DBA
ENGINEERING LTD.
Consulting Engineers

GEOTECHNICAL INVESTIGATION REPORT
FIFTY BED HOUSING UNIT
PITTSBURGH INSTITUTION
JOYCEVILLE, ONTARIO

Submitted to:

Public Works and Government Services Canada

Submitted by:

DBA Engineering Ltd.

September

11-1539-05

DBA ENGINEERING LTD. Consulting Engineers

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1.0 INTRODUCTION

DBA Engineering Ltd. (DBA) was retained by Public Works and Government Services Canada, herein after referred to as the 'Client", to carry out geotechnical engineering consulting services at the site of the proposed construction of the fifty bed housing unit within Pittsburgh Institution near Joyceville, Ontario. The new housing unit is a two storey high wood and steel frame construction security unit with basement. The proposed building footprint is shown the site plan attached in Appendix I.

The purpose of the geotechnical investigation was to obtain information on the subsurface conditions at the site by means of a limited number of boreholes and visual/tactile analysis of selected soil samples. Based on DBA's interpretation of the data obtained, necessary design parameters and recommendations are provided on the geotechnical aspects of the proposed development.

This report contains the findings of DBA's geotechnical investigation, together with recommendations and comments. These recommendations and comments are based on factual information and are intended only for the use of the client and appointed affiliates. Conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The anticipated construction conditions are also discussed, but only to the extent that they may influence design decisions. Construction methods discussed, however, express DBA's opinion only and are not intended to direct the contractors on how to carry out the construction.

The report is prepared with the condition that all designs will be in accordance with applicable standards and codes, regulations of authorities having jurisdiction, and good engineering practice. Further, the recommendations and opinions in this report are applicable only to the Site and proposed development as described in Section 2.0.

On-going liaison with DBA during the final design and construction phase of the project is recommended to ensure that the recommendations in this report are applicable and/or

correctly interpreted and implemented. Also, any queries concerning the geotechnical aspects of the proposed project should be directed to DBA for further elaboration and/or clarification.

2.0 SITE DESCRIPTION

The Site is within Pittsburgh Institution, located on Highway #15 near the village of Joyceville, Ontario. The area under investigation is currently the baseball field located in the recreation area of the institution. It is currently grave andgrass covered and is relatively flat.

3.0 FIELDWORK

The fieldwork was performed on August 29 and 30, 2011 and consisted of advancing a total of eighteen (20) boreholes (BH1 to BH20). The boreholes were drilled to practical auger refusal on the surface of inferred limestone bedrock which was encountered at depths ranging from 1.75 m to 8.73 m below existing ground surface.

Borehole locations were selected and marked in the field by the client.

The boreholes were advanced using solid-stem continuous-flight augers, with truck-mounted power-auger drilling rig under the full-time supervision of experienced geotechnical personnel from DBA. Soil samples were generally taken at 0.76 m or 1.5 m intervals while performing the Standard Penetration Test (SPT) in accordance with ASTM D1586. This consisted of freely dropping a 63.5 kg (140 lbs.) hammer for a vertical distance of 0.76 m (30 inches) to drive a 51 mm (2 inches) outer diameter O.D. split-barrel (split spoon) sampler 0.6 m (24 inches) into the ground. The number of blows of the hammer required to drive the sampler into the relatively undisturbed ground by a vertical distance of 0.30 m (12 inches), excluding the first and last 0.15 m (6 inches), was recorded as SPT 'N' value of the soil which indicated the consistency of cohesive soils or the relative density of non-cohesive soils.

In order to assess the environmental contamination, soil samples obtained during the geotechnical field drilling program were field screened for evidence of environmental impact. The field screening activities included visually inspecting the soil samples for evidence of environmental impact (i.e. staining, odours, unusual soil characteristics). Results of the field screening did not identify any visual or olfactory evidence of environmental impact in the fill and/or native soil samples recovered from the boreholes.

All boreholes were advanced to practical auger refusal on inferred bedrock. Rock coring to prove and evaluate bedrock was not part of this scope of work.

The groundwater level was measured in the boreholes during and upon completion of drilling.

Upon completion of drilling, all the boreholes were backfilled to restore the ground surface.

Ground surface elevations at each borehole location were surveyed by others and provided to DBA Engineering Ltd for inclusion in this report.

The soil conditions and groundwater levels are presented on the corresponding Record of Boreholes.

4.0 SUBSURFACE CONDITIONS

Based on the subsurface conditions encountered at the borehole locations, the soil profile consisted predominantly of topsoil underlain by surficial topsoil or gravel fill underlain by native soils, over bedrock.

The stratigraphic units and groundwater conditions are discussed in the following

sections. Additional information is provided in the record of borehole logs attached to this report in Appendix II.

The following summary is to assist the designers of the project with an understanding of the anticipated soil conditions across the site. However, it should be noted that the soil and groundwater conditions will vary between these locations.

4.1 Surficial Topsoil/Gravel Fill

Surficial fill material was encountered within borehole Nos. 1, 2, 4, 5, 6, 7, 10, 12, and 16 which were advanced within the baseball infield. The fill material consisted of sand with gravel in a compact state and extended to depths of 0.5 m to 0.6 m below existing site grades.

Topsoil was encountered in all other boreholes advanced within the baseball outfield, at the surface. The average topsoil thickness was 200 mm. In general, the topsoil consisted of silty clay with high content of organic matter and rootlets.

It should be noted that the thickness of the topsoil could vary significantly between and beyond the borehole locations. Furthermore, the topsoil thickness could change significantly due to some on-site activities. Therefore, it is recommended that allowance be made for possible variations when making construction estimates. The quality of this material is unknown however it is likely suitable for reuse as landscaping material on-site.

4.2 Native Soils

Native soils were encountered below the surficial topsoil / fill materials in all the boreholes extending down to the surface of the inferred bedrock at depths 1.75 m to 8.73 m below the existing site grades.

The native subsoil consisted of brown silty clay changing with depth to clayey silt to silt with clay. The SPT 'N' values for the silty clay to clayey silt were generally in the range of 8 to 22 blows indicating a stiff to very stiff state of consistency. The moisture content was in a dry to damp state ranging from 16% to 26%.

4.4 Inferred Bedrock

Practical auger refusal on inferred limestone bedrock was encountered within all boreholes at depth of between 1.75 m to 8.73 m below existing site grades. Bedrock coring for the purposes of proving and evaluating bedrock was not part of this project's scope of work.

4.5 Ground Water

Upon completion of drilling, groundwater was encountered at depths of between 1.6 m to 2.4 m below existing site grades.

It should be noted that groundwater levels fluctuate seasonally and can be expected to be higher during the spring months and in response to major weather events.

4.6 Record of Borehole Logs

Full details of the subsurface conditions encountered at the test locations are presented in the borehole logs attached to this report in Appendix II. It is emphasized however, that the soil types, their sequence, thickness and physical properties may vary spatially between test locations.

5.0 DISCUSSION AND RECOMMENDATIONS

Based on the information provided to DBA, it is our understanding that the new housing unit will be a two storey wood and steel frame with partial basement with the foundation loads to be supported by steel columns and footings.

The design specifications/design loads not available at the time of the preparation of this report. It is further assumed that the underground services will not be more than 4 m below grades.

5.1 Grading and Preparation

The existing ground surface cover (e.g., topsoil) should be stripped and removed from the area of the proposed development. Any deleterious materials exposed should be removed from the area of the proposed building pad, road / driveways or any other settlement-sensitive structures.

Based on the conditions encountered in the boreholes advanced, no excessive organics and/or debris were encountered in the fill soils. Therefore, the existing fill material in the vicinity of these boreholes are suitable for slab-on-grade and pavement subgrade purposes and can remain in place, subject to heavy proof rolling and approval of the DBA's geotechnical engineer at the time of construction.

The footings shall be founded on the competent native subsoils, sound bedrock or engineered fill placed for grade adjustment.

The soils at the site are susceptible to disturbance when exposed to weather and construction traffic. Water (e.g., surface water runoff) should not be permitted to enter and/or pond within the construction area. This is especially important to the success of the planned construction (i.e., proof rolling or engineered fill placement).

Consideration should be given to redirecting the surface water runoff from the neighbouring properties, if there would be a down gradient and grade difference (permanent and/or temporary) between final site grades and the existing/final grades in the neighbouring properties.

General Site Preparation Recommendations:

Subsequent to stripping of the ground surface cover and removal of any exposed soils which contain excessive organics/debris and other compressible, weak and deleterious materials, the base of the excavation should be compacted and proof rolled with heavy compactors (minimum 10,000 kg). The entire area should be inspected and approved by DBA's geotechnical personnel. During proof rolling, spongy, wet or soft/loose spots should be sub-excavated to stable subgrade and replaced with approved soil, compatible with subgrade conditions, as directed by the geotechnical engineer. After approval of the exposed subgrade, the grade can be restored to design grades with compacted engineered fill.

Subsequent to approval of the exposed subgrade, it is recommended that all new fill, where required, be placed as engineered fill to provide competent subgrade for building pad and pavement areas. Material used for backfilling excavations/trenches or mass filling to raise the site grade should consist of OPSS Granular B, OPSS Select Sub-grade, or approved equivalent. For engineered fill below foundations, the engineered fill should be uniformly compacted to an average of 100% of its Standard Proctor Maximum Dry Density (SPMDD). Above the foundation level (below slab subgrade), engineered fill can be compacted to 98% SPMDD. General recommendations for placement of the engineered fill are provided in the Appendix.

5.2 Foundations

The on-site native subsoil, sound bedrock and / or engineered fill (if any placed for grade adjustment) are suitable to support spread/strip foundations and the basement floor slab, provided that the subgrade exposed during footing excavation is assessed by a geotechnical engineer.

Footings may be constructed directly on native silty clay/clayey silt sub soil. Alternatively, footings may be placed atop properly constructed engineered fill raised from native subsoil or the bedrock or directly on bedrock surface.

Due the significant difference in strength between bedrock and soil, it is cautioned that, in foundations bearing on two different founding materials, differential settlement at the interface of soil and rock may occur. This may exceed the tolerances of footings or foundation walls if a proper construction joint or other considerations are not provided. Evaluation of the footing design and performance of the existing structure may provide additional insight into the measures needed to accommodate differential movement.

Bearing capacities were determined by evaluating 'SPT' results of native soil and bedrock type and quality. For footings placed on approved material, the following bearing capacities apply:

Footings Constructed on Undisturbed Native Subsoil

- At SLS: 150 kPa
- At ULS: 300 kPa

Footings Constructed Directly Atop or Within the Sound Limestone Bedrock

- At SLS: 500 kPa
- At ULS: 1500 kPa

Bearing capacities are valid for footing placed on or within sound bedrock, free of any loose, fractured, and easily excavated rock.

Footings Constructed on an Engineered Fill Pad Raised From Bedrock

- At SLS: 150 kPa

- At ULS: 300 kPa

The Factored Bearing Resistances (at ULS) noted here are applicable for a concentrically loaded footing.

The design frost penetration depth for heated structures is 1.2 m. Therefore, a permanent soil cover of 1.2 m or its thermal equivalent is required for frost protection of foundations. A suitable method of insulating footings in provided in Appendix III of this report.

For footings placed on native sub soil or on properly constructed engineered fill, settlements are not anticipated to exceed 25 mm total and 19 mm differentially. These limits are usually within the tolerances of most structures. Negligible settlement of footings placed directly on bedrock is anticipated. It is good engineering practice to increase the rigidity of foundations of structures erected over engineered fill. This measure helps bridge over possible weak spots in the fill.

During the footing excavation, ground water (if any) should be kept below the base of excavation. In no case should the footing be placed on dilated or disturbed sub grade soil. If the ground water elevation is high, dewatering must be performed prior to placing engineered fill.

The minimum footing sizes, footing thickness, excavations and other footing requirements should be designed in accordance to the latest edition of the National Building Code (2005).

The footing sub grade should be inspected and evaluated by qualified geotechnical personnel prior to placing concrete to verify that the footings are founded on competent subgrade consistent with the material encountered during the field investigation.

All engineered fill used to construct a foundation pad for footings should consist of OPS Granular B, Type II or approved equivalent. A minimum compaction of 100% SPMDD applies and must be confirmed with field density testing performed at a frequency in accordance with industry best practices. Full compaction of the engineered fill will only be obtained if fill is placed in appropriately sized lifts compatible with the compaction equipment used. Lift thickness should not exceed 0.3 m. Sufficient overbuild of engineered fill must be provided to accommodate the footing pressure bulb (section 5.1). Where required, the engineered fill should be benched into the native soils (typically where the slope of the sub grade is steeper than 6H: 1V).

The stepping of footings at different elevations should be carried out at an angle no steeper than 2 horizontal (clear horizontal distance between footings) to 1 vertical (difference in elevation). No individual footing step should be greater than 0.3 m.

If rock anchors are required for uplift resistance, they may be installed into the rock formation. Grouted anchors are preferred to mechanical anchors.

For the design of tension anchors, the following factored capacities of the limestone rock formation may be employed:

Maximum factored bond strength for socketed and grouted anchors:

- At SLS 300kPa
- At ULS 450kPa (assuming a geotechnical resistance factor of 0.5)

An angle of 55° may be used when determining the cone of uplift resistance mobilized by individual rock anchors.

26 KN/m^3 is an appropriate unit weight for limestone bedrock (un-factored).

The following formula is suitable for the design of rock tension anchors:

$Qr = \varphi(\pi)\gamma^2 D^3 \tan(\theta)$

Where: **Qr** is factored uplift resistance of the anchor, (kN)
phi is resistance factor, (use 0.3)
gamma is effective unit weight of rock, (use 26 kN/m^3)
D is anchor length in meters
theta is 1/2 of the apex angle of the rock failure cone, (use 27.5 ° (55° / 2)

In accordance with criteria listed in the National Building Code of Canada, 2005 (NBCC2005) and based on the results of the investigation, the appropriate seismic site classification for the site is **Site Class C.**

5.3 Backfilling

Backfilling requirements vary depending on the nature of the excavation. Backfilling requirements for footings and utility services are specified below. Backfilling requirements for services differ between immediately above the service line (structural fill) and at a distance above. Also, backfilling requirements vary depending on the intended use of the ground above the trench or excavation.

5.3.1 Footing Excavations

Only a free draining granular material is suitable for use as exterior foundation backfill within the specified depth of frost penetration (1.2 m) to provide adequate protection from adfreeze. A capping layer consisting of clay or other impermeable material such as a concrete or asphalt apron should be used to seal the excavation and minimize surface water penetration into backfilled areas. Generally, a minimum compaction of 95% Standard Proctor Maximum Dry Density (SPMDD) applies to all backfill adjacent to foundations. The level of compaction should be increased to a minimum 98% SPMDD within 0.6 m of underside of slab however.

5.3.2 General Utility Service Backfilling

On site fill and native soils are generally suitable as backfill for utility service trenching. The excavated soils may require reconditioning (e.g., drying) prior to reuse. Unsuitable material such as organic pockets, large cobbles, boulders, etc., should be wasted. Ideally, dissimilar materials should be stockpiled separately during excavation. If unacceptable material cannot be efficiently separated, the material must be wasted and imported fill used instead. Saturated material is not acceptable.

Fill should be placed and then compacted in no greater than 200mm to 300 mm loose lifts depending on the soil type. Soil must only be placed and compacted when moisture contents are near optimum to ensure proper compaction. A minimum compaction of 95% SPMDD must be obtained and verified by on site compaction testing. The minimum level of compaction should be increased to 98% SPMDD within 0.6 m of the final sub grade elevation. If rock excavation is required for utility servicing, broken rock may be reused for service trench backfill. The rock must be broken to a maximum size of 100 mm however.

If field conditions during the construction period prevent the use of on site soils as backfill, imported engineered fill may be employed. To prevent differential movement of sub grade soils during periods of frost action where backfill material is significantly different from existing soils, excavation walls and backfill should taper out in upper trench portions.

Backfilling of service trenches immediately above the service line should be performed in accordance with Section 5.9 of this report.

Under no circumstances is frozen or dilated (wet) soil suitable for use as backfill material.

5.4 Reuse of On-Site Materials

Based on the conditions encountered in the boreholes, in general, the excavated on-site soils which do not contain excessive organic matters/debris can be reused as trench back fill. The excavated soils may require reconditioning (e.g., drying) prior to reuse. Unsuitable material such as organic pockets, boulders, cobbles, frozen soils, etc., should be wasted. Ideally, dissimilar materials should be stockpiled separately during excavation.

For engineered fill (if any) below the footings, a uniform material must be used. Significant variations in fill type will require smaller (thinner) lifts, more compaction effort and more field and laboratory testing. As well, significantly more time will be required during excavation to selectively sort through the fill to ensure a uniform product. Less stringent requirements can be considered for fill quality and placement below slab on grade (but above footings) or pavement areas.

The existing onsite soils are subject to softening in the presence of excess moisture.

The existing site soils are considered frost susceptible and should not be reused where a volume change in the presence of freezing conditions would have an adverse effect on the serviceability of proposed infrastructure.

5.5 Pavement Design

All paved areas may be built up from the native soil or existing fill material following preparation in accordance with Section 5.1 of this report. The following two conventional pavement structures are suitable for parking and roadway surfaces at the Site.

The pavement design considers that construction will be carried out during the dry time of the year and that the sub grade is competent. If the sub grade becomes excessively

wet or rutted during construction activities, additional sub-base material may be required. The need for additional sub base material is best determined during construction.

Light Duty Driveways and Parking Areas for Cars and Light Trucks		**Heavy Duty** All Fire Routes, Loading and Truck Parking Areas	
50mm	HL3, over	40 mm	HL3, over
150 mm	Granular A Base, over	50 mm	MDBC (medium duty binder course), over
300 mm	Granular B, Type II, Sub-base	150 mm	Granular A Base, over
		300 mm	Granular B, Type II Sub base

In order to provide a durable pavement structure, the following pavement construction method is recommended.

I. The sub grade should be adequately prepared to receive the sub-base course. Disturbed and wet sub grade materials should be removed. The top of the sub grade should then be proof-rolled, and inspected by qualified geotechnical personnel. Cavities created by the removal of unsuitable materials should be backfilled with approved, inorganic fill materials similar to the existing sub grade material where possible. Imported fill may be used where necessary. All new fill should be placed in maximum 300 mm loose lifts within $\pm$ 2 % of its optimum moisture content, and each lift compacted with suitable equipment to minimum 95 % SPMDD, before placing the next lift. The uppermost zones of the road fill, within 600 mm of the roadbed, should be compacted to minimum 98 % Standard Proctor Maximum Dry Density. All base and sub base granular layers must be compacted to a minimum 100% SPMDD.

II. The granular materials should be compacted and the placing, spreading and rolling of the asphalt should be in accordance with Ontario Provincial Standard Specifications or equivalent.

III. Construction traffic over exposed sub grade materials should be minimized, and temporary construction hauling routes should be established. If these routes coincide with future paved areas, adequately reinforced haul roads (e.g., increased thickness of granular base, geo-fabrics, etc.) should be constructed to reduce disturbance to the sub grade soils. These provisions are particularly important if the construction is scheduled during wet and cold seasons.

IV. If construction of the pavement fill is carried out in wet weather, the thickness of the sub-base course should be increased. The existing inorganic soil on site can be re-used to raise the grade beneath the proposed pavement, provided it is not contaminated with any topsoil / organic matters.

V. Special attention should be paid to proper grading of the pavement structure. Depressions and undulations in the sub grade should be eliminated and, to permit quick drainage, the sub grade surface should be sloped towards ditches, sub-drains and/or catch-basins. To promote effective surface drainage, the finished pavement surface should be free of depressions and sloped at a minimum grade of two percent towards the shoulder(s). Surface water should not be allowed to pond at the outside edges of the pavement areas. Also, proper attention should be given to pavement and/or sidewalks directly adjacent to buildings to accommodate potential differential settlement due to frost heave problems.

VI. It is recommended that a programme of geotechnical / material inspection and testing be carried out during the construction phase of the project to confirm that the conditions exposed in the excavations are consistent with those encountered

in the boreholes and the design assumptions, and to confirm that the various project specifications and materials requirements are being met.

5.6 Slab-on-Grade

For the proposed building, a concrete slab-on-grade floor can be used and may be built on a properly prepared sub grade (Section 5.1).

Underneath the slab, a minimum a 150 mm thick layer of Granular A should be placed and compacted to a minimum 100% SPMDD to provide a uniform bearing surface. Further filling can be performed using Granular B; Type I or Type II compacted to 98% SPMDD.

The floor slabs should not be tied to any load-bearing walls or columns unless they have been designed accordingly. Contraction/expansion joints should be provided for the slabs as required by the structural engineer.

Based on the ground water levels encountered during the field investigation, a perimeter drainage system and underfloor drains will not be required, provided that the proposed floor is a minimum of 150 mm above the exterior grade and the ground surface around the perimeter of the building slopes down away from the building walls. This also may depend on the designed storm water management of the site. In general, perimeter drains and underfloor drains will not be required for the proposed structure, if any ingress of water under the slab is prevented.

It should be noted that permanent, failsafe drainage (connected to frost-free outlet, permanent sump/ pump system) should be designed around any depressed areas such as below grade loading docks, pits or stairwells, as well as behind retaining walls..

The design and construction of floor slabs should at all times conform to the requirements outlined in the latest edition of the Ontario Building Code.

Provided that the above recommendations are followed, a coefficient of sub-grade reaction of 30,000 kN/m^3 applies.

5.7 Utility Services

For the preparation of this report, it is considered that utility services depths will not exceed 4.0 m below grades. The following discussion is based on this consideration.

Based on the subsurface conditions encountered at the borehole locations, new utility services would be installed within the native silty clay/clayey silt subsoils or within bedrock trenching. Bedding should be in accordance with the pipe design/manufacture recommendations, appropriate local municipality requirements, and standards (e.g., OPS). However, as a guideline, normal Class 'B' Type bedding (OPSD-802) can be considered. The thickness of the bedding may, however, have to be increased depending on the pipe diameter.

Bedding for all pipes should consist of 200 mm Granular 'A' material. The bedding material must be placed in lifts compatible with the compaction equipment used to achieve 95% SPMDD.

Properly compacted Granular "A" engineered fill should be used to back fill all services to a minimum 300 mm above the pipes obvert. On site soils are suitable for final backfilling if compacted to 95% SPMDD.

All services should be installed in accordance with all applicable regulations.

Normal excavation equipment will be suitable for excavating trenches in the native soil deposits.

5.8 Excavations/Dewatering

All excavations should be carried out in accordance with the Occupational Health & Safety Act & Regulations for Construction Projects. Under the Act, the soils to be excavated can be classified as follows:

Fill Material	**Type 3**
silty clay / clayey silt	**Type 2**

Stockpiles of excavated materials should be kept at least 2.0 m from the edge of any excavation, subject to confirmation by the geotechnical engineer. Soil should be excavated back beyond the edge of rock excavations to protect workers from falling debris. Care should also be taken to avoid overloading of any underground services/structures by stockpiles.

Surface run off should be diverted away from excavated trenches. It should be noted that groundwater levels will fluctuate seasonally and also during periods of drought and precipitation. Some ground water may be encountered within service excavations. Water infiltration can be managed with normal pumping.

5.9 Cement Type and Corrosion Potential / Chemical Testing

A representative sample of the material encountered in the investigation was submitted to an analytical laboratory to determine the pH, sulphates, and conductivity (see test results in Appendix III). This testing was completed to assess the potential for degradation of the concrete in the presence of soluble sulphates and corrosion potential of the soils.

Testing was conducted to determine soil pH, conductivity and soluble sulphate concentration. A summary of results is as follows:

- Soil pH and soluble sulphate concentration to not pose any treat to buried concrete elements. Normal Portland cement is therefore appropriate.
- Soil electrical conductivity indicates the soil has a low to moderate potential to promote accelerated corrosion of buried, unprotected steel elements.

Two representative samples were submitted to an accredited analytical laboratory to determine landfill disposal criteria of excess excavated material. Samples were tested for soil decommissioning metals and inorganics. Test results are attached within Appendix III and should be used to determine the suitability for reuse of excess soil.

5.10 Site Inspections

The footing subgrade should be inspected and evaluated by the geotechnical personnel prior to placing concrete to verify that the footings are founded on competent subgrade capable of supporting the recommended design pressure.

It is recommended that the placement and compaction of all granular soils be monitored and tested by qualified geotechnical personnel to ensure that the appropriate materials and compaction densities are achieved.

6.0 CLOSURE

The Limitations of Report attached, form an integral part of this report. We trust this report provides sufficient information for your present requirements in accordance with our Term of Reference. We trust this report is to your satisfaction. Should you have any questions concerning the above, please feel free to contact our office.

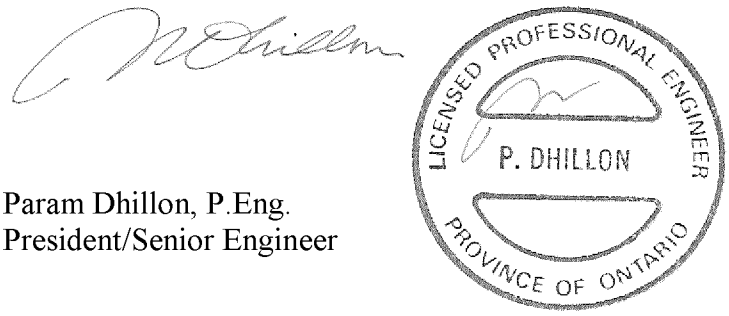
Sincerely,
DBA Engineering Ltd.

Prepared by:

Murray McClelland
Geotechnical Project Manager

Rob Cole, C.E.T.,
Principal/Vice President

Reviewed By:



Param Dhillon, P.Eng.
President/Senior Engineer

REPORT LIMITATIONS

The conclusions and recommendations given in this report are based on information determined at the testhole locations. The information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Geotechnical Engineer be retained during the construction to confirm that the subsurface conditions across the site do not deviate materially from those encountered in the testholes.

The design recommendations given in this report are applicable only to the project described in the text, and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

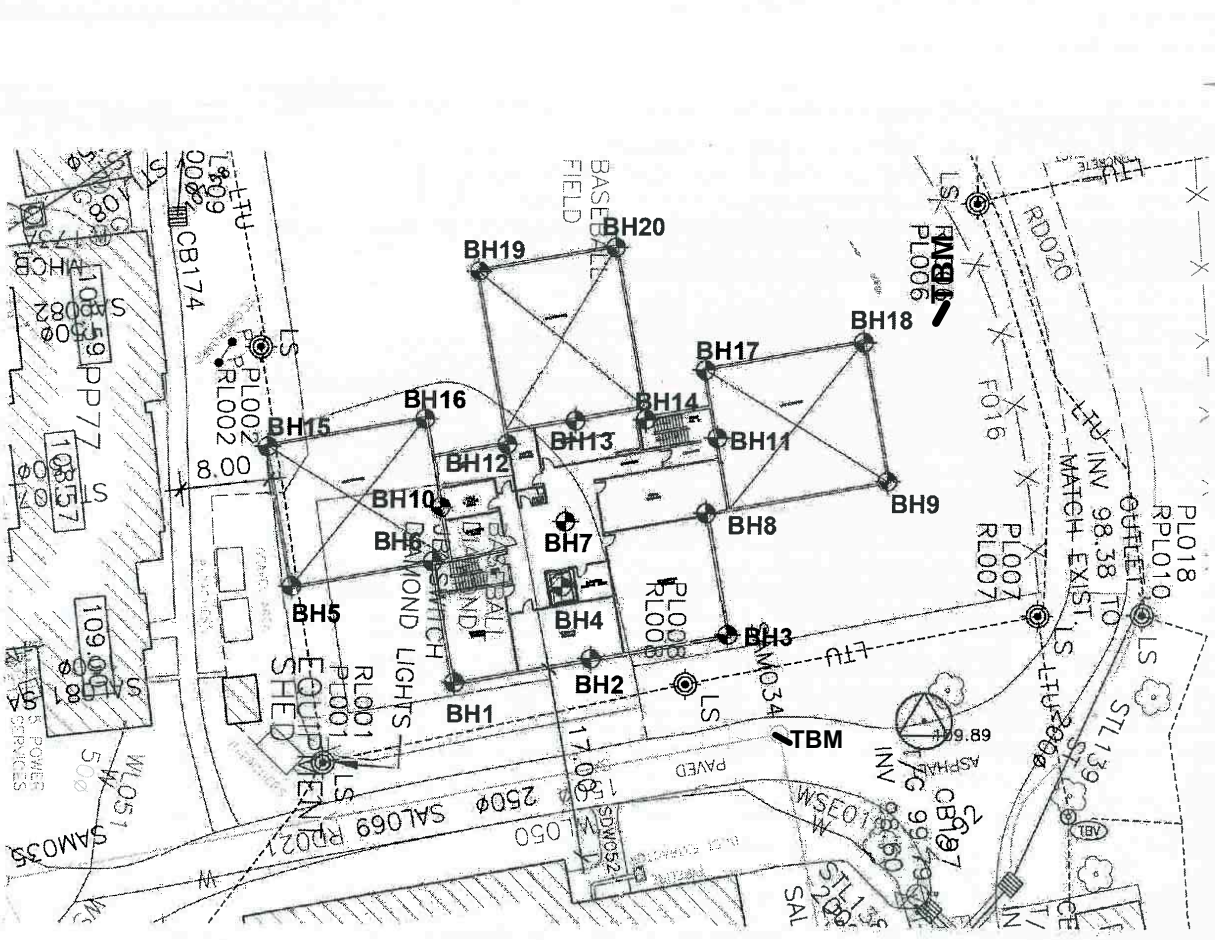
The comments made in this report relating to potential construction problems and possible methods of construction are intended only for the guidance of the designer. The number of testholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

The benchmark and elevations mentioned in this report were obtained strictly for use by this office in the geotechnical design of the project. They should not be used by any other party for any other purpose.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. DBA accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

APPENDIX I

SITE MAP/BOREHOLE LOCATIONS



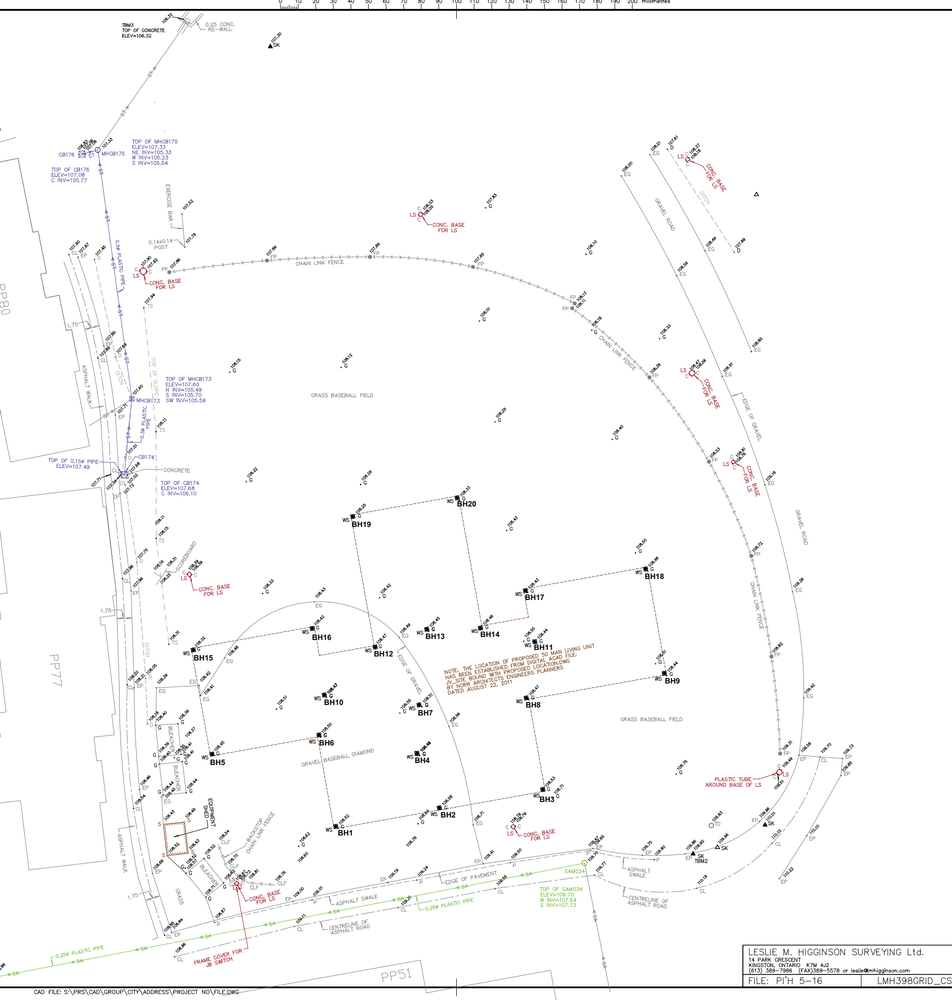
SCALE: NTS	*Fifty Bed Housing Unit*	DBA ENGINEERING
DATE: Sept. 21, 2011	*Geotechnical Investigation*	
PROJECT: 11-1539-05	*Pittsburgh Institution*	
DRAWING NO. 1		Drawn By: MM / Rev'd By: RC

04 11

TOPOGRAPHICAL PLAN
AT JOYCEVILLE/PITTSBURGH
INSTITUTIONS ON
PART OF LOT 16
CONCESSION 5

CITY OF KINGSTON
(GEOGRAPHIC TOWNSHIP OF PITTSBURGH)
COUNTY OF FRONTENAC
SCALE: 1 : 200

5m 0 5 10 15 metres



METRIC
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

LESLIE M. HIGGINSON SURVEYING Ltd.
2011

BENCHMARKS

BM No.	DESCRIPTION	ELEVATION
TBM1	SPIKE IN ASPHALT	108.27
TBM2	SPIKE IN ASPHALT	109.92
TBM3	TOP OF CONCRETE	106.32

CONTROL MOUMENTS
UTM NAD27 (ZONE 18) 1974 ADJUSTMENT

LABLEL	NORTHING	EASTING	ELEVATION
JOYCE 001	4 912 299.216	392 423.991	111.238
JOYCE 002	4 912 529.725	392 398.377	109.824
PITT 001	4 912 339.332	392 526.019	113.753

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

CHECKED BY ______________ DATED AUGUST 30TH, 2011
L. HIGGINSON

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THIS DRAWING ACCURATELY REPRESENTS THE FIELD SURVEY COMPLETED AUG. 26, 2011 AND IS CORRECT.

AUGUST 30, 2011 — DATE
LESLIE HIGGINSON — ONTARIO LAND SURVEYOR

PWGSC PROJECT No.: R.045087.001

Legend

G	DENOTES	GROUND
EP	"	EDGE OF PAVEMENT
P	"	PAVEMENT
EG	"	EDGE OF GRAVEL
CL	"	CENTRE LINE
TS	"	TOP OF SLOPE
D	"	DITCH
S	"	SHED
SAM	"	SANITARY MANHOLE
MH	"	STORM MANHOLE
CB	"	CATCH BASIN
C	"	CONCRETE
FP	"	FENCE POST
CLF	"	CHAIN LINK FENCE
TD	"	DECIDUOUS TREE
LS	"	LIGHT STANDARD
JB	"	JUNCTION BOX
N,S,E,W	"	NORTH,SOUTH,EAST,WEST
ø	"	DIAMETER
SK	"	SPIKE
WS	"	BURIED WOODEN STAKE GROUND PAINTED WHITE

COORDINATES FOR THIS SURVEY ARE REFERENCED TO UTM NAD27 (ZONE 18) 1974 ADJUSTMENT AND THE ELEVATIONS ARE GEODETIC BASED ON THE GSC 1928 DATUM AS SHOWN ON SITE SERVICES MASTER PLAN. DWG No. 450-451-01 1/2

THIS PROJECT HAS BEEN RELATED TO CONTROL MONUMENTS JOYCE 001, JOYCE 002 & PITT 001

THE BUILDINGS, SOUTH SIDE OF THE ROAD & THE WEST SIDE OF THE ASPHALT WALK HAVE BEEN INSERTED FROM THE DIGITAL FILE FOR THE SITE SERVICES MASTER PLAN.
DWG No. 450/451-01 1/2, REVISION 1
PROJECT DATE: 2008-03-19

revision		date
04		
03		
02		
01		

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the Departmental Representative of all discrepancies.

A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
JOYCEVILLE Ontario
CORRECTIONAL SERVICE CANADA
JOYCEVILLE/PITTSBURGH INSTITUTIONS

drawing title / titre du dessin
TOPOGRAPHICAL SURVEY FOR PITTSBURGH INSTITUTION PROPOSED 50 MAN LIVING UNIT

drawn by / dessine par: JOE NOURRY
designed by / conc par: LESLIE HIGGINSON O.L.S.
approved by / approuve par: GEORGE McFARLANE O.L.S.
bid / offre — project manager / administrateur de projets: KAREN DURNFORD–McINTOSH
project date / date du projet: 2011/08/30
project no. / no. du projet: R.045087.001
drawing no. / dessine no.: TOPO–2

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FILE: PI'H 5–16 | LMH398GRID_CSC

GSC–A1 DATE PLOTTED: 2011/08/29 PLOT SCALE: 1:200 CAD FILE: S:\PRS\CAD\GROUP\CITY\ADDRESS\PROJECT NO\FILE.DWG

APPENDIX II

RECORD OF BOREHOLE LOGS

RECORD OF BOREHOLE No. BH1

Project Number:	11-1539-05	Drilling Location:	BH1	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 29, 11 Date Completed:	Revision No.:	0

Lithology Plot	DESCRIPTION Local Ground Surface Elevation: 108.5 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING Penetration Testing: SPT ○ DCPT ●; MTO Vane* Intact △ Remould ▲; Nilcon Vane* Intact ◇ Remould ◆; * Undrained Shear Strength (kPa) 20 40 60 80	LAB TESTING ★ Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W_P W W_L; △ Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400; ▲ Lower Explosive Limit (LEL); * Passing 75 um (%); ■ Moisture Content (%) Plastic 20 40 60 80 Liquid	INSTRUMENTATION INSTALLATION	COMMENTS
	grey fill - sand with gravel compact	SS	1	41	10			○			
	107.9						108				
	brown 0.6 **SILTY CLAY** stiff	SS	2	84	10	1		○			
							107				
		SS	3	84	10	2 ▽		○			
	106.2										
	refusal on inferred bedrock 2.3										

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▽ Groundwater depth on completion of drilling: 2 m.

RECORD OF BOREHOLE No. BH2

Project Number:	11-1539-05	Drilling Location:	BH2	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 29, 11 Date Completed:	Revision No.:	0

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation: 108.6 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: SPT, DCPT; MTO Vane* Intact/Remould; Nilcon Vane* Intact/Remould; * Undrained Shear Strength (kPa) 20 40 60 80	Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W_P W W_L; Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400; Lower Explosive Limit (LEL); Passing 75 um (%); Moisture Content (%) Plastic 20 40 60 80 Liquid	INSTRUMENTATION INSTALLATION	
	grey fill - sand with gravel compact 108.0	SS	1	51	10						
	brown 0.6 **SILTY CLAY** stiff	SS	2	79	11	1	108 107				
	106.8 refusal on inferred bedrock 1.8										

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▽ No freestanding groundwater measured in open borehole on completion of drilling.

RECORD OF BOREHOLE No. BH3

Project Number:	11-1539-05	Drilling Location:	BH3	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 29, 11	Date Completed:	Revision No.: 0

Local Ground Surface Elevation: 108.5 m

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
	dark brown 108.4						
	topsoil - silty clay with roots and organics 0.2						
	brown **SILTY CLAY** stiff						108
		SS	1	70	8	1	
							107
		SS	2	84	9	2	
		SS	3	84	16		106
		SS	4	84	17	3	
	105.0						105
	brown 3.5 **CLAYEY SILT** trace sand very stiff					4	
	104.4 refusal on inferred bedrock 4.1						

FIELD TESTING: Penetration Testing — SPT, DCPT; MTO Vane* Intact, Remould; Nilcon Vane* Intact, Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: Rinse pH Values; Atterberg Limits; Soil Vapour Reading parts per million (ppm); Lower Explosive Limit (LEL); % Passing 75 um (%); Moisture Content (%); Plastic; Liquid 20 40 60 80

INSTRUMENTATION INSTALLATION

COMMENTS

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Groundwater depth on completion of drilling: 1.6 m.

RECORD OF BOREHOLE No. BH4

Project Number:	11-1539-05	Drilling Location:	BH4	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 29, 11 Date Completed:	Revision No.:	0

Lithology Plot	DESCRIPTION Local Ground Surface Elevation: 108.5 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
	grey fill - sand with gravel compact						
	107.9						
	brown 0.6 **SILTY CLAY** stiff	SS	1	75	10	1	108
		SS	2	75	9	2	107
	106.2						
	brown 2.3 **CLAYEY SILT** trace sand very stiff	SS	3	84	20	3	106
		SS	4	79	19		105
	104.8						
	brown 3.7 **SILT** some sand some clay trace gravel very stiff					4	
	104.4						
	refusal on inferred bedrock 4.1						

FIELD TESTING: Penetration Testing — ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W_P W W_L; △ Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400; ▲ Lower Explosive Limit (LEL); ✱ Passing 75 um (%); ■ Moisture Content (%); Plastic 20 40 60 80 Liquid

INSTRUMENTATION INSTALLATION

COMMENTS

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▽ Groundwater depth on completion of drilling: 2.1 m.

RECORD OF BOREHOLE No. BH5

Project Number:	11-1539-05	Drilling Location:	BH5	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 29, 11 Date Completed:	Revision No.:	0

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	Local Ground Surface Elevation: 108.5 m							Penetration Testing: ○ SPT ● DCPT; MTO Vane*: △ Intact ▲ Remould; Nilcon Vane*: ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W_P W W_L; △ Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400; ▲ Lower Explosive Limit (LEL) ✱ W Passing 75 um (%) W_L ■ Moisture Content (%) Plastic 20 40 60 80 Liquid		
	grey fill - sand with gravel compact										
	108.0										
	brown 0.5 **SILTY CLAY** stiff										
		SS	1	67	8	1	108	○			
		SS	2	79	9	2 ▽	107	○			
	106.0										
	brown 2.4 **CLAYEY SILT** trace sand very stiff	SS	3	84	15	3	106	○			
		SS	4	84	16	4	105	○			
		SS	5	75	15	5	104	○			
	102.7						103				
	brown 5.8 **SILT** some sand some clay trace gravel very stiff					6					
	102.1										
	refusal on inferred bedrock 6.4										

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▽ Groundwater depth on completion of drilling: 1.8 m.

RECORD OF BOREHOLE No. BH6

Project Number:	11-1539-05	Drilling Location:	BH6	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 29, 11 Date Completed:	Revision No.:	0

Local Ground Surface Elevation: 108.5 m

DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
grey fill - sand with gravel compact						
108.1						
brown **SILTY CLAY** stiff 0.5	SS	1	59	9	1	108
	SS	2	70	9	2	107
106.2						
brown **CLAYEY SILT** trace sand very stiff 2.3	SS	3	87	15	3	106
	SS	4	84	16		105
104.2					4	
brown **SILT** some sand some clay trace gravel very stiff 4.3						104
103.6						
refusal on inferred bedrock 4.9						

FIELD TESTING: Penetration Testing — SPT, DCPT; MTO Vane* Intact, Remould; Nilcon Vane* Intact, Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W_P, W, W_L; Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400; Lower Explosive Limit (LEL); Passing 75 um (%); Moisture Content (%); Plastic 20 40 60 80 Liquid

INSTRUMENTATION INSTALLATION

COMMENTS

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Groundwater depth on completion of drilling: 1.8 m.

RECORD OF BOREHOLE No. BH7

Project Number:	11-1539-05	Drilling Location:	BH7	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 29, 11 Date Completed:	Revision No.:	0

Lithology Plot	DESCRIPTION Local Ground Surface Elevation: 108.5 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	grey fill - sand with gravel compact 108.1							Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W, W_P, W_L; △ Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400; ▲ Lower Explosive Limit (LEL); ✱ Passing 75 um (%); ■ Moisture Content (%); Plastic 20 40 60 80 Liquid		
	brown **SILTY CLAY** stiff 0.5	SS	1	54	9	1	108				
		SS	2	75	10	2	107				
	106.3 brown **CLAYEY SILT** trace sand very stiff 2.3	SS	3	79	16	3	106				
	105.0 brown **SILT** some sand some clay trace gravel very stiff 3.5	SS	4	87	16	4	105				
	104.2 refusal on inferred bedrock 4.3										

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▽ Groundwater depth on completion of drilling: 1.8 m.

RECORD OF BOREHOLE No. BH8

Project Number:	11-1539-05	Drilling Location:	BH8	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 30, 11 Date Completed:	Revision No.:	0

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
	Local Ground Surface Elevation: 108.5 m						
	dark brown 108.3 topsoil - silty clay with roots and organics 0.2						
	brown **SILTY CLAY** stiff	SS	1	59	10	1	108
		SS	2	62	10	2	107
	106.3 brown 2.2 **CLAYEY SILT** trace sand very stiff	SS	3	95	17	3	106
	105.1 brown 3.4 **SILT** some sand some clay trace gravel very stiff	SS	4	92	16	4	105
	104.4 refusal on inferred bedrock 4.1						

FIELD TESTING: Penetration Testing — ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W_P W W_L; Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400; ▲ Lower Explosive Limit (LEL); ✱ Passing 75 um (%); ■ Moisture Content (%); Plastic 20 40 60 80 Liquid

INSTRUMENTATION INSTALLATION

COMMENTS

▽ Groundwater depth on completion of drilling: 2.1 m.

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RECORD OF BOREHOLE No. BH9

Project Number:	11-1539-05	Drilling Location:	BH9	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 30, 11 Date Completed:	Revision No.:	0

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
	Local Ground Surface Elevation: 108.4 m						
	dark brown 108.3 topsoil - silty clay with roots and organics 0.2						
	brown **SILTY CLAY** stiff						
		SS	1	54	9	1	108
		SS	2	75	10	2 ▽	107
	105.9						
	brown 2.5 **CLAYEY SILT** trace sand very stiff	SS	3	79	16	3	106
		SS	4	87	18		105
	104.9						
	brown 3.6 **SILT** some sand some clay trace gravel very stiff	SS	5	87	20	4	104
	103.8						
	refusal on inferred bedrock 4.7						

FIELD TESTING

Penetration Testing
○ SPT ● DCPT
MTO Vane* Nilcon Vane*
△ Intact ◇ Intact
▲ Remould ◆ Remould
* Undrained Shear Strength (kPa)
20 40 60 80

LAB TESTING

★ Rinse pH Values
2 4 6 8 10 12
Atterberg Limits
W_P W W_L
Soil Vapour Reading
△ parts per million (ppm)
Plastic 200 300 Liquid 400
▲ Lower Explosive Limit (LEL)
✱ W Passing 75 um (%) W_L
■ Moisture Content (%) ●
Plastic Liquid
20 40 60 80

INSTRUMENTATION INSTALLATION

COMMENTS

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▽ Groundwater depth on completion of drilling: 2 m.

RECORD OF BOREHOLE No. BH10

Project Number:	11-1539-05	Drilling Location:	BH10	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 29, 11 Date Completed:	Revision No.:	0

Lithology Plot	DESCRIPTION Local Ground Surface Elevation: 108.5 m	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
	grey fill - sand with gravel compact 108.0						
	brown 0.5 **SILTY CLAY** stiff	SS	1	54	9	1	108
		SS	2	75	10	2	107
	106.4 brown 2.1 **CLAYEY SILT** trace sand very stiff	SS	3	79	16	3	106
		SS	4	87	20	4	105
		SS	5	87	24	5	104
	103.7 brown 4.8 **SILT** some sand some clay trace gravel very stiff	SS	6	87	23		103
	102.9 refusal on inferred bedrock 5.6						

FIELD TESTING: Penetration Testing — SPT, DCPT; MTO Vane* Intact, Remould; Nilcon Vane* Intact, Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: Rinse pH Values; Atterberg Limits; Soil Vapour Reading parts per million (ppm); Lower Explosive Limit (LEL); % Passing 75 um (%); Moisture Content (%); Plastic; Liquid; 20 40 60 80

INSTRUMENTATION INSTALLATION

COMMENTS

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Groundwater depth on completion of drilling: 1.8 m.

RECORD OF BOREHOLE No. BH11

Project Number:	11-1539-05	Drilling Location:	BH11	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 30, 11	Date Completed:	Revision No.: 0

Local Ground Surface Elevation: 108.4 m

DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
dark brown topsoil - silty clay with roots and organics 108.3 / 0.1						
brown **SILTY CLAY** stiff	SS	1	67	8	1	108
	SS	2	84	13	2	107
106.3 / brown **CLAYEY SILT** trace sand very stiff 2.1	SS	3	75	20	3	106
104.9 / brown **SILT** some sand some clay trace gravel very stiff 3.5	SS	4	95	20	4	105
104.4 / refusal on inferred bedrock 4.1						

FIELD TESTING: Penetration Testing — SPT, DCPT; MTO Vane* Intact, Remould; Nilcon Vane* Intact, Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: Rinse pH Values; Atterberg Limits; Soil Vapour Reading parts per million (ppm); Lower Explosive Limit (LEL); % Passing 75 um (%); Moisture Content (%); Plastic; Liquid

INSTRUMENTATION INSTALLATION

COMMENTS

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▽ Groundwater depth on completion of drilling: 2.1 m.

RECORD OF BOREHOLE No. BH12

Project Number:	11-1539-05	Drilling Location:	BH12	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 29, 11	Date Completed:	
				Revision No.:	0

Lithology Plot	DESCRIPTION Local Ground Surface Elevation: 108.5 m		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	grey fill - sand with gravel compact	108.0							Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W_P Plastic 200 300 W_L Liquid 400; △ Soil Vapour Reading parts per million (ppm); ▲ Lower Explosive Limit (LEL); * W_P Passing 75 um (%) W_L; ■ Moisture Content (%) Plastic 20 40 60 80 Liquid		
	brown **SILTY CLAY** stiff	0.5	SS	1	62	10	1	108				
			SS	2	75	10	2	107				
		106.2										
	brown **CLAYEY SILT** trace sand very stiff	2.3	SS	3	87	18	3	106				
			SS	4	87	15	4	105				
		103.6	SS	5	87	18	5	104				
	brown **SILT** some sand some clay trace gravel very stiff	4.9						103				
		102.7										
	refusal on inferred bedrock	5.8										

▽ Groundwater depth on completion of drilling: 2.2 m.

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RECORD OF BOREHOLE No. BH13

Project Number:	11-1539-05	Drilling Location:	BH13	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 30, 11 Date Completed:	Revision No.:	0

Local Ground Surface Elevation: 108.5 m

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
	dark brown 108.3 topsoil - silty clay with roots and organics 0.2						
	brown **SILTY CLAY** stiff	SS	1	79	9	1	108
		SS	2	84	10	2	107
	106.2 brown 2.3 **CLAYEY SILT** trace sand very stiff	SS	3	92	19	3	106
		SS	4	92	18	4	105
	104.5 brown 4.0 **SILT** some sand some clay trace gravel very stiff						104
	103.7 refusal on inferred bedrock 4.7						

FIELD TESTING: Penetration Testing (SPT, DCPT); MTO Vane* (Intact, Remould); Nilcon Vane* (Intact, Remould); * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W, W_P, W_L; Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400; Lower Explosive Limit (LEL); % Passing 75 um (%); Moisture Content (%); Plastic 20 40 60 80 Liquid

INSTRUMENTATION INSTALLATION

COMMENTS

DBA Engineering Limited
370 Steelcase Road East
Markham, Ontario L3R 1G2
Tel: 1-800-819-8833
Fax: 905-940-8508

▽ Groundwater depth on completion of drilling: 2.4 m.

RECORD OF BOREHOLE No. BH14

Project Number:	11-1539-05	Drilling Location:	BH14	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 30, 11 Date Completed:	Revision No.:	0

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
	Local Ground Surface Elevation: 108.5 m						
	dark brown 108.3 topsoil - silty clay with roots and organics 0.2						
	brown **SILTY CLAY** stiff						
		SS	1	75	9	1	108
		SS	2	79	11	2	107
	106.2						
	brown 2.3 **CLAYEY SILT** trace sand very stiff	SS	3	92	16	3	106
		SS	4	84	20	4	105
	104.5						
	brown 4.0 **SILT** some sand some clay trace gravel very stiff						104
	103.7						
	refusal on inferred bedrock 4.7						

FIELD TESTING

Penetration Testing: ○ SPT ● DCPT; MTO Vane*: △ Intact ▲ Remould; Nilcon Vane*: ◇ Intact ◆ Remould

* Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING

★ Rinse pH Values 2 4 6 8 10 12

Atterberg Limits W_P W W_L

△ Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400

▲ Lower Explosive Limit (LEL)

✱ Passing 75 um (%)

○ Moisture Content (%)

Plastic 20 40 60 80 Liquid

INSTRUMENTATION INSTALLATION

COMMENTS

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▽ Groundwater depth on completion of drilling: 2.1 m.

RECORD OF BOREHOLE No. BH15

Project Number:	11-1539-05	Drilling Location:	BH15	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 30, 11 Date Completed:	Revision No.:	0

Local Ground Surface Elevation: 108.3 m

DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
dark brown 108.2 topsoil - silty clay with roots and organics 0.2 brown fill - sand with silty clay some gravel						
107.3 brown 1.0 **SILTY CLAY** stiff	SS	1	70	10	1	107
	SS	2	87	9	2	106
105.9 brown 2.4 **CLAYEY SILT** trace sand very stiff	SS	3	92	15	3	105
	SS	4	87	16	4	104
	SS	5	87	18	5	103
	SS	6	92	17	6	102
100.7 brown 7.6 **SILT** some sand some clay trace gravel very stiff					7	101
99.8 refusal on inferred bedrock 8.5					8	100

FIELD TESTING: Penetration Testing — SPT, DCPT; MTO Vane* Intact, Remould; Nilcon Vane* Intact, Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W, W_P, W_L; Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400; Lower Explosive Limit (LEL); Passing 75 um (%); Moisture Content (%); Plastic 20 40 60 80 Liquid

INSTRUMENTATION INSTALLATION

COMMENTS

Groundwater depth on completion of drilling: 2.2 m.

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RECORD OF BOREHOLE No. BH16

Project Number:	11-1539-05	Drilling Location:	BH16	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 29, 11	Date Completed:	
				Revision No.:	0

Lithology Plot	DESCRIPTION (Local Ground Surface Elevation: 108.4 m)	Elev.	Depth	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value
	grey fill - sand with gravel compact	108.0	0.5				
	brown **SILTY CLAY** stiff			SS	1	67	9
				SS	2	84	8
		106.1	2.4				
	brown **CLAYEY SILT** trace sand very stiff			SS	3	92	16
				SS	4	87	16
				SS	5	87	17
				SS	6	87	17
		101.5	6.9				
	brown **SILT** some sand some clay trace gravel very stiff						
		100.7	7.8				
	refusal on inferred bedrock						

FIELD TESTING: Penetration Testing — SPT, DCPT; MTO Vane* Intact, Remould; Nilcon Vane* Intact, Remould; * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: Rinse pH Values; Atterberg Limits; Soil Vapour Reading parts per million (ppm); Lower Explosive Limit (LEL); % Passing 75 um (%); Moisture Content (%); Plastic; Liquid

INSTRUMENTATION INSTALLATION

COMMENTS

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▽ Groundwater depth on completion of drilling: 2 m.

RECORD OF BOREHOLE No. BH17

Project Number:	11-1539-05	Drilling Location:	BH17	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 30, 11 Date Completed:	Revision No.:	0

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
	Local Ground Surface Elevation: 108.4 m						
	dark brown 108.3 topsoil - silty clay with roots and organics 0.2						
	brown **SILTY CLAY** stiff						
		SS	1	67	9	1	108
		SS	2	84	15	2	107
	106.2						
	brown 2.2 **CLAYEY SILT** trace sand very stiff						
		SS	3	92	20	3	106
	105.3						
	brown 3.1 **SILT** some sand some clay trace gravel very stiff	SS	4	87	22		105
	104.8						
	refusal on inferred bedrock 3.7						

FIELD TESTING

Penetration Testing
○ SPT ● DCPT
MTO Vane* △ Intact ▲ Remould
Nilcon Vane* ◇ Intact ◆ Remould
* Undrained Shear Strength (kPa)
20 40 60 80

LAB TESTING

★ Rinse pH Values 2 4 6 8 10 12
Atterberg Limits W, W_P, W_L
△ Soil Vapour Reading parts per million (ppm) 100 200 300 400
▲ Lower Explosive Limit (LEL)
✱ % Passing 75 um (%)
○ Moisture Content (%)
Plastic Liquid
20 40 60 80

INSTRUMENTATION INSTALLATION

COMMENTS

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▽ Groundwater depth on completion of drilling: 2 m.

RECORD OF BOREHOLE No. BH18

Project Number:	11-1539-05	Drilling Location:	BH18	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 30, 11	Date Completed:	Revision No.: 0

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
	Local Ground Surface Elevation: 108.5 m						
	dark brown 108.3 topsoil - silty clay with roots and organics 0.2						
	brown **SILTY CLAY** stiff						
		SS	1	62	11	1	108
		SS	2	92	11	2	107
	106.2						
	brown 2.3 **CLAYEY SILT** trace sand very stiff	SS	3	92	17	3	106
		SS	4	95	20		105
	104.6					4	
	brown 3.9 **SILT** some sand some clay trace gravel very stiff						104
	103.8						
	refusal on inferred bedrock 4.7						

FIELD TESTING

Penetration Testing: ○ SPT ● DCPT

MTO Vane*: △ Intact ▲ Remould

Nilcon Vane*: ◇ Intact ◆ Remould

* Undrained Shear Strength (kPa): 20 40 60 80

LAB TESTING

★ Rinse pH Values 2 4 6 8 10 12

Atterberg Limits: W, W_P, W_L

△ Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400

▲ Lower Explosive Limit (LEL)

✱ % Passing 75 um (%)

○ Moisture Content (%)

Plastic 20 40 60 80 Liquid

INSTRUMENTATION INSTALLATION

COMMENTS

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Fax: 905-940-8508

▽ Groundwater depth on completion of drilling: 1.9 m.

RECORD OF BOREHOLE No. BH19

Project Number:	11-1539-05	Drilling Location:	BH19	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 30, 11 Date Completed:	Revision No.:	0

Local Ground Surface Elevation: 108.3 m

DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)
dark brown topsoil - silty clay with roots and organics 0.2						
brown **SILTY CLAY** stiff	SS	1	75	9	1	107
	SS	2	87	12	2	106
brown **CLAYEY SILT** trace sand very stiff 105.9 2.4	SS	3	95	16	3	105
	SS	4	92	16	4	104
	SS	5	92	22	5	103
	SS	6	92	20	6	102
brown **SILT** some sand some clay trace gravel very stiff 100.5 7.8					7	101
refusal on inferred bedrock 99.9 8.4					8	100

FIELD TESTING: Penetration Testing (SPT, DCPT); MTO Vane* (Intact, Remould); Nilcon Vane* (Intact, Remould); * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: Rinse pH Values 2 4 6 8 10 12; Atterberg Limits W, W_P, W_L; Soil Vapour Reading parts per million (ppm) Plastic 200 300 Liquid 400; Lower Explosive Limit (LEL); Passing 75 um (%); Moisture Content (%); Plastic 20 40 60 80 Liquid

INSTRUMENTATION INSTALLATION

COMMENTS

DBA Engineering Limited
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Tel: 1-800-819-8833
Fax: 905-940-8508

▽ Groundwater depth on completion of drilling: 2 m.

RECORD OF BOREHOLE No. BH20

Project Number:	11-1539-05	Drilling Location:	BH20	Logged by:	MM
Project Client:	Public Works and Government Services Canada	Drilling Method:	100 mm Solid Stem Augers	Compiled by:	MM
Project Name:	Fifty Bed Housing Unit	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RC
Project Location:	Pittsburgh Institution	Date Started:	Aug 30, 11 Date Completed:	Revision No.:	0

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	Local Ground Surface Elevation: 108.3 m							Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) ✱ Passing 75 um (%) W_L ■ Moisture Content (%) ● Plastic Liquid 20 40 60 80		
	dark brown 108.2 topsoil - silty clay with roots and organics 0.2										
	brown **SILTY CLAY** stiff	SS	1	79	10	1	108	○			
		SS	2	84	11	2	107	○			
	106.1										
	brown 2.2 **CLAYEY SILT** trace sand very stiff	SS	3	92	17	3	106	○			
		SS	4	87	16	4	105	○			
		SS	5	87	18	5	104	○			
	102.0					6	103				
	brown 6.3 **SILT** some sand some clay trace gravel very stiff					7	102				
	101.3										
	refusal on inferred bedrock 7.0										

DBA Engineering Limited
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▽ Groundwater depth on completion of drilling: 2.2 m.

APPENDIX III

SOIL TESTING

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova Accutest

Client: DBA Engineering
1164 Clyde Court

Kingston, ON
K7P 2E4
Attention: Mr. Murray McClelland

Kingston Report: K11-2971
Report Number: 1120662
Date: 2011-09-15
Date Submitted: 2011-09-06

Project: 11-1539-05

P.O. Number:

Chain of Custody Number: 118104

Matrix: Soil

			LAB ID:	908777	908778				GUIDELINE		
			Sample Date:	2011-08-29	2011-08-29						
			Sample ID:	Pittsburgh BH1'-2'	Pittsburgh BH12 5'-7'						
PARAMETER	**UNITS**	**MRL**							**TYPE**	**LIMIT**	**UNITS**
Cyanide (free)	ug/g	0.03		<0.03	<0.03						
Electrical Conductivity	mS/cm	0.05		0.13	0.23						
pH				8.2	7.7						
Sodium Absorption Ratio (SAR)		0.01		0.19	0.26						
Sulphate	%	0.01			0.12						
Antimony	ug/g	1		<1	<1						
Arsenic	ug/g	1		1	1						
Barium	ug/g	1		88	177						
Beryllium	ug/g	1		<1	<1						
Boron (hot water extract)	ug/g	0.5		<0.5	<0.5						
Cadmium	ug/g	0.5		<0.5	<0.5						
Chromium	ug/g	1		10	33						
Cobalt	ug/g	1		3	10						
Copper	ug/g	1		6	22						
Hexavalent Chromium (Cr(VI))	ug/g	0.5		<0.50	<0.50						
Lead	ug/g	1		4	5						
Mercury	ug/g	0.1		<0.1	<0.1						
Molybdenum	ug/g	1		<1	<1						
Nickel	ug/g	1		10	21						
Selenium	ug/g	1		<1	<1						
Silver	ug/g	0.2		<0.2	<0.2						
Thallium	ug/g	1		<1	<1						
Vanadium	ug/g	2		14	51						
Zinc	ug/g	2		37	62						

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:
Samples were subcontracted for cyanide (free) analysis. Holding time for cyanide (free) analysis had been exceeded upon sample receipt.

APPROVAL:
Lorna Wilson
Inorganic Lab Supervisor

Methods references and/or additional QA/QC information available on request.

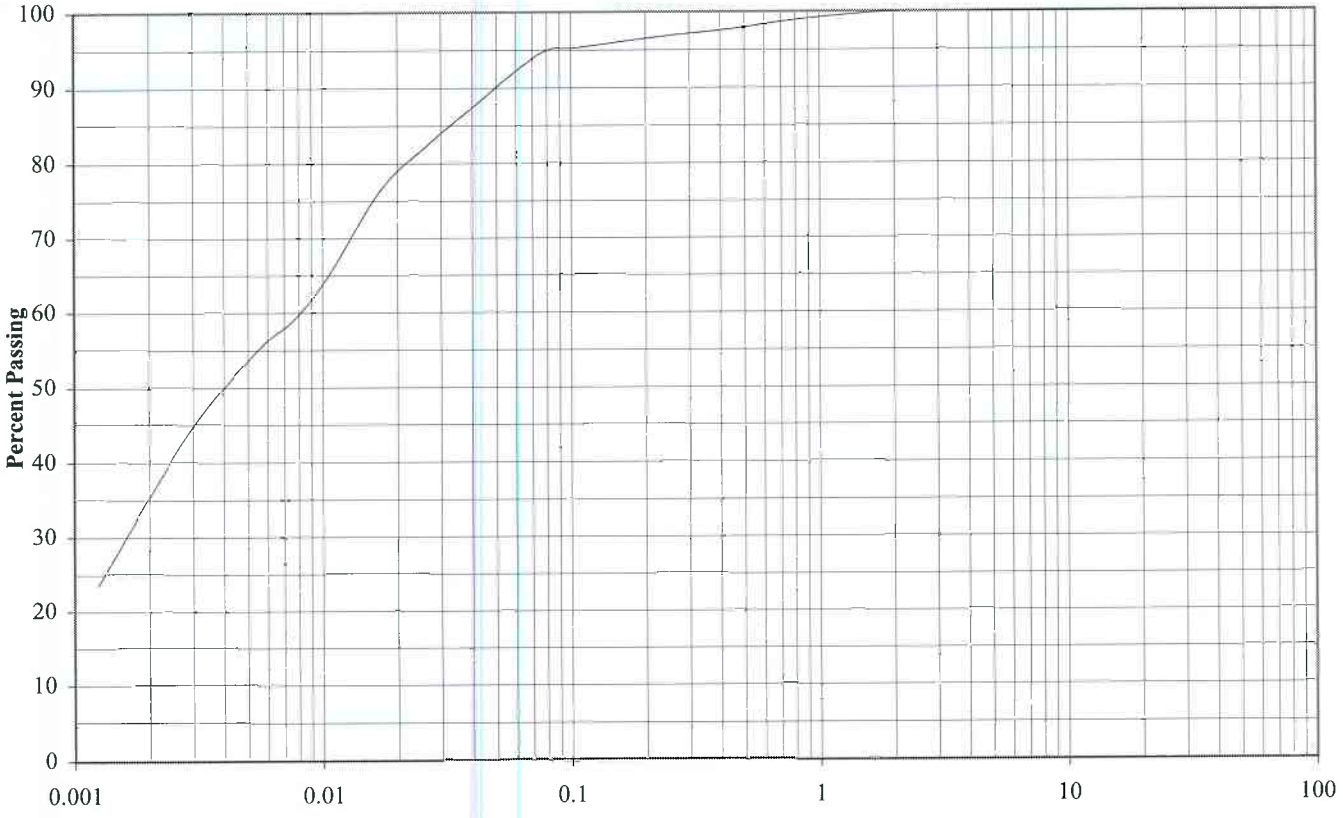
DBA Engineering

Grain Size Analysis

LAB NUMBER: 11073A
PROJECT NUMBER: 11-1539-05
PROJECT: Pittsburgh 50 Bed Housing Unit
CONTRACT:
CLIENT: Public Works
CONTRACTOR:
PROJECT SITE:
SAMPLED BY: MM
DATE SAMPLED: 29-Aug-11
SUPPLIER:
SAMPLE LOCATION: SS#2
BOREHOLE No 15 **SAMPLE DEPTH** 1.50M-2.13M
DESCRIPTION: Clayey Silt,Trace of Sand
DATE TESTED: 8-Sep-11
SPECIFICATION:
COMMENTS: Moisture Content For this Grading is 35.8%

TESTED BY: COS

SIEVE SIZE	PERCENT PASSING	SPECIFICATIONS
150.0 mm	100.0	
106.0 mm	100.0	
75.0 mm	100.0	
63.0 mm	100.0	
53.0 mm	100.0	
37.5 mm	100.0	
26.5 mm	100.0	
19.0 mm	100.0	
16.0 mm		
13.2 mm	100.0	
9.5 mm	100.0	
4.75 mm	100.0	
2.36 mm		
2.00 mm	100.0	
.850mm	99.0	
425 µm	97.6	
250 µm	96.9	
106 µm	95.3	
75 µm	94.5	



	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse
clay	silt			sand			gravel		

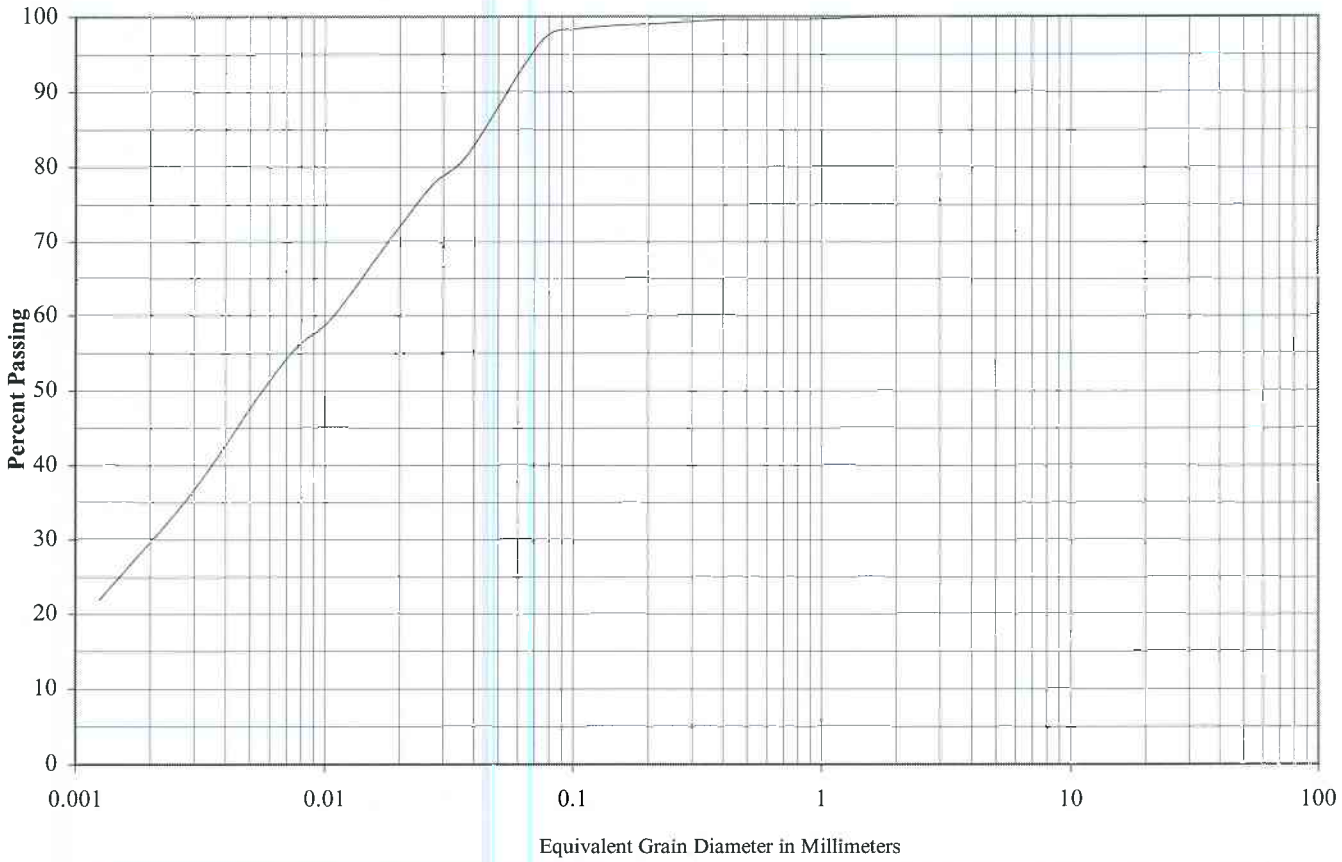
DBA Engineering

Grain Size Analysis

LAB NUMBER: 11073B
PROJECT NUMBER: 11-1539-05
PROJECT: Pittsburgh 50 Bed Housing Unit
CONTRACT:
CLIENT: Public Works
CONTRACTOR:
PROJECT SITE:
SAMPLED BY: MM
DATE SAMPLED: 29-Aug-11
SUPPLIER:
SAMPLE LOCATION: SS#4
BOREHOLE No 15 **SAMPLE DEPTH** 3.05M-3.66M
DESCRIPTION: Clayey Silt,Trace of Sand
DATE TESTED: 8-Sep-11
SPECIFICATION:
COMMENTS: Moisture Content For this Grading is 26.9%

TESTED BY: COS

SIEVE SIZE	PERCENT PASSING	SPECIFICATIONS
150.0 mm	100.0	
106.0 mm	100.0	
75.0 mm	100.0	
63.0 mm	100.0	
53.0 mm	100.0	
37.5 mm	100.0	
26.5 mm	100.0	
19.0 mm	100.0	
16.0 mm		
13.2 mm	100.0	
9.5 mm	100.0	
4.75 mm	100.0	
2.36 mm		
2.00 mm	100.0	
.850mm	99.6	
425 µm	99.6	
250 µm	99.2	
106 µm	98.4	
75 µm	96.8	



	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse
clay	silt			sand			gravel		

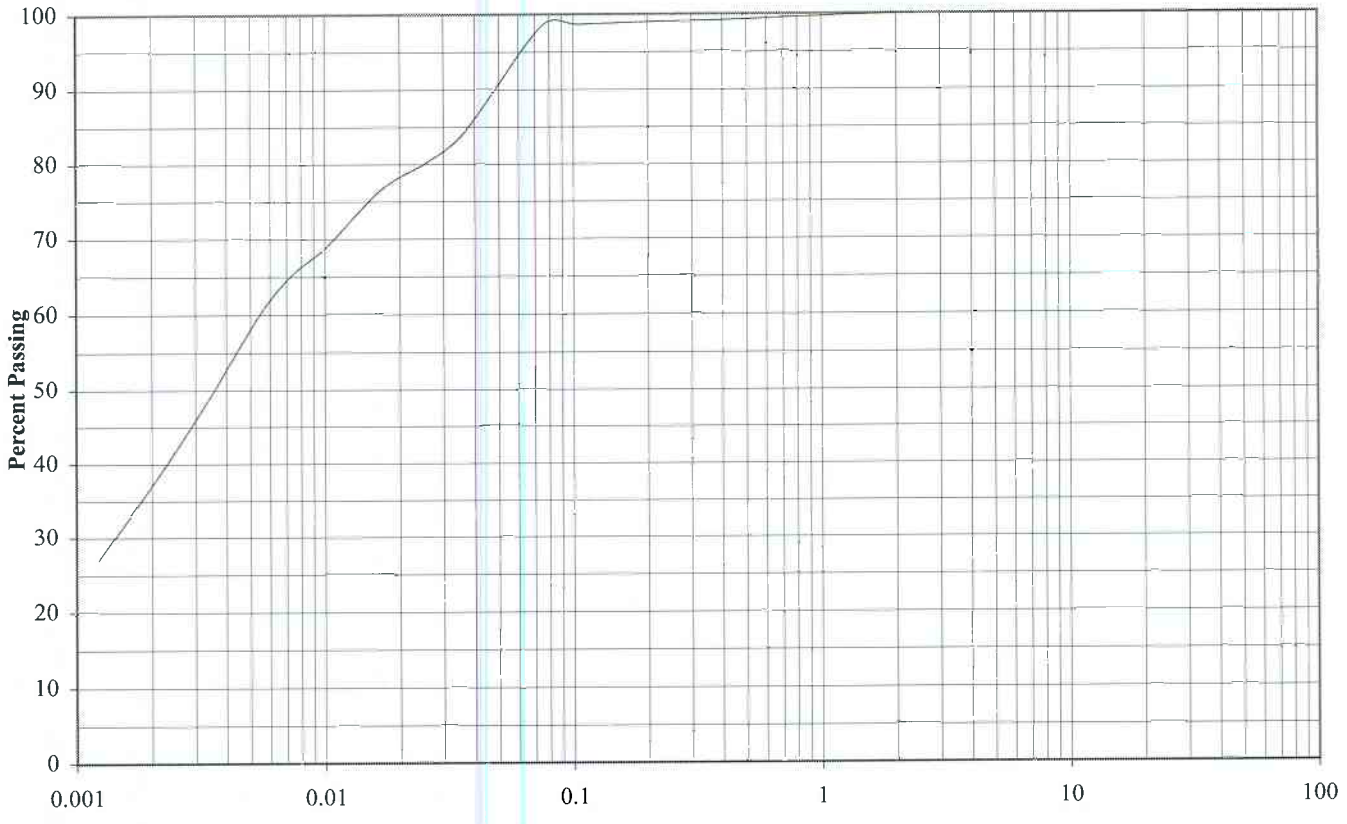
DBA Engineering

Grain Size Analysis

LAB NUMBER: 11073C
PROJECT NUMBER: 11-1539-05
PROJECT: Pittsburgh 50 Bed Housing Unit
CONTRACT:
CLIENT: Public Works
CONTRACTOR:
PROJECT SITE:
SAMPLED BY: MM
DATE SAMPLED: 29-Aug-11
SUPPLIER:
SAMPLE LOCATION: SS#6
BOREHOLE No 15 **SAMPLE DEPTH** 6.10M-6.70M
DESCRIPTION: Clayey Silt,Trace of Sand
DATE TESTED: 8-Sep-11
SPECIFICATION:
COMMENTS: Moisture Content For this Grading is 26.5%

TESTED BY: COS

SIEVE SIZE	PERCENT PASSING	SPECIFICATIONS
150.0 mm	100.0	
106.0 mm	100.0	
75.0 mm	100.0	
63.0 mm	100.0	
53.0 mm	100.0	
37.5 mm	100.0	
26.5 mm	100.0	
19.0 mm	100.0	
16.0 mm		
13.2 mm	100.0	
9.5 mm	100.0	
4.75 mm	100.0	
2.36 mm		
2.00 mm	100.0	
.850mm	99.6	
425 µm	99.2	
250 µm	99.0	
106 µm	98.7	
75 µm	98.5	



	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse
clay	silt			sand			gravel		