 MAY 27

L:\2009\091-02131 PWS John Robson School, NW, BC\v8 Project Engineer's File\Vab\Location Plan.dwg
Jun 19, 2009 - 5:29pm

TROW ASSOCIATES INC.
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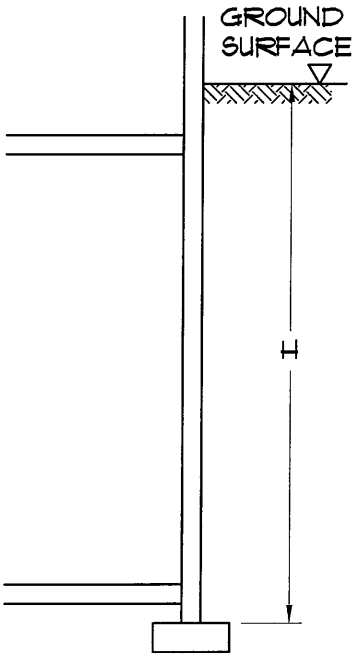
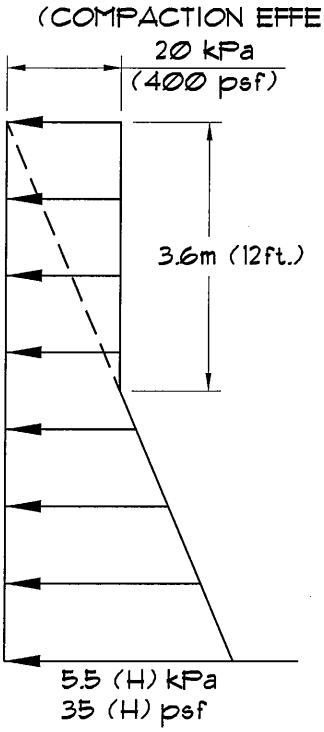
British Columbia, V5A 1X7
Telephone: 604-874-1245
Fax: 604-874-2358

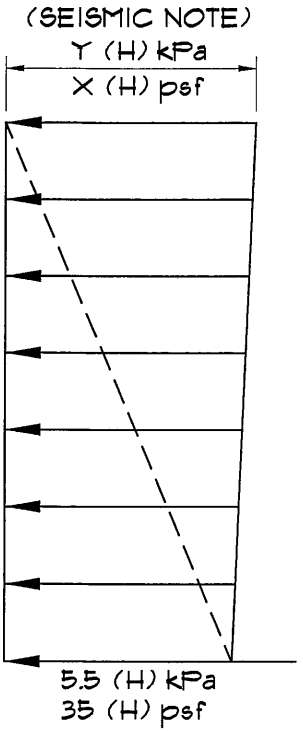
DFTR.	REVISIONS			CLIENT	TITLE:		
MG	No.	DESCRIPTION	DATE	SD40/HOWARD BINGHAM HILL	TESTHOLE LOCATION PLAN		
DSGN.				PROJECT			
				JOHN ROBSON SCHOOL SITE 8TH ST. & QUEENS AVE., NEW WESTMINSTER, B.C.			
CHK.				PROJECT NO.	DATE	SCALE:	DWG NO.
DWS				091-02131	2009 JUNE 19	1:1000	091-02131-1



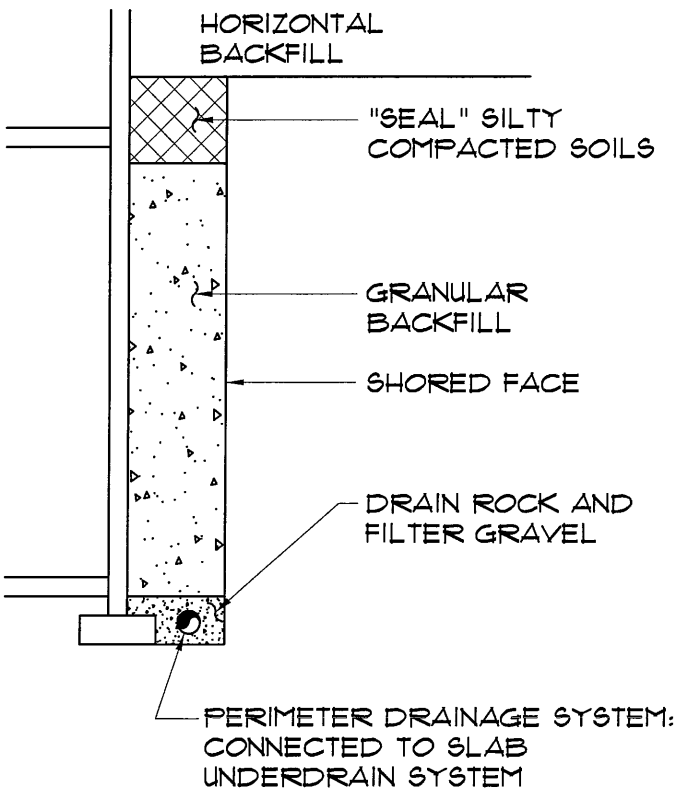
TYPICAL BASEMENT WALL



STATIC LOAD



SEISMIC+STATIC LOAD



NOTES:

- ALL METRIC UNITS IN (m) AND (kPa)
- ALL IMPERIAL UNITS IN (ft.) AND (psf)
- ABOVE SKETCHES ARE NOT TO SCALE
- SEISMIC LATERAL LOAD:

BCBC	X	Y
2006	44	7.0

TROW ASSOCIATES INC.

CLIENT: SD40/HOWARD BINGHAM HILL				TITLE: LATERAL PRESSURE FOR BASEMENT WALL DESIGN		
PROJECT: JOHN ROBSON SCHOOL SITE 8TH ST. & QUEENS AVE., NEW WESTMINSTER, B.C.						
PROJECT NO. 091-02131	DFTR. MG	DSGN. DWS	CHK.	DATE 2009 JUNE	SCALE: NTS	DWG NO. 091-02131-2

Jun 19, 2009 - 5:23pm L:\2009\091-02131 DWS John Robson School, NW, BC\4.25 CAD\091-02131 Pressure diagram.dwg

Appendix C

Test Hole Logs

AH09-1 to AH09-6

Auger Hole No.: AH09–1

Equipment : TRACK MOUNTED AUGER RIG

Location : (See Test Hole Location Plan)

Method of Sampling: GRAB SAMPLE

Ground Water Elevation : AS NOTED
(at time of investigation)

depth, ft.	depth, m	Geodetic elevation	symbol	Description	sample no.	water content %	Remarks
0	0			Brown SAND, some gravel, trace silt, moist, loose to compact			Area of drilling was covered with 1" of pebble size gravel
	1			Brown SAND, some gravel to gravelly, semi angular, trace silt, moist, dense (Till–Like Soil)	S1	7	
5						▽	GWL (at time of drilling)
	2			Wet below water level	S2	16	Water level noted to fluctuate slightly, inferred to light artisian condition
10	3			Brown SAND, fine to medium grained, some silt to silty, wet to saturated, compact to dense	S3	33	
	4			Grey SILT, some sand, wet, stiff	S4	29	
15				Grey, fine grained SAND, some silt to silty, wet to saturated, dense			
	5				S5	29	
20	6			End of hole @ 20'			
	7						
25							
	8						
	9						
30							
	10						

SCHOOL DISTRICT NO. 40	TROW ASSOCIATES INC.		
JOHN ROBSON SCHOOL 8TH STREET AND QUEENS AVENUE NEW WESTMINSTER, BC	Auger Hole No. AH09–1	Logged by: TT Sheet: 1 of 1	Date of Drilling: 2009–JUNE–6 Ref No. 091–02131

Auger Hole No.: AH09-2

Equipment : TRACK MOUNTED AUGER RIG

Location : (See Test Hole Location Plan)

Method of Sampling: GRAB SAMPLE

Ground Water Elevation : AS NOTED
(at time of investigation)

depth, ft.	depth, m	Geodetic elevation	symbol	Description	sample no.	water content %	Dynamic Cone Penetration Test P-1 Blows/ft. 10 20 30 40 50 60	Remarks
0	0			Dark brown gravelly SAND, some silt, moist to wet, loose (Fill)	S1	16		
5	1			Brown SAND, some gravel to gravelly, trace silt, moist , dense to very dense (Till-Like soil)				Hard drilling @ 5 ft
10	2				S2	8		End of Penetration Test @ 6.5 ft
	3					▽		GWL (at time of drilling)
15	4				S3	9		
	5			End of hole @ 15'				
20	6							
25	7							
	8							
30	9							
	10							

SCHOOL DISTRICT NO. 40	TROW ASSOCIATES INC.		
JOHN ROBSON SCHOOL 8TH STREET AND QUEENS AVENUE NEW WESTMINSTER, BC	Auger Hole No. AH09-2	Logged by: TT Sheet: 1 of 1	Date of Drilling: 2009-JUNE-6 Ref No. 091-02131

Auger Hole No.: AH09–3

Equipment : TRACK MOUNTED AUGER RIG

Location : (See Test Hole Location Plan)

Method of Sampling: GRAB SAMPLE

Ground Water Elevation : AS NOTED
(at time of investigation)

depth, ft.	depth, m	Geodetic elevation	symbol	Description	sample no.	water content %	Dynamic Cone Penetration Test P–1 Blows/ft. 10 20 30 40 50 60 — Remarks
0	0			Dark brown gravelly SAND, some silt, moist to wet, loose (Fill)	S1	20	
5	1						
	2			Brown gravelly SAND, trace to some silt, moist very dense (Till–Like soil)	S2	8	Hard drilling @ 7 ft
10	3						End of Penetration Test @ 7'
	4				S3	11	▽ GWL (at time of drilling)
15	5			Grey brown SAND, some gravel to gravelly, some silt, wet, dense (Till–Like soil)	S4	9	
20	6			Changed to saturated after 20 ft			Low Recovery due water in the hole
	7				S5	14	
25	8			End of hole @ 25'			
30	9						
	10						

SCHOOL DISTRICT NO. 40	TROW ASSOCIATES INC.		
JOHN ROBSON SCHOOL 8TH STREET AND QUEENS AVENUE NEW WESTMINSTER, BC	Auger Hole No. AH09–3	Logged by: TT Sheet: 1 of 1	Date of Drilling: 2009–JUNE–6 Ref No. 091–02131

Auger Hole No.: AH09–4

Equipment : TRACK MOUNTED AUGER RIG

Location : (See Test Hole Location Plan)

Method of Sampling: GRAB SAMPLE

Ground Water Elevation : AS NOTED
(at time of investigation)

depth, ft.	depth, m	Geodetic elevation	symbol	Description	sample no.	water content %	Dynamic Cone Penetration Test P–1 Blows/ft. 10 20 30 40 50 60	Remarks
0	0			Dark brown gravelly SAND, some silt, moist, loose (Fill)				
	1			Brown fine SAND, some silt, moist to wet, compact	S1	22		
5								
	2			Brown SAND, some gravel to gravelly, semi angular, trace silt, wet, dense (Till–Like Soil)				GWL
					S2	14		
10	3							End of Penetration Test @ 8ft
				Grey SAND, some gravel to gravelly, trace silt, moist, very dense (Till–Like soil)				
	4				S3	7		
15								
	5			End of hole @ 15'				
20	6							
	7							
25								
	8							
30	9							
	10							

SCHOOL DISTRICT NO. 40	TROW ASSOCIATES INC.		
JOHN ROBSON SCHOOL 8TH STREET AND QUEENS AVENUE NEW WESTMINSTER, BC	Auger Hole No. AH09–4	Logged by: TT Sheet: 1 of 1	Date of Drilling: 2009–JUNE–6 Ref No. 091–02131

Auger Hole No.: AH09–5

Equipment : TRACK MOUNTED AUGER RIG

Location : (See Test Hole Location Plan)

Method of Sampling: GRAB SAMPLE

Ground Water Elevation : AS NOTED
(at time of investigation)

depth, ft.	depth, m	Geodetic elevation	symbol	Description	sample no.	water content %	Dynamic Cone Penetration Test P–1 Blows/ft. 10 20 30 40 50 60	Remarks
0	0			Grey brown sandy SILT/silty SAND, some gravel, trace wood debris, moist to wet, compact (Till Fill)				
	1			colour changed to brown at 4 ft				
5					S1	21		
	2			Brown SILT, trace to some fine sand, trace gravel, moist to wet, stiff (Till–Like soil)	S2	22		
10	3			Grey SAND, some gravel, trace silt, moist, very dense (Till–Like soil)				
	4				S3	9		
15	5			End of hole @ 15'			End of Penetration Test @ 11 ft	
20	6							
	7							
25	8							
	9							
30								
	10							

SCHOOL DISTRICT NO. 40

TROW ASSOCIATES INC.

JOHN ROBSON SCHOOL
8TH STREET AND QUEENS AVENUE
NEW WESTMINSTER, BC

Auger Hole No. AH09–5

Logged by: TT

Date of Drilling: 2009–JUNE–6

Sheet: 1 of 1

Ref No. 091–02131

Auger Hole No.: AH09–6

Equipment : TRACK MOUNTED AUGER RIG

Location : (See Test Hole Location Plan)

Method of Sampling: GRAB SAMPLE

Ground Water Elevation : AS NOTED
(at time of investigation)

depth, ft.	depth, m	Geodetic elevation	symbol	Description	sample no.	water content %	Dynamic Cone Penetration Test P–1 Blows/ft. 10 20 30 40 50 60	Remarks
0	0			Grey SAND, medium grained, poorly graded, moist, compact				
	1			Brown silty SAND, some gravel, moist, loose	S1	6		
5	2			Grey SAND, some gravel, trace to some silt, wet, very dense (Till–Like soil)	S2	12 ▽		End of Penetration Test @ 7 ft
10	3			SILT, some fine sand, trace gravel, moist, stiff	S3	27		
	4			Grey SAND, some gravel, trace to some silt, wet, very dense (Till–Like soil)				
15	5			Grey SAND, fine grained, some silt to silty, wet, dense to very dense	S4	24		
20	6			End of hole @ 20'				
25	7							
	8							
30	9							
	10							

SCHOOL DISTRICT NO. 40	TROW ASSOCIATES INC.		
JOHN ROBSON SCHOOL 8TH STREET AND QUEENS AVENUE NEW WESTMINSTER, BC	Auger Hole No. AH09–6	Logged by: TT Sheet: 1 of 1	Date of Drilling: 2009–JUNE–6 Ref No. 091–02131