CITY OF VANCOUVER

CITY CLERK'S DEPARTMENT
Access to Information & Privacy Division

File No.: 04-1000-20-2024-255

August 9, 2024

s.22(1)

Dear s.22(1)

Re: **Request for Access to Records under the Freedom of Information and Protection of Privacy Act (the "Act")**

I am responding to your request of April 26, 2024 under the ***Freedom of Information and Protection of Privacy Act*** for:

> **Records related to 4685 Valley Drive and 4759 Valley Drive, from January 1, 1999 to December 31, 2004, specifically:**
> 1. **Any geotechnical reports and addendums (regarding soil, building foundations, groundwater, etc.); and**
> 2. **Geotechnical field review during the construction of the building.**

All responsive records are attached.*

*Please note, Letters of Assurance are routinely available on a fee for service basis from the Property Research section of the Development, Building & Licensing Department. To access these records, please contact Property Research at property.research@vancouver.ca. Please see the following link which also provides more information on obtaining property records: https://vancouver.ca/home-property-development/request-property-research-and-copies-of-permits.aspx.

Under section 52 of the Act, and within 30 business days of receipt of this letter, you may ask the Information & Privacy Commissioner to review any matter related to the City's response to your FOI request by writing to: Office of the Information & Privacy Commissioner, info@oipc.bc.ca or by phoning 250-387-5629.

If you request a review, please provide the Commissioner's office with: 1) the request number (#04-1000-20-2024-255); 2) a copy of this letter; 3) a copy of your original request; and 4) detailed reasons why you are seeking the review.

Yours truly,

*[Signed by Cobi Falconer]*

**Cobi Falconer, MAS, MLIS, CIPP/C**
**Director, Access to Information & Privacy**

If you have any questions, please email us at foi@vancouver.ca and we will respond to you as soon as possible. You may also contact 3-1-1 (604-873-7000) if you require accommodation or do not have access to email.

Encl. (Response Package)

:ma

**CFT Engineering Inc.**

203 - 1104 Hornby Street
Vancouver, BC
V6Z 1V8
Ph: (604) 684-2384
Fax: (604) 684-2402
e-mail: cft@cftengineering.com

# TRANSMITTAL

**TO:** Mr. Hank Uyeyama
Environmental Protection Branch Vancouver
Suite 301-456 West Broadway
Vancouver, BC
V5Y 1R3

**cc:** Mr. Brian Ellis - Polygon Development 876-7610

**FROM:** Michael Linton

**DATE:** August 7, 2003

**RE:** 4775 Valley Drive, BU 425988

**PROJECT #:** C4922.01

BU 425988

**TRANSMITTING:** Sediment Erosion Control Plan

Please find enclosed 2 copies of the sediment control plan prepared by the geotechnical consultant.

This project is being administered under the Certified Professional program and staged permits will be sought. At this stage we are seeking clearance for an excavation/shoring permit on this project. If you require further information or have questions please contact myself or Mr. Tom Bryski of Golder Associates (604) 298-6623.

Thank you for your assistance.

Regards,

Michael Linton, P.Eng., C.P.

ML/jg


C4922.01_T01

APPROVED FROM ENV. PROT.

BU 425988

**Golder Associates Ltd.**

500 - 4260 Still Creek Drive
Burnaby, British Columbia, Canada V5C 6C6
Telephone (604) 298-6623
Fax (604) 298-5253

Golder Associates

**REPORT ON**

# PRELIMINARY GEOTECHNICAL ENGINEERING SERVICES FOR PROPOSED REDEVELOPMENT OF ARBUTUS GARDENS AT WEST 33RD AVENUE AND ARBUTUS STREET VANCOUVER, BRITISH COLUMBIA

Submitted to:

Arbutus Gardens Holdings Ltd.
1800 Spyglass Place
Vancouver, B.C.
V6Z 4K8


DISTRIBUTION:

6 Copies - Arbutus Gardens Holdings Ltd.
2 Copies - Golder Associates Ltd.

December 1997

972-1242



OFFICES IN AUSTRALIA, CANADA, GERMANY, HUNGARY, ITALY, SWEDEN, UNITED KINGDOM, UNITED STATES

**Golder Associates Ltd.**

500 - 4260 Still Creek Drive
Burnaby, British Columbia, Canada V5C 6C6
Telephone (604) 298-6623
Fax (604) 298-5253

December 5, 1997

972-1245 2 ?

Arbutus Gardens Holdings Ltd.
1800 Spyglass Place
Vancouver , B.C.
V6Z 4K8

Attention: Mr. John Northey

**RE: PRELIMINARY GEOTECHNICAL INVESTIGATION FOR PROPOSED REDEVELOPMENT OF ARBUTUS GARDENS, WEST 33rd AVENUE AND ARBUTUS STREET, VANCOUVER, BRITISH COLUMBIA**

Dear Sir:

As requested, Golder Associates has carried out a preliminary geotechnical investigation for the proposed redevelopment of the above site, located at West 33rd Avenue and Arbutus Street in Vancouver, British Columbia. The purpose of the investigation was to determine the general soil and groundwater conditions at the site and, based on this information, provide preliminary geotechnical input to overall planning and site preparation and foundation design for the proposed structures.

The scope of this work was limited to the geotechnical aspects of the proposed development and does not include any provision for the investigation, testing or assessment of the potential presence or impact of soil or groundwater contamination at the site. Golder Associates has the capability and will be pleased to provide such specialist environmental engineering services, if requested.

## 1.0 SITE CONDITIONS AND PROPOSED DEVELOPMENT

The site is approximately 12 acres in size and triangular in shape. It is bounded by West 33rd Avenue to the south, Arbutus Street to the west, and Valley Drive running diagonally on the north east side of the property (see Figure 1). The site is currently occupied by seven existing two story wooden frame buildings with single level underground parking beneath each building as well as associated access driveways and landscaping.

City of Vancouver - FOI 2024-255 - Page 3 of 22

The proposed redevelopment will consist of the demolition of the existing buildings, and construction of a number of new multi-story residential buildings in approximately the same positions as the existing buildings, thus preserving many of the large old trees on the site. Although the detailed design is not finalized, we understand that the buildings will vary from two stories to nine stories, with two levels of underground parking.

Based on published information on the surficial geology of the site area, the site is inferred to be underlain by a sequence of marine, deltaic and fluvial deposits of the Capilano Sediments, comprising medium to coarse sand overlying glacial drift with lenses and interbeds of sand, gravel and stoney silt. Maps of the ancient streams of Vancouver indicate that a stream originally flowed along Valley Drive, near the north east boundary of the property, indicating that there may be loose or soft sediments in this area.

## 2.0 GEOTECHNICAL INVESTIGATION

### 2.1 Visual and Office Study

The visual and office study included a field reconnaissance and an examination of available topographic, geological, and airphoto information pertinent to the site. The following information was examined:

- Province of British Columbia aerial photographs series BC792 (No. 14), dated 1949, BC1674 (No. 20) dated 1954, BC5062 (No. 53) dated 1963, BC5581 (No. 0007) dated 1974, BC9055 (No. 256) dated 1979, and Department of Energy, Mines and Resources series A 26511, dated 1984.

- Map 1484A - "Vancouver - British Columbia", Geological Survey of Canada, Surficial Geology Map, dated 1979, scale 1:50,000.

Information obtained from the visual and office study was used in siting the auger holes.

### 2.2 Drilling Investigation

Golder Associates carried out a field investigation at the site on November 12, 1997 using a truck-mounted auger drilling rig supplied by Mud Bay Drilling Co. Ltd. A total of six sampled augerholes, designated as augerholes AH97-1 through AH97-3, and AH97-5 through AH97-7, were put down across the site using an auger drill rig. All drilling was confined to asphalt surfaced driveways and parking lots or immediately adjacent to the asphalt surfaced areas at locations selected to provide subsurface information across the property while minimizing disturbance to the existing facilities. The augerholes were put down to depths of 3.0 to 8.2 m below the ground surface at the


City of Vancouver - FOI 2024-255 - Page 4 of 22

approximate locations shown on Figure 2. Augerhole AH97-4 was drilled to a depth of 0.6 m through asphalt and base layers to permit the dynamic cone penetration test (DCPT) to be carried out. The DCPT probes were put down adjacent to all the drilled holes to permit correlation of relative density with soil stratigraphy. PVC standpipe piezometers were installed in test holes AH97-1 and AH97-3 to permit the measurement of the groundwater levels. The remainder of the test holes were backfilled to ground surface using the auger cuttings following completion of logging and sampling.

The field work was carried out under the full-time inspection of a member of our geotechnical staff, who located the augerholes, logged in detail the soil and groundwater conditions encountered, and collected representative soil samples for detailed examination and testing in our laboratory.

## 3.0 SUBSURFACE CONDITIONS

Detailed descriptions of the soil stratigraphy and groundwater conditions encountered at each of the augerholes are presented in the Record of Borehole sheets following the text of this report. The following is a summary of the subsurface conditions, as inferred from the results of the field investigation as well as the published surficial geology information.

### 3.1 Asphalt Concrete, Road Base and Fill

Augerholes AH97-1, 5, and 6 were located on asphalt driveways or parking areas. The asphalt thickness in all cases was 50 mm overlying a sand and gravel layer varying in thickness from 100 mm to 300 mm.

Heterogeneous mineral fill was encountered in augerholes AH97-2, 3, 6, and 7. The fill varied in thickness from 0.9 m in AH97-2 to 2.1 m in AH97-7, and typically consists of sandy and silty material containing gravel or organics. The fill encountered in AH97-2 and 3, located along Valley Drive, consisted of firm or compact moist brown silt or sandy silt, varying in depth from 0.9 m to 1.5 m. Compact to dense grey sand with a trace of gravel or loose to compact brown silty sand with some gravel, extending to a depth of between 1.5 m and 2.1 m, was encountered at AH97-6 and 7, located along 33rd Avenue. Results of water content determination testing of the fill in test hole AH97-6 indicate a water content of 22 percent.

### 3.2 Brown and Grey Silty Sand

Beneath the asphalt concrete, road base or general fills, a compact, rusty brown and grey silty sand layer was encountered varying in depth from 1.5 m to 3.0 m below the ground surface. The DCPT values within this zone ranged between 12 to 57 blows/ft., except in


City of Vancouver - FOI 2024-255 - Page 5 of 22

AH97-5 where refusal was reached in this zone, indicating that this silty sand layer is generally compact. This layer was absent in AH97-3. The natural water content of samples of this layer were found to vary between 24 and 25 percent.

### 3.3 Grey Clayey Silt and Silty Sand

Beneath the silty sand layer, a firm, grey clayey silt layer was encountered varying in depth from 2.7 m to 4.3 m below the ground surface and ranging in thickness from 0.9 to 1.5 m. The DCPT values within this zone ranged between 6 to 40 blows/ft and a SPT blow count of 6 blows/ft. was recorded in AH97-2. This layer was absent in AH97-5.

Field vane tests carried out within this layer in AH97-3 indicated natural shear strength values of 48 kPa and remolded values of 0.48 kPa. The natural water content of samples of this layer were found to be 23 percent. Based on the results of the DCPT, "N" value and field vane tests, this clayey layer is considered to be firm to very stiff in its natural undisturbed state. However, the large decrease in field vane test values from initial to remoulded values indicates that this clayey layer is likely to be highly susceptible to disturbance and strength loss.

At AH97-7, located in the south east extremity of the site, the compact to dense sand layer encountered at depths between 2.1 and 3 m is in turn underlain by generally loose silty sand to silty sand, trace clay which extends to a depth of some 5.9 m and becomes finer with depth The DCPT results in this loose zone or layer vary from 4 to 10 blows/ft. The natural water content for the loose or soft layer in AH97-7 was measured as 24 percent.

### 3.4 Dense Grey Silty Sand or Sandy Silt

Underlying the grey clayey silt, a deposit consisting of very dense, grey silty sand or sandy silt was encountered at all test hole locations. All of the augerholes encountered effective refusal to auger advance within this deposit at depths varying from 3.1 m to 8.2 m below the ground surface. The DCPT probes encountered refusal in all the holes at a depth of between 1.2 m and 6.1 m.

The natural water content for this layer was found to be between 10 and 20 percent. Grain size distributions from this unit are shown in Figures 3 and 4. Based on the gradation and high blow counts, the dense silty sand is inferred to represent the glacial till or drift deposits which underlie this area.


City of Vancouver - FOI 2024-255 - Page 6 of 22

### 3.5 Groundwater Conditions

At the time of the investigation, groundwater was encountered in borehole AH97-6 at a depth of 2.1 m below the ground surface. The groundwater levels measured in the standpipe piezometers on November 28, 1997, are tabulated below:

| Location | depth below ground surface |
|---|---|
| AH97-1 | 0.7 m |
| AH97-3 | 1.1 m |
| AH97-5 | grouted shut |
| AH97-7 | obstruction (likely vandalism) |

We anticipate that the groundwater level at the site will fluctuate in response to seasonal fluctuations in precipitation and runoff, with perched water levels developing within the relatively loose to compact granular fills and natural soils overlying the dense, relatively impermeable silty sand glacial drift deposit at depth.

## 4.0 GEOTECHNICAL RECOMMENDATIONS

### 4.1 General

The proposed development of two levels of underground parking is likely to require excavation depths varying between 4 to 8 m below the existing ground surface. In most areas, the lower portion of these excavations and the foundation level of the structures are expected to be within the very dense sandy silt or silty sand till-like soils which underlie the property. These silty till-like soils are considered highly suitable for foundation support for moderately to heavily loaded structures such as those proposed for this site, provided that the subgrade is suitably prepared as outlined below.

It should be noted that these fine grained silty soils, although dense and strong in their undisturbed state, are moderately to highly susceptible to softening and disturbance if exposed to ponded water and/or construction traffic.

### 4.2 Potential Impact of Infilled Stream or Drainage Channel

The depth to the dense silty till-like deposits generally increases from west to east across the site. Although the test hole data to date is not sufficient for confirmation, it appears that the depth to the dense silty soils is generally less than some 1 to 2.5 m below current ground surface over the west and central portions of the property, then increases to depths of some 4 to 6 m near the easterly (Valley Drive) property line. The increasing thickness of loose or soft soils and fills and depth to the dense silty till-like deposit is consistent


City of Vancouver - FOI 2024-255 - Page 7 of 22

with the reported presence of an old stream or drainage channel along the Valley Drive property line.

It be noted that AH97-6, located at about the midpoint of the south property line, also encountered fills and soft to stiff clayey soils extending to some 4.3 m depth, similar to that along the Valley Drive property line. It is possible that there is a local widening in the old creek or stream channel near the south east corner of the site or, alternatively, there may be a tributary channel in this area.

### 4.3 Building Foundation Support

The dense to very dense sandy silt to silty sand deposit is considered suitable to support the proposed buildings provided that careful site preparation is carried out to prevent softening or loosening of the subgrade soils during construction. For preliminary design purposes, consideration may be given to the use of conventional spread footing or strip footings having a minimum width of 0.6 and 0.45 m, respectively, and an allowable bearing capacity of up to 300 kPa.

The overlying, generally loose to compact or soft to stiff sandy to clayey soils and the heterogeneous fills are not considered suitable for foundation support of heavily loaded or settlement sensitive structures or facilities. Consideration may be given to support of lightly loaded and settlement tolerant structures, pavements and the like as well as buried services at grade or within these soils.

### 4.4 Temporary Excavation, Shoring and Dewatering

Construction of the underground parking garage will require excavations within and through the native clayey and sandy silt soils up to 4 to 8 m depth below the ground surface. Depending on the season, excavation may extend through or below one or more "perched" groundwater level(s). It is also possible that more concentrated seepage may be encountered near the east (Valley Drive) property line where an infilled old drainage channel or stream is likely to be present.

The soft to firm silty soils and the loose to compact sandy soils which underlie the fills are relatively weak and highly susceptible to softening or disturbance during construction. Some risk also exists for failure or sloughing of steep cut slopes. Excavations carried out entirely within the surficial fill soils should be cut at 1 horizontal to 1 vertical (1H:1V), or flatter for temporary excavation slopes. Excavations carried down through the stiff crust and into the soft and likely saturated silty or clayey soils should be cut at 1.5H:1V, or flatter.


City of Vancouver - FOI 2024-255 - Page 8 of 22

The stockpiling or storage of excavation spoil, construction materials or heavy equipment should not be permitted within 4 m of the crest of the excavation slopes. Similarly, the operation of earth moving equipment should be minimized within this setback zone due to the potential for slope movements or base heave and foundation disturbance.

Groundwater seepage into the excavations may occur, particularly within layers or lenses of silt and sand within the clay sequence. Control of groundwater flow can likely be accomplished using conventional ditching and sumping techniques.

Due to space restrictions caused by the proximity of existing trees, services and roads, near vertical excavation cuts and shoring may be required to support excavations for the construction of underground parking garages. Consideration may be given to use of shotcrete and anchor temporary slope support treatment. However, where significant thicknesses of soft or loose and saturated silty and sandy soils are present, such as at AH97-6 and 97-7, it may be desirable or necessary to use driven sheetpiles or H piles and lagging, together with anchor tie backs due to the risk of excessive sloughing or slumping during excavation for conventional shotcrete and anchor shoring treatment.

### 4.5 Wall Backfill and Lateral Soil Pressures on Below-Grade Facilities

The natural silt and clayey deposits present at the site have a relatively high natural water content and are not considered to be suitable for use as select fill or backfill materials where drainage or limited post construction settlement is required. These materials will likely become excessively softened and disturbed during excavation and handling, particularly if construction is carried out during wet weather periods, and will be difficult or impractical to handle and compact.

Backfill immediately adjacent to walls or underground services or utilities should consist of clean, granular fill. However, where space limitations exist, inclusion of a continuous layer of geotextile drainage board, such as Nilex "NuDrain Type C", may be considered as an acceptable alternative provided that the geotextile will not clog when exposed to seepage through the native fine grained soils.

A coefficient of lateral earth pressure of 0.45 should be used in the design of the walls unless the wall is free to rotate at least 10 mm for each 3 m of height. If rotation is permitted, a lesser coefficient of active earth pressure of 0.30 may be used. In either case, it is recommended that the unit weight of the backfill should be considered to be a minimum of 20 kN/m$^3$ and all surcharge loads should be included. It is recommended that the resulting triangular earth pressure distribution be re-distributed in equivalent rectangular form over the entire embedded wall height for all restrained walls.


City of Vancouver - FOI 2024-255 - Page 9 of 22

Unless a more rigorous analysis is considered warranted, an increase in the re-distributed rectangular earth pressure of 50 percent should be used as a simplified method to evaluate the earth pressures acting on the walls below grade under seismic loading conditions.

### 4.6 Fills and Final Site Grading

Grade fill, if required, should consist of clean, well-graded pit run sand and gravel or sand having less than 5 percent passing the 0.075 mm (U.S.S. 200) sieve. Fills should be founded on suitably prepared subgrade soils which have been protected from softening and disturbance due to rainfall, runoff and construction traffic.

All fills should be placed in horizontal lifts having a maximum loose thickness of 300 mm and should be compacted using vibratory compaction equipment to 100 percent standard Proctor maximum dry density under footings and 95 percent under lightly loaded floor slabs.

## 5.0 SEISMIC LOADING EFFECTS

The site of the proposed redevelopment is located within Seismic Zone 4 of the current National and British Columbia Building Codes, which is one of the higher seismic risk categories in Canada. Based on the results of this investigation, the site is underlain by an extensive deposit of generally dense to very dense silty sands and sandy silts, which are expected to extend to depths in excess of 15 m. It is recommended that a Foundation Factor, F, of 1.0 be used in design in accordance with the B.C. Building Code.

The liquefaction susceptibility of the native silts and sands have been evaluated using the Chinese Criteria outlined in the Task Force Report of Earthquake Design in the Fraser Delta (June, 1991). Based on this approach, the foundation subgrade soils are not considered to be susceptible to liquefaction.

## 6.0 ADDITIONAL GEOTECHNICAL SERVICES

It is recommended that a supplementary geotechnical investigation be carried out at the site once demolition of the existing structures takes place so that the foundation subgrade conditions and potential variations in conditions can be better delineated or confirmed at the actual new building locations.

Golder Associates will be pleased to provide geotechnical review of the foundation design for the proposed structure once the site development concept is finalized and preliminary architectural and structural drawings are available. We will also be pleased to provide temporary excavation and shoring designs and drawings, construction


City of Vancouver - FOI 2024-255 - Page 10 of 22

inspections and field review services, including provision of necessary letters of assurance.

We trust that this report provides the information that you require at the present time. If you have any questions or wish to discuss the above, please do not hesitate to contact us.

Yours very truly,

**GOLDER ASSOCIATES LTD.**

M.D. Graham, P.Eng.
Geotechnical Group

Maureen A. Kelly, P.Eng.
Geotechnical Engineer

Reviewed by:

Richard Butler, P.Eng.
Principal

MDG/MAK/RCB/vw
972-1242

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City of Vancouver - FOI 2024-255 - Page 11 of 22

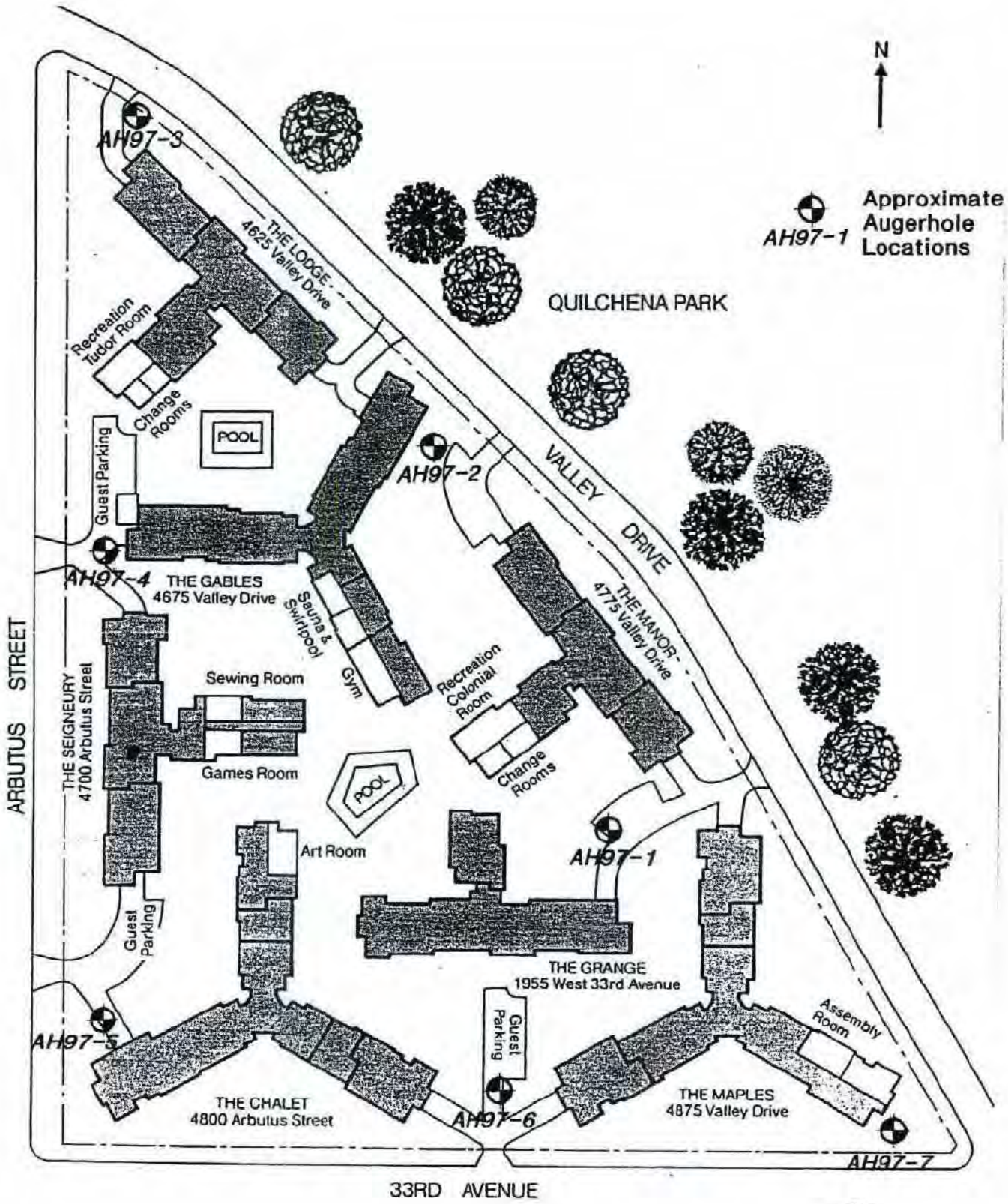

Reference Drawing: Street-Wise Map Book, titled "Greter Vancouver and Fraser Valley", Map #23, published by Westport Publishing Co. Ltd., dated 1995.

Golder Associates

# Key Plan

Figure 1

Project No. 97611642 Drawn ang Reviewed ..... Date Nov. 1997

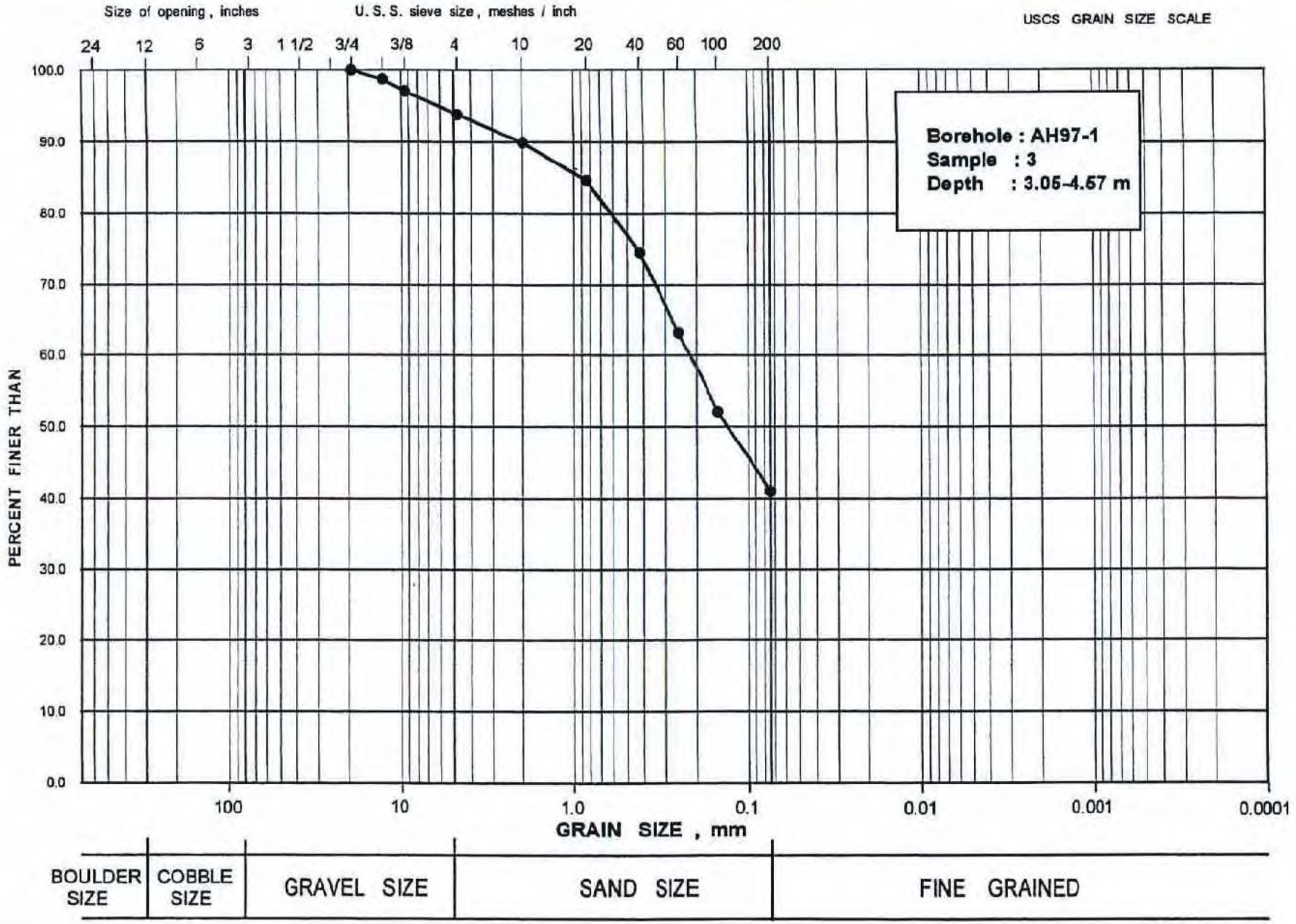



Project No. 97-1642 Drawn SHY Reviewed Date Nov. 1997

Golder Associates

# Site Plan

Figure 2




Project No. ..9721242.....
Drawn .....LL.....
Reviewed .....LL.....
Date .....11/21/97.....

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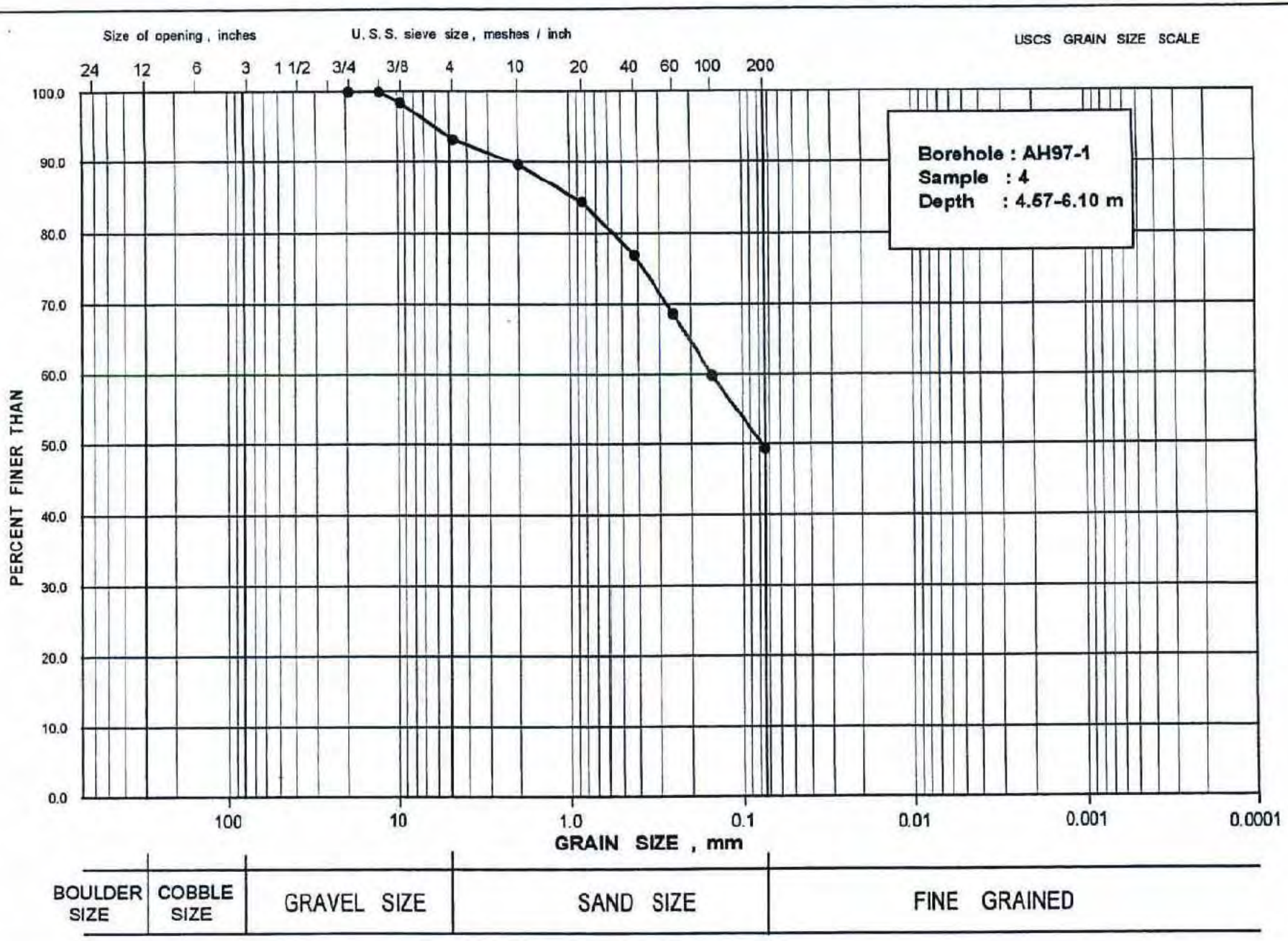
## GRAIN SIZE DISTRIBUTION

Figure 3

City of Vancouver - FOI 2024-255 - Page 14 of 22




Project No. ..9721242.....
Drawn .....LL.....
Reviewed .....LL.....
Date .....11/21/97.....

Golder Associates

## GRAIN SIZE DISTRIBUTION

Figure 4

PROJECT: 972-1242

# RECORD OF BOREHOLE AH97-1

SHEET 1 OF 1

LOCATION: Gardens/Vancouver

BORING DATE: Nov. 12,1997

DATUM: G.S.

SAMPLER HAMMER,63.5kg; DROP,760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat.V - +, rem.V - ⊕, Q - ⊕, U - O) | HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT (Wp, W, Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Truck Mounted Auger / Solid Stem Auger | Ground Surface | | | | | | | | | |
| | | Asphalt. | | 0.00 | | | | | | | Bentonite Seal |
| | | Compact, crushed SAND and GRAVEL. | | 0.05 | | | | | | | |
| | | Compact, moist, rusty brown and grey, silty SAND. | | 0.30 | 1 | AS | | | | | Nov.28/97 |
| 2 | | Firm, wet, grey, clayey SILT, trace sand and gravel. | | 1.82 | 2 | AS | | | O | | Native Fill |
| 3 | | Dense to very dense, moist, grey, silty SAND, trace gravel. | | 2.74 | 3 | AS | | | O | | 25mm dia. PVC Pipe |
| 5 | | Very dense, moist, grey, silty SAND, trace gravel. | | 4.57 | 4 | AS | | | O | | |
| 7 | | | | | 5 | AS | | | O | | Pea Gravel |
| 8 | | | | | 6 | AS | | | O | | 127mm dia. Slotted Pipe |
| | | End of Borehole. (Refusal). | | 8.23 | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DATA INPUT: S.S. Nov/97

DEPTH SCALE

1 to 50

LOGGED: L.W.

CHECKED: M.K.

Golder Associates

City of Vancouver FOI 2024-255 Page 16 of 22

PROJECT: 972-1242

LOCATION: Gardens/Vancouver

SAMPLER HAMMER,63.5kg; DROP,760mm

# RECORD OF BOREHOLE AH97-2

BORING DATE: Nov. 12,1997

SHEET 1 OF 1

DATUM: G.S.

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat.V- + Q-● rem.V- ⊕ U-○) | HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT (Wp W Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Truck Mounted Auger / Hollow Stem Auger | Ground Surface | | | | | | | | | |
| | | Sod | | 0.00 / 0.08 | | | | | | | |
| | | Compact, moist, brown sandy SILT. (FILL). | | | 1 | 50 DO | 14 | | | | |
| 1 | | Compact, moist, rusty brown and grey, silty SAND. | | 0.91 | 2 | 50 DO | 27 | | | | |
| | | | | | 3 | 50 DO | | | | | |
| 2 | | Firm to stiff, moist to wet, brown and grey, silty SAND, trace clay. | | 1.83 | | | | | | | |
| 3 | | Firm, moist to wet, grey, clayey SILT, some sand, trace gravel. | | 3.05 | 4 | 50 DO | 6 | | | | |
| 4 | | | | | | | | | | | |
| | | Very dense, moist, grey, silty SAND, trace gravel. | | 4.27 | 5 | 50 DO | 91 | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | 6 | 50 DO | 100 | | | | |
| | | End of Borehole. (Refusal). | | 6.04 | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DATA INPUT: S.S. Nov./97

DEPTH SCALE

1 to 50

LOGGED: L.W.

CHECKED: M.K.

Golder Associates

PROJECT: 972-1242

# RECORD OF BOREHOLE AH97-3

SHEET 1 OF 1

LOCATION: Gardens/Vancouver

BORING DATE: Nov. 12,1997

DATUM: G.S.

SAMPLER HAMMER,63.5kg; DROP,760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (10 20 30 40) nat.V - + rem.V - ⊕ | HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT Wp W Wl (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ground Surface | | 35. | | | | | | | |
| 0 | Truck Mounted Auger / Solid Stem Auger | Firm, moist to wet, brown, sandy SILT, trace organics. (FILL). | | 0.00 | 1 | AS | | | | | Bentonite Seal |
| 1 | | | | | | | | | | | Nov.28/97 |
| | | Compact, moist, brown GRAVEL and SAND layer. (FILL). | | 1.52 | | | | | | | Nov.12/97 |
| 2 | | Firm, wet, grey, clayey SILT, trace sand and gravel. | | 1.83 | 2 | AS | | | | | Native Fill |
| 3 | | | | 3165 | 3 | AS | | ⊕ + | O | | 25mm dia. PVC Pipe |
| | | Stiff, wet to moist, grey, clayey SILT, trace sand and gravel. | | 3.35 | | | | | | | |
| 4 | | | | 4.27 | | | | | | | |
| 5 | | Very dense, moist, grey, sandy SILT, trace gravel with cobbles. | | | 4 | AS | | | O | | Pea Gravel |
| 6 | | | | | | | | | | | 127mm dia. Slotted PVC Pipe |
| | | End of Borehole. (Refusal). | | 6.10 | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DATA INPUT: S.S. Nov./97

DEPTH SCALE

1 to 50

LOGGED: L.W.

CHECKED: M.K.

Golder Associates

PROJECT: 972-1242

# RECORD OF BOREHOLE AH97-4

SHEET 1 OF 1

LOCATION: Gardens/Vancouver

BORING DATE: Nov. 13,1997

DATUM: G.S.

SAMPLER HAMMER,63.5kg; DROP,760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat.V - + Q - ● rem.V - ⊕ U - ○) | HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT (Wp W Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Truck Mounted Auger / Solid Stem Auger | Ground Surface | | | | | | | | | |
| | | Asphalt. | | 0.00 | | | | | | | |
| | | Crushed SAND and GRAVEL. | | 0.15 | | | | | | | |
| | | Loose, moist to wet, grey, silty SAND. | | | | | | | | | |
| 1 | | End of Borehole. | | 0.61 | | | | | | | |
| 2 | | | | | | | | | | | |
| | | End of Penetration Test. (Refusal). | | 2.49 | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DATA INPUT: S.S. Nov./97

DEPTH SCALE

1 to 50

LOGGED: L.W.

CHECKED: M.K.

Golder Associates

City of Vancouver - FOI 2024-255 - Page 19 of 22

PROJECT: 972-1242

LOCATION: Gardens/Vancouver

SAMPLER HAMMER,63.5kg; DROP,760mm

# RECORD OF BOREHOLE AH97-5

BORING DATE: Nov. 12,1997

SHEET 1 OF 1

DATUM: G.S.

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat.V- + Q-● rem.V- ⊕ U-○) | HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT (Wp W Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Truck Mounted Auger / Solid Stem Auger | Ground Surface | | | | | | | | | |
| | | Asphalt. | | 0.00 | | | | | | | Bentonite Seal |
| | | Compact SAND and GRAVEL. (FILL). | | 0.05 | 1 | AS | | | | | |
| | | | | 0.30 | | | | | | | |
| 1 | | Dense to very dense, brown to grey, silty SAND, trace gravel with cobbles. | | | 2 | AS | | | | | Native Fill |
| | | | | 1.52 | | | | | | | 25mm dia. PVC Pipe |
| 2 | | Very dense, moist, grey, silty SAND, some gravel, with cobbles. (Till-Like). | | | 3 | AS | | | | | 25mm dia. Slotted PVC Pipe |
| | | | | | | | | | | | Pea Gravel |
| 3 | | End of Borehole. (Refusal). | | 3.05 | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DATA INPUT: S.S. Nov./97

DEPTH SCALE

1 to 50

LOGGED: L.W.

CHECKED: M.K.

Golder Associates

City of Vancouver - FOI 2024-255 - Page 20 of 22

PROJECT: 972-1242

# RECORD OF BOREHOLE AH97-6

SHEET 1 OF 1

LOCATION: Gardens/Vancouver

BORING DATE: Nov. 13,1997

DATUM: G.S.

SAMPLER HAMMER,63.5kg; DROP,760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m |
|---|---|---|---|---|---|---|---|
| 0 | Truck Mounted Auger, Solid Stem Auger | Ground Surface | | | | | |
| | | Asphalt. | | 0.00 | | | |
| | | Dense, grey, crushed SAND and GRAVEL. (FILL). | | 0.05 | 1 | AS | |
| | | | | 0.31 | | | |
| 1 | | Compact to dense, moist, grey SAND, trace gravel and silt. (FILL). | | | 2 | AS | |
| | | | | 1.52 | | | |
| 2 | | Compact, moist to wet, grey and brown, sandy SILT. | | | 3 | AS | |
| | | | | 3.05 | | | |
| 3 | | Stiff to very stiff, moist to wet, grey, clayey SILT, trace sand and gravel. | | | 4 | AS | |
| | | | | 4.27 | | | |
| 4 | | Very dense, moist, grey, silty SAND, some gravel with cobbles. (Till-Like). | | | 5 | AS | |
| 5 | | | | | | | |
| 6 | | End of Borehole. | | 6.10 | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80)

SHEAR STRENGTH Cu, kPa — nat.V - + q - ● rem.V - ⊕ u - O

HYDRAULIC CONDUCTIVITY, k, cm/s

WATER CONTENT, PERCENT — Wp | W | Wl (20, 40, 60, 80)

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

DATA INPUT: S.S. Nov./97

DEPTH SCALE

1 to 50

LOGGED: L.W.

CHECKED: M.K.

Golder Associates

City of Vancouver - FOI 2024-255 - Page 21 of 22

PROJECT: 972-1242

LOCATION: Gardens/Vancouver

SAMPLER HAMMER,63.5kg; DROP,760mm

# RECORD OF BOREHOLE AH97-7

BORING DATE: Nov. 13,1997

SHEET 1 OF 1

DATUM: G.S.

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat.V. + Q ● / rem.V. ⊕ U ○) | HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT (Wp W Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | Truck Mounted Auger / Solid Stem Auger | Ground Surface | | 0.00 | | | | | | | |
| 1 | | Loose to compact, moist, brown, silty SAND, some gravel, with cobbles. (FILL). | | | 1 | AS | | | | | Bentonite Seal |
| 2 | | Compact to dense, moist to wet, grey SAND, some silt. | | 2.13 | 2 | AS | | | | | Native Fill |
| 3 | | Loose to compact, wet, grey, silty SAND. | | 3.05 | 3 | AS | | | | | 25mm dia. PVC Pipe |
| 4 | | | | | | | | | | | |
| 5 | | Soft to firm, wet, grey, silty SAND, trace clay. | | 4.57 | 4 | AS | | | | | |
| 6 | | Very dense, moist, grey, silty SAND, some gravel. | | 5.84 | 5 | AS | | | | | Pea Gravel / 25mm dia. Slotted PVC Pipe |
| 7 | | End of Borehole. (Refusal). | | 7.16 | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DATA INPUT: s.s. Nov./97

DEPTH SCALE

1 to 50

Golder Associates

LOGGED: L.W.

CHECKED: M.K.