
To: Azadeh Safaie – City of Coquitlam **Date:** November 25, 2024

C: _____ **File:** 2400754

From: Imogen Rowe, Sean Reilly, Dan Bruton
Ecora Engineering & Environmental Ltd. (Ecora)

Subject: Geotechnical Comment: 560 Sydney Ave, Coquitlam – Demolition

1. Introduction

The City of Coquitlam has engaged Ecora Engineering & Environmental Ltd. (Ecora) to provide geotechnical and Erosion & Sediment Control (ESC) consulting services for the demolition of the existing building at 560 Sydney Avenue, Coquitlam, BC. The work is being carried out under Purchase Order No. 160143, Rev 0, in accordance with the City’s Master Service Agreement outlined in RFIO 22-039 for Geotechnical Engineering Consulting Services. This memo outlines the geotechnical assessment and recommendations for the proposed demolition work. The ESC reporting will be provided under separate cover.

2. Background

The City of Coquitlam plans to engage a contractor to demolish the existing multi-storey building at the site in preparation for future development. The existing one level basement floor has a retaining wall structure and basement floor slab that requires demolition and restoration. We understand that following removal of the wall/slab, the excavation left behind will need to be graded appropriately.

The existing City utilities must be maintained, and the potential for the demolition and removal of the existing building to impact these utilities is the primary concern for this geotechnical assessment. A secondary concern is that the site be left in a suitable condition for future development.

3. Site Description

Ecora conducted a site visit on November 7, 2024, and documented the following observations:

- The site features a six-story building with a walk-out basement floor. The building is currently vacant and has been out of use for some time.
- The site slopes downward from the northeast corner to the southwest corner. A vehicle ramp runs parallel to the eastern boundary, providing access to the basement floor beneath the building.
- The basement is below grade along the northern and eastern sides of the property. The southern and western sides of the property are walk-out to a level parking area at basement grade.
- The northern wall is located approximately 20 m south of the northern boundary. The eastern wall is approximately 10 m west of the eastern property boundary.

- The basement walls are approximately 3 m in height. The northern wall extends about 30 m from east to west, while the eastern wall measures approximately 40 m from north to south.
- A third retaining wall runs parallel to the western basement wall and the access ramp. This wall tapers at the northeast corner of the site, where the access ramp begins.
- A “wing wall” retains the slope to the west of the building along the north side of the basement grade exterior parking.

Please refer to the site photographs attached.

Ecora has reviewed the available drawings (attached in Appendix B) to confirm the extent of the basement structures. Figure 1 attached shows the general layout of the current structure and indicates the City’s utilities are on all four sides on the property.

4. Geotechnical Conditions

An existing geotechnical investigation report was completed for the neighboring properties at 594–602 Sydney Avenue prepared by Geopacific Consultants, dated April 2024 (attached in Appendix C). These investigations, conducted approximately 60 meters east of the current site, indicate the following likely subsurface conditions:

- **Fill Material:** Likely related to the construction of the building, with variable thicknesses anticipated.
- **Silt Material:** Associated with glaciomarine deposits. The silt is described as stiff to very stiff, moist, and tan to grey in colour, with a moisture content ranging from 23% to 35%.
- **Sand and Gravel:** Underlying the silt material, these fluvial channel deposits are dense to very dense, moist to wet, and grey in colour. Laboratory testing indicates a moisture content between 7% and 16%.

Groundwater levels on the neighboring site were observed between 1.8 m and 4.5 m below grade.

5. Geotechnical Considerations for Demolition

The bulk of the building demolition can be completed using temporary excavations which do not extend off the property. The schematic (see Figures 2 & 3 attached) shows the approximate extent of excavation required to remove the basement level structure including foundations. While the depth of foundations is not known, based on the significant setback of basement walls from property lines, it is reasonable to conclude that the temporary excavation slopes required to remove the basement structure will not encroach onto or impact existing City of Coquitlam utilities to the north, south, east and west of the property.

Locally, excavation to remove foundations close to existing utilities on the north, east and south of the site may extend close to the utilities. Given that foundation drawings for the existing building are not available, test excavation in the presence of the geotechnical engineer and/or the City representative at the time of demolition should be undertaken to confirm the relationship of foundations to utilities, and to finalize excavation/demolition plans.

The ground surface along the west side of the site is well below the lowest grade of the structure, and so excavations to remove foundations are not expected to approach the location of utilities to the west.

Where personnel need to work at the top or base of excavation slopes, temporary slopes should be cut to WorkSafe requirements determined by the contractor or unless otherwise approved by a geotechnical engineer.

Following demolition and removal of all foundations, utilities and other improvements as per the City of Coquitlam's requirements, the site should be graded so that the permanent slopes tie back to the access ramp level on the east side of the site and graded to a 2H:1V slope or flatter along the north side of the site.

The graded site should be proof rolled with a loaded dump truck, and any soft/loose zones remediated to the satisfaction of the geotechnical engineer prior to placing 150 mm of crushed gravel road base compacted to at least 95% (Modified Proctor Maximum Dry Density (MPMDD)).

In addition to the above, the site should be graded and finished as required by the ESC report.

The contractor is responsible for ensuring that all utilities are safely protected during the demolition work. Note that unidentified utilities may exist on the site and may not be shown in Figure 1.

As part of the contracting of the demolition, Ecora recommends the following involvement of our Geotechnical team:

- Review of the tender documents to confirm that they capture the intent of the geotechnical recommendations;
- Attendance at pre-tender site meetings to address contractor questions;
- Review of contractors excavation plan to verify that it meets the intent of recommendations; and
- Review of completed works.

6. Closure

We trust this memo meets your present requirements. Do not hesitate to call with any questions.

Sincerely
Ecora Engineering & Environmental Ltd.

Prepared by:

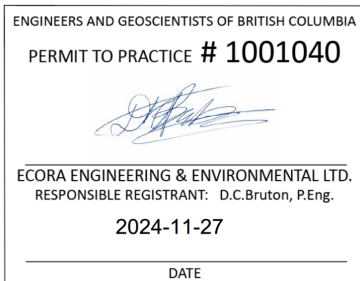
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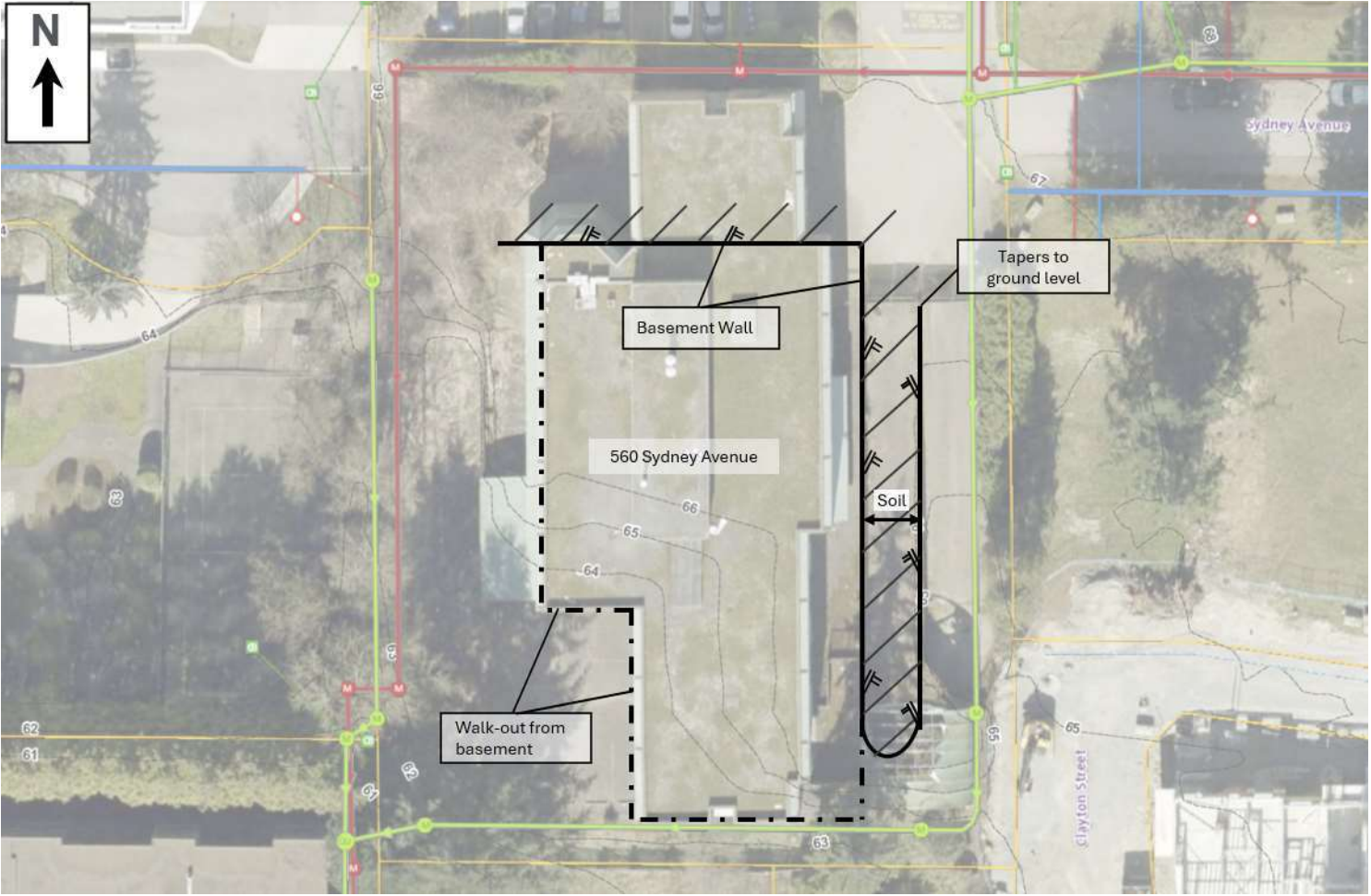
Reviewed by:



Dan Bruton, P.Eng., M.Eng.
Senior Geotechnical Engineer
Direct Line: 604.343.2966 x1121
dan.bruton@ecora.ca

Attachments: Figures
Photographs
Appendix A – General Conditions
Appendix B – Relevant Drawings
Appendix C – Geotechnical Report

Figures



- Legend**
- Retained Soil
 - Top of Cut
 - Basement Wall
- Drainage**
- Main
 - Main, Private
 - Manhole, Standard
 - Manhole, Outside
 - Catch Basin, Regular
- Sanitary Mains**
- Main, Gravity
 - San Service Connection, Existing
 - Manhole
 - Property Boundary

Notes:
 This sketch is not to scale and is intended for reference purposes only.

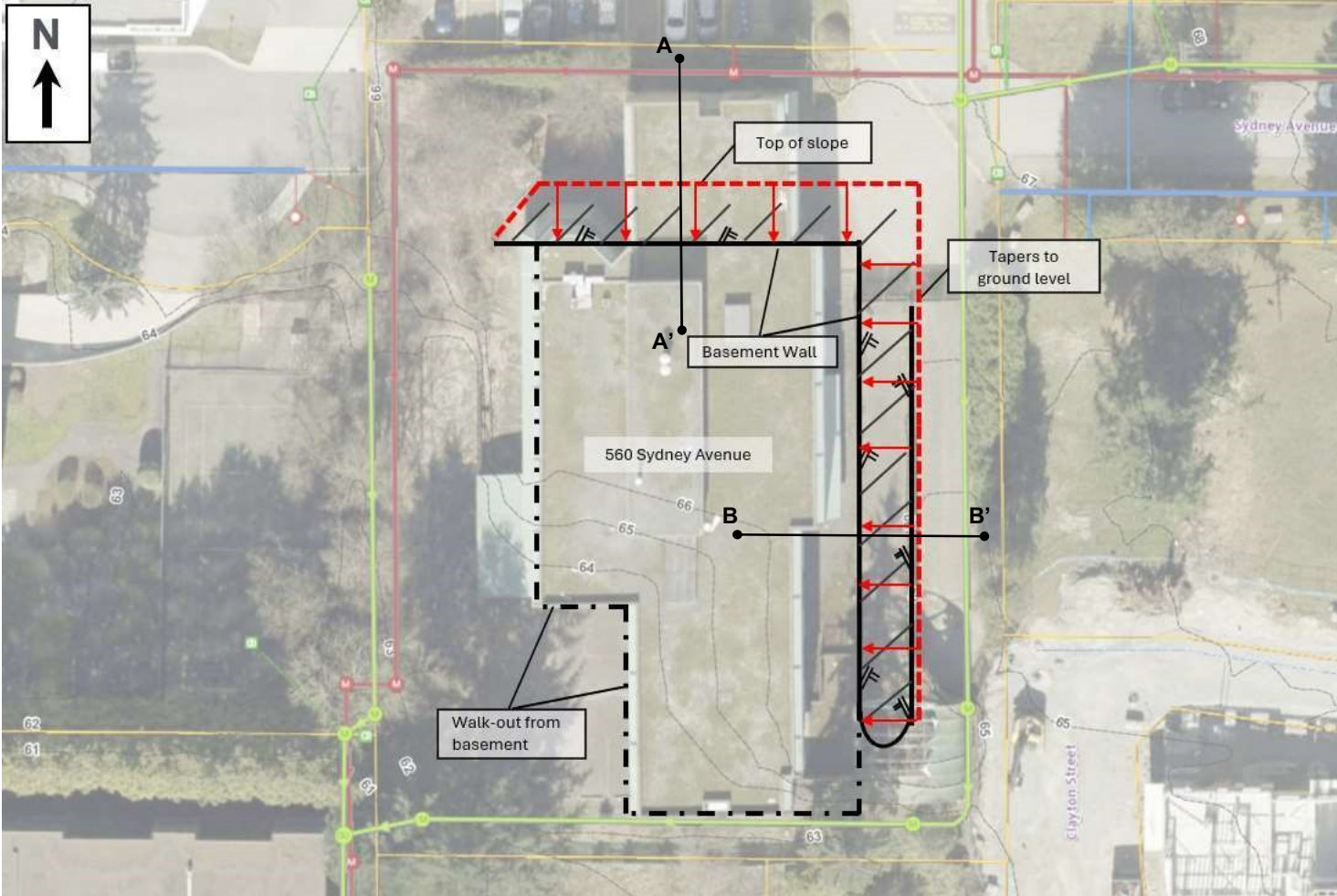
References:
 Aerial Image: City of Coquitlam (2021), EPW, Mapping Section taken 11/18/2024.

560 Sydney Avenue – BLCC Demolition

Plan View of 560 Sydney Avenue

<p>Project No. 2400754 Client: City of Coquitlam Office: Vancouver Scale: NTS Date: Nov 22, 2024 DWN: IR CHK: DB</p>	
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Figure 1.0



- Legend**
- Retained Soil
 - Basement Wall
 - Walk-out
 - Proposed Top of Cut
 - Direction of Slope
 - Drainage**
 - Main
 - Main, Private
 - Manhole, Standard
 - Manhole, Outside
 - Catch Basin, Regular
 - Sanitary Mains**
 - Main, Gravity
 - San Service Connection, Existing
 - Manhole
 - Property Boundary

Notes:
This sketch is not to scale and is intended for reference purposes only.

References:
Aerial Image: City of Coquitlam (2021), EPW, Mapping Section taken 11/18/2024.

560 Sydney Avenue – BLCC Demolition

Proposed Demolition Sketch

Project No. 2400754
 Client: City of Coquitlam
 Office: Vancouver
 Scale: NTS
 Date: Nov 22, 2024
 DWN: IR CHK: DB



Figure 2.0



Notes:
This sketch is not to scale and is intended for reference purposes only.

References:
Taken from Drawing: CITYDOCS-#2453372-v1-BD0435 Burquitlam Lions Care Facility Architectural Tender Drawings for the Building Addition & Renovation 1991. Pages 3 & 4.

560 Sydney Avenue – BLCC Demolition

Proposed Demolition Schematic Cross-Sections

Project No. 2400754
Client: City of Coquitlam
Office: Vancouver
Scale: NTS
Date: Nov 22, 2024
DWN: IR CHK: DB

ecora

Figure 3.0

Photographs



Photo 1 View north, access ramp from Sydney Ave down into basement car park.



Photo 2 View north, showing basement walls.



Photo 3 View north, showing northern “wing wall”.



Photo 4 View north, showing walk out to ground level at the southern and western side of property.

Appendix A

General Conditions

Standard of Care

Ecora Engineering and Environmental Ltd. (Ecora) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report

This report and the recommendations contained in it are intended for the sole use of Ecora's Client. Ecora does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than Ecora's Client unless otherwise authorized in writing by Ecora. Any unauthorized use of the report is at the sole risk of the user. In order to properly understand the suggestions, recommendations and opinions expressed herein, reference must be made to the whole of the report. We cannot be responsible for use by any party of portions of the report without reference to the whole report.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of Ecora. Additional copies of the report, if required, may be obtained upon request.

Alternate Report Format

Where Ecora submits both electronic file and hard copy versions of reports, drawings and other project-related documents, only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by Ecora shall be deemed to be the original for the Project. Both electronic file and hard copy versions of Ecora's deliverables shall not, under any circumstances, no matter who owns or uses them, be altered by any party except Ecora.

Soil, Rock and Groundwater Conditions

Classification and identification of soils, rocks and geological units have been based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Ecora does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities such as traffic, excavation, groundwater level lowering, pile driving, blasting on the site or on adjacent sites. Excavation may expose the soils to climatic elements such as freeze/thaw and wet /dry cycles and/or mechanical disturbance which can cause severe deterioration. Unless otherwise indicated the soil must be protected from these changes during construction.

Environmental and Regulatory Issues

The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Sample Disposal

Ecora will dispose all soil and rock samples for 30 days following issue of this report. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

Construction Services

During construction, Ecora should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Ecora's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Ecora's report. Adequate field review, observation and testing during construction are necessary for Ecora to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Ecora's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Job Site Safety

Ecora is responsible only for the activities of our employees on the jobsite. The presence of Ecora's personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that Ecora never occupy a position of control of the site. The Client undertakes to inform Ecora of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general.

Changed Conditions and Drainage

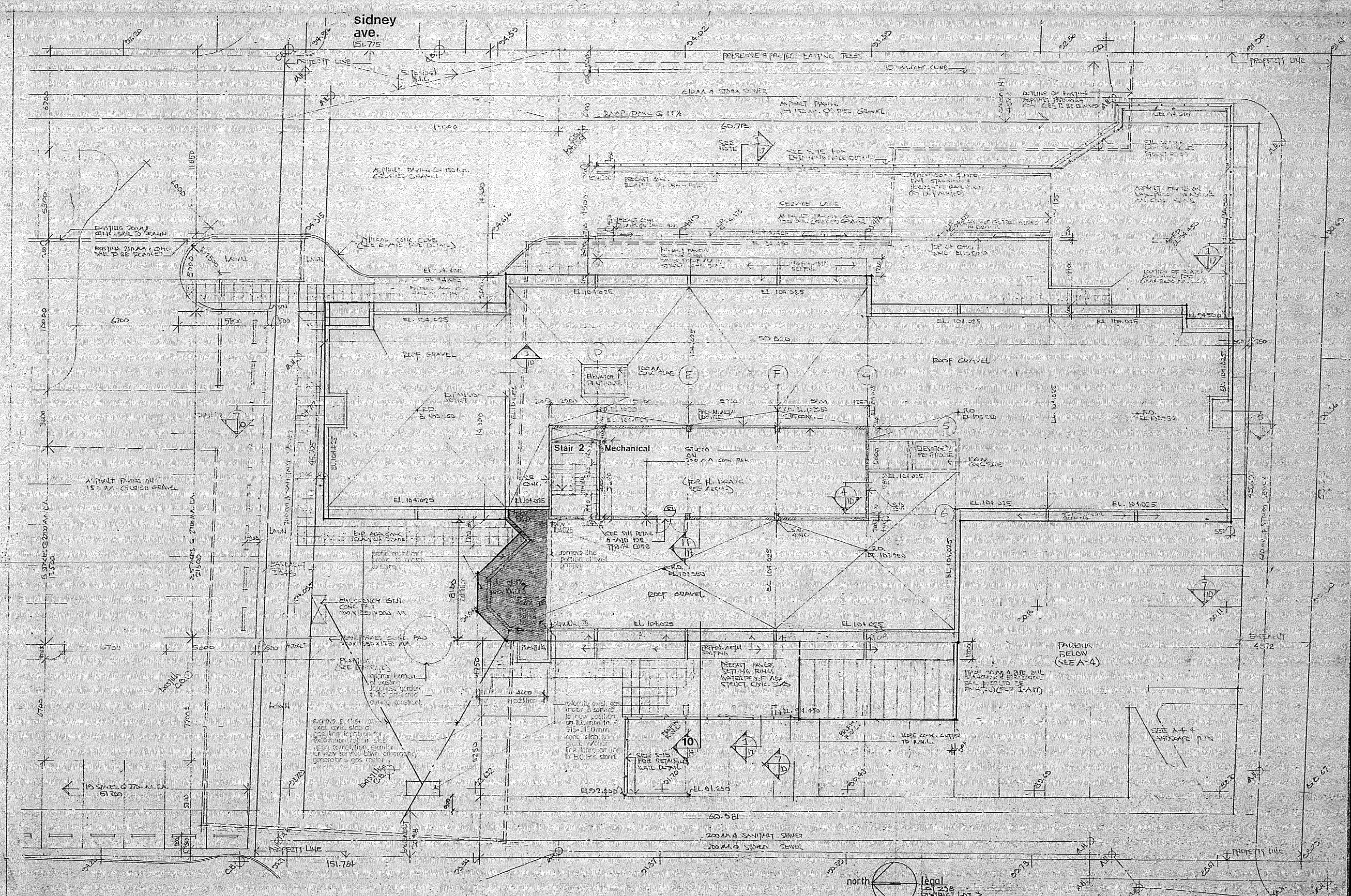
Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Ecora be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Ecora be employed to visit the site with sufficient frequency to detect if conditions have changed significantly. Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Ecora takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

Services of Sub consultants and Contractors

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. Ecora may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend Ecora from and against all claims arising through such hiring's to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

Appendix B

Relevant Drawings



data

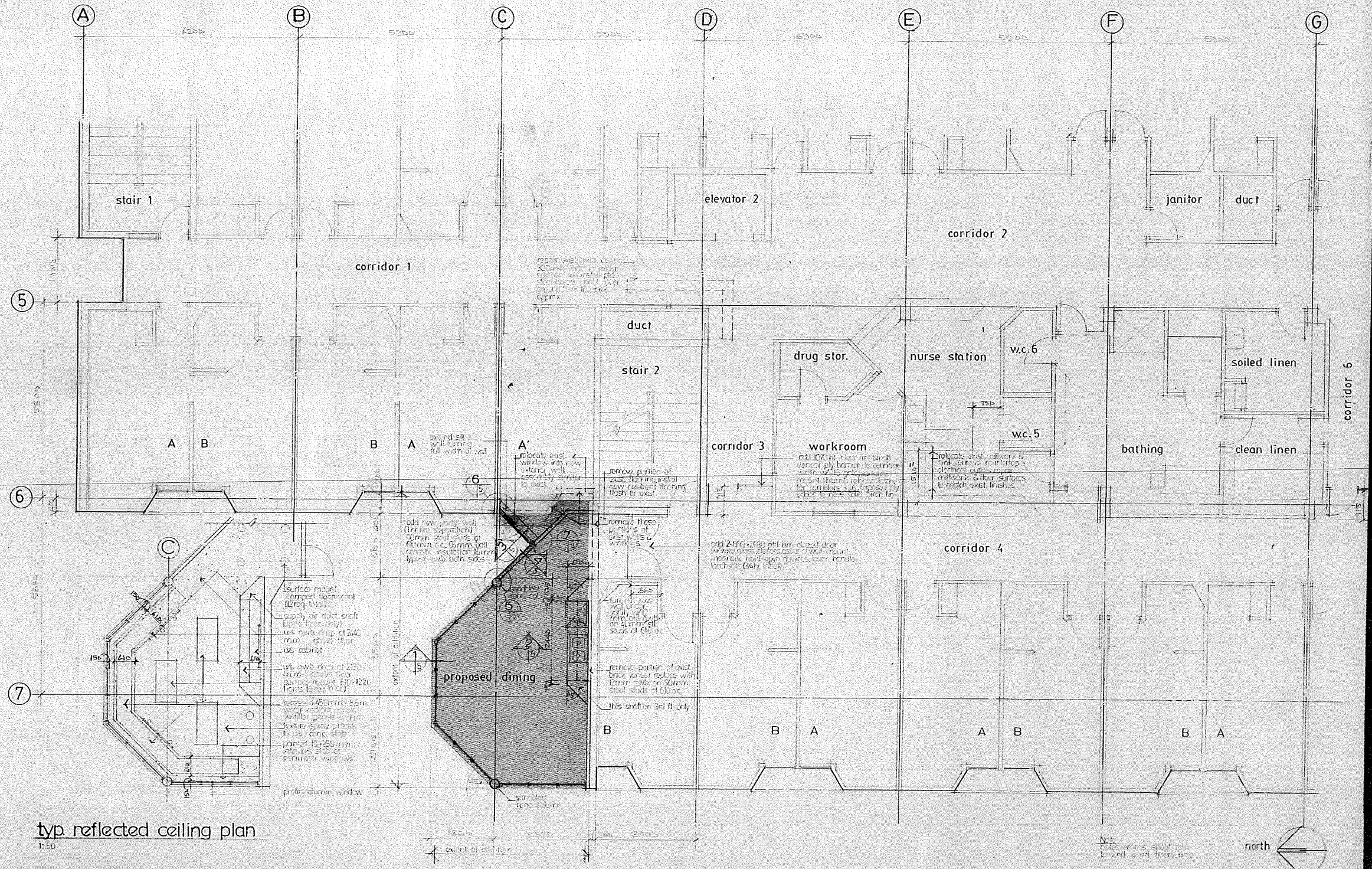
lot area	3656.4 m ²
exist lot coverage	1185.2 m ² (31.8%)
area of addition	29.7 m ²
proposed lot coverage	1164.9 m ² (31.9%)

extent of proposed addition

- scope of work
- remove a portion of existing concrete at the rear corner of site of the street cut-off for construct access, and replace upon completion.
 - provide protection to Japanese garden during construction.
 - relocate gas meter & service as located & noted on the drawing.
 - to all exist metal roof/ceiling panels, remove, coat, prime, brush and prepare prime, according to MPPA/BFC specs, to match. Delcora series 500 colour 2C10 Turquoise.
 - construct 2-story concrete frame addition to the existing as noted, located & detailed on the drawing.
 - relocate steel pipe stacks with wire & clamp and pinless electronic counters, outlets on each floor, as located & noted on the drawing, repair all floorwork & millwork surfaces to match adjacent floors.
 - provide & install 2 exterior barrier ramps on each floor, as noted & located on the drawings.

addition & renovations to
 Burquitlam Lions Care Centre
 560 Sydney Ave.,
 Coquitlam, B.C.
 site/roof plan
 1.105

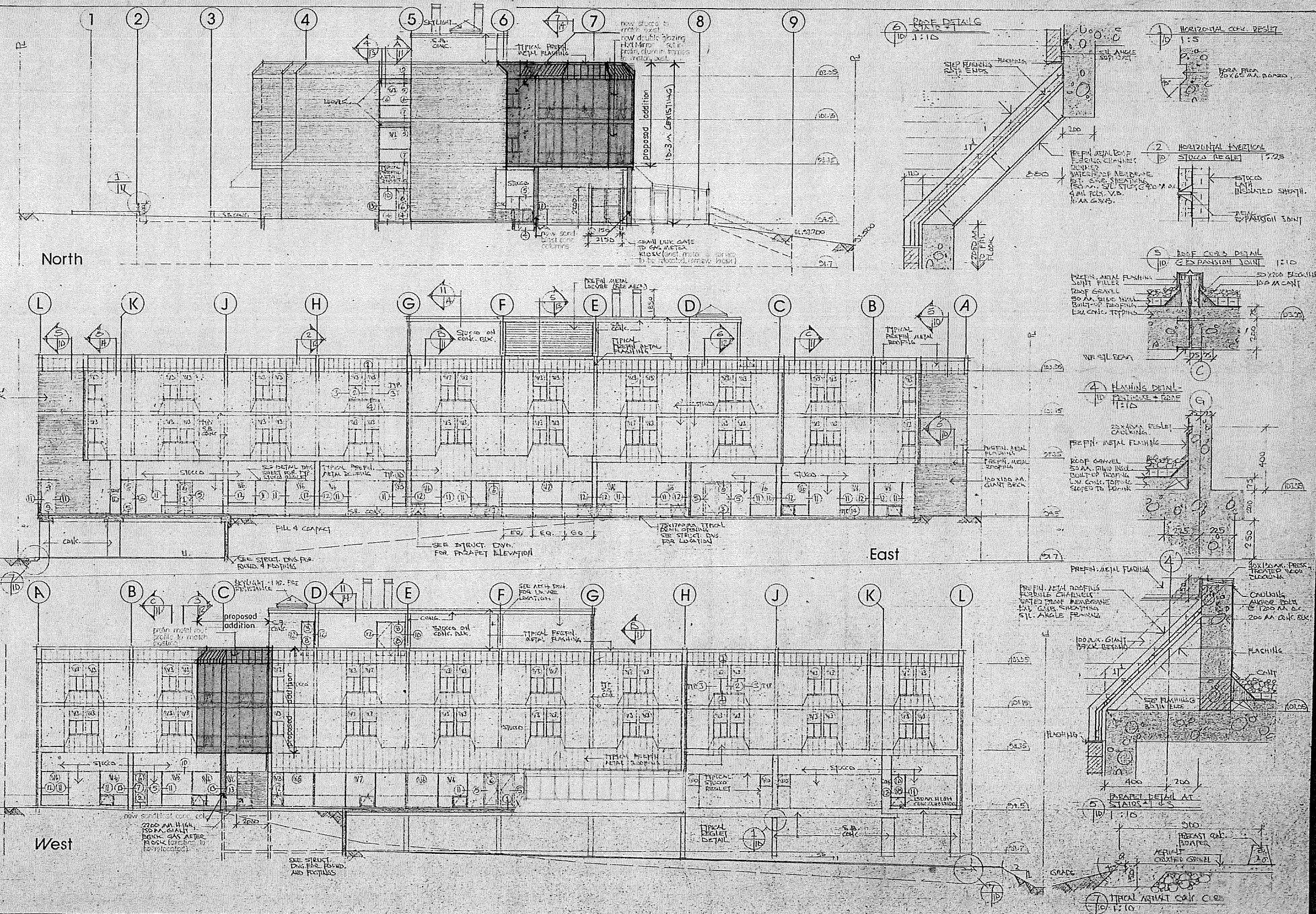
w/beatty architect
 m.l.h.a. m.a.i.b.c.
 3370 w 44th ave.
 vancouver, canada
 v6n 3k8
 604-6197 tele. & fax



issued for tender 5/12/91

addition & renovations to
Burquitlam
Lions Care
Centre
560 Sydney Ave.,
Coquitlam, B.C.
partial 2nd & 3rd
floor plans
1:50

w/beatly, architect
m.l.p.a. m.a.i.b.c.
3370 w 44th ave.,
vancouver, canada
v6n 3k6
604-619-7424 & fax



Note:
 Refer to details
 1 to 7 on this sheet.

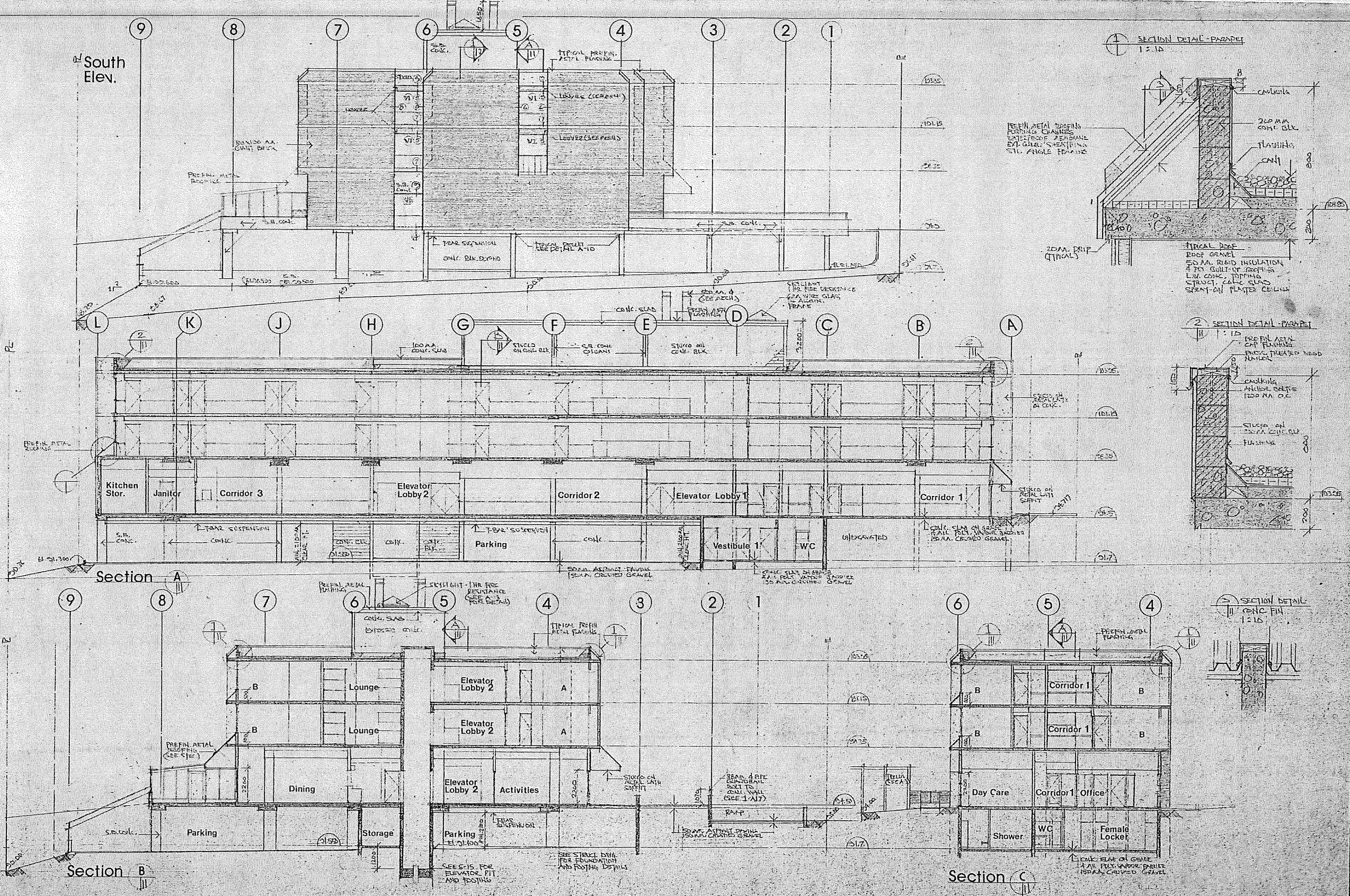
issued for tender 16/12/01
 revised elevations 27/3/01

**addition &
 renovations to
 Burquitlam
 Lions Care
 Centre**
 560 Sydney Ave.,
 Coquitlam, B.C.

elevations
 1 100

w/beaty, architect
 m.ba, malbc
 3370 w44th ave,
 vancouver, canada
 v6n 3k8
 604-6197 tele & fax

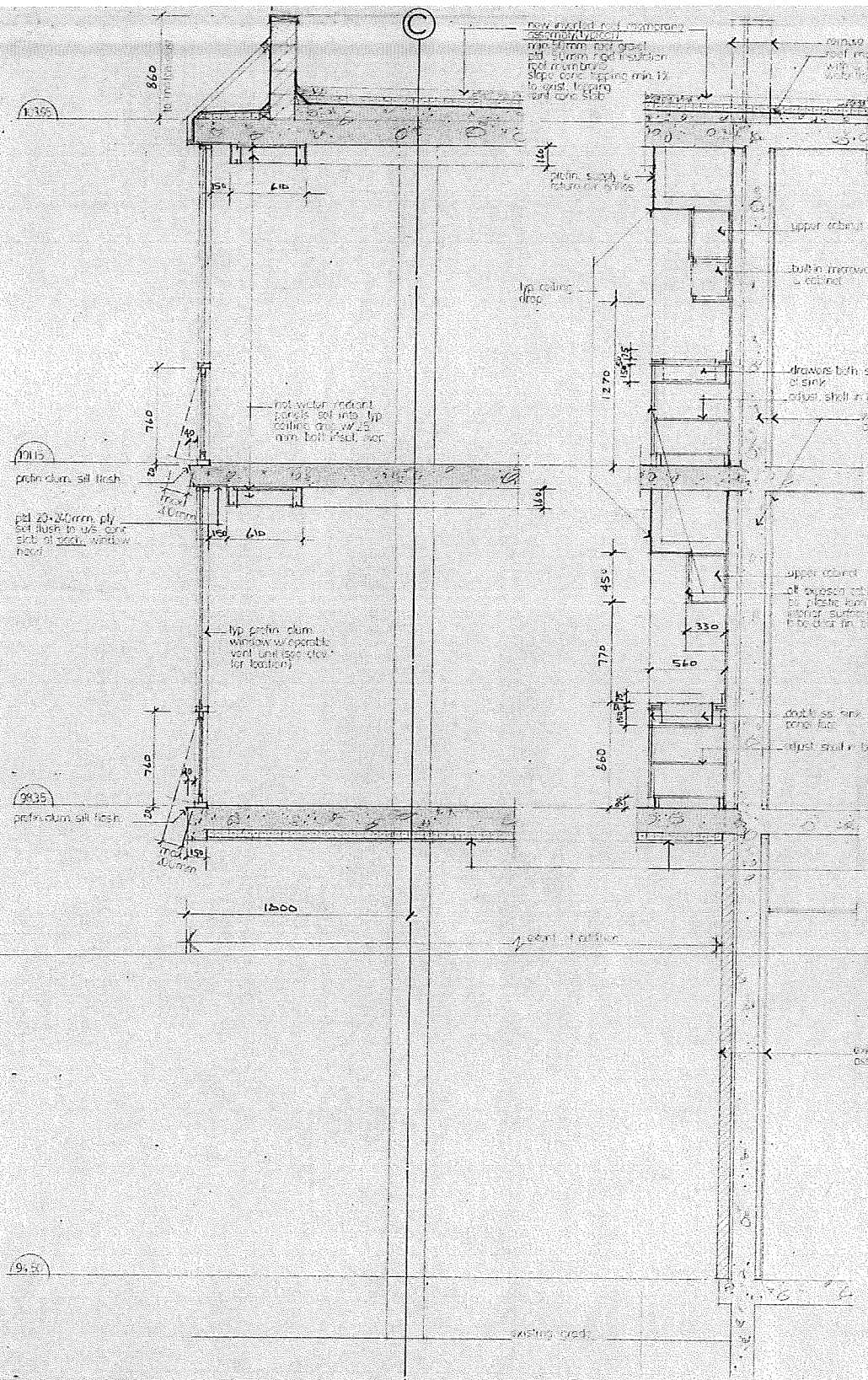
South Elev.



Note:
delete reference to details 1 to 3 on this sheet

issued for tender 16/12/91
addition & renovations to
Burquitlam Lions Care
Centre
560 Sydney Ave.,
Coquitlam, B.C.
elevations, building
sections

w.f. beatty, architect
m.l.a., m.a., b.c.
3370 w. 44th ave.,
vancouver, canada
v6n 3k8
604-619-7412 & fax



1 section
1:20

2 section
1:20

3 section
1:20

- GENERAL NOTES**
- All work shall conform to the 2010 Building Code (B.C. Building Code) unless otherwise indicated. The contractor shall verify all dimensions and conditions prior to commencement of the work. All errors, omissions and discrepancies shall be reported to the Architect before construction proceeds.
 - The contractor shall verify all dimensions and conditions prior to commencement of the work. All errors, omissions and discrepancies shall be reported to the Architect before construction proceeds.
 - All vertical dimensions to take precedence over scale drawings shown on plans, sections, and details.
 - The contractor shall verify and confirm the exact locations, correct elevations, etc. of all underground services located within the site perimeter lines before proceeding with construction. Any discrepancies between the locations shown on the construction documents and those found in the field shall be reported to the Architect and Consultant immediately.
 - All below grade walls shall be installed to subfoot with two continuous beads of acoustical caulking prior to the framing of the partition. Partitions shall be "double-stud" heavy electrical outlet on either side of a stud party wall and maintain a minimum separation of 100mm.
 - Wall and ceiling finishes are to conform to sub-section 3.1.11, British Columbia Building Code.
 - The building shall conform to requirements of section 3 of the B.C. Building Code.
 - All fire and acoustic separations to be continuous behind projections into wall and ceiling assemblies.
 - All load-bearing walls, columns and beams to have fire-resistance rating, unless otherwise noted.
 - All exterior dimensions are to be taken to the exterior face of the concrete, unless otherwise noted.
 - General Contractor to coordinate location of fire extinguisher cabinets with local fire department.
 - Walk around exterior perimeter of all windows.
 - The window frame spaced setting for wall and ceiling finishes, as described under the B.C. Building Code 3.1.11 shall be 75mm generally and 25mm for sills and lintels.
 - All interior gypsum wallboard and exterior stone assemblies to conform to the standards of the Wall and Ceiling Contractors Association of B.C.
 - All paint and stain finishes to conform to the standards of the Painter, Finisher and Decorator Association of B.C. Practice Guide.
 - All roofing work and accessories to conform to the standards of the Canadian Roofing Contractors Association for a Super membrane.
 - All masonry work to conform to the standards of the Masonry Institute of B.C.

4 section
1:20

5 plan detail
1:10

6 plan detail
1:10

7 plan detail
1:10

8 parapet detail
1:10

6
1:20

4 section
1:20

addition & renovations to
Burquitlam Lions Care Centre
550 Sydney Ave.
Coquitlam, B.C.
sections, details
1:20 1:10

w/beaty, architect
m.l.b. m.a.p.c.
3370 w44th ave.
Vancouver, Canada
V6N 3A8
604-619-7424 fax

Appendix C

Geotechnical Report

VanMar Constructors 1114 Inc.
#101B 30701 Simpson Road
Abbotsford, BC
V2T 6Y7

April 4, 2024
File: 23650
R1

Attention: Jeff Marin

**Re: Geotechnical Investigation Report – Proposed Seniors Rental Housing Development
594 – 602 Sydney Avenue, Coquitlam, BC**

1.0 INTRODUCTION

We understand that it is intended to proceed with a residential development at the site referenced above. Based on information provided to us, we understand the proposed development would consist of a 6-storey residential building constructed over a single level of underground parking. We expect the below grade-parking would be reinforced concrete construction with the remaining levels being wood framed construction. We expect loading to be moderate.

The following report presents our recommendations for the design and construction of the proposed development and temporary excavations, based on findings from our geotechnical investigation and experience in the immediate area. This report has been prepared exclusively for our client, for their use, and the use of others in their design team as well as for the City of Coquitlam for use in the development and permitting.

2.0 SITE DESCRIPTION

The proposed development site is approximately 60 m west of the intersection between Sydney Avenue and Guilby Street in Coquitlam, BC. The site is approximately rectangular in shape and measures 0.3 hectares in area. The site is bounded by Sydney Avenue to the north, existing residential developments to the west, an active construction site to the south, and a laneway to the west. The majority of the site is unimproved and surfaced with grass and trees. A single family home was present on the east side of the site at the time of our investigation. The development site is relatively flat at an elevation of 68 m geodetic according to City of Coquitlam's QtheMap.

The location of the site and the existing improvements is shown on the attached Drawing No. 23650-01.

3.0 FIELD INVESTIGATION

3.1 Test Hole Investigation

GeoPacific completed a field investigation on March 1, 2024. At that time, 4 test holes were advanced to depths of up to 6.1 m below existing grades using an auger drill rig, supplied and operated by Bluemax Drilling of Surrey, BC. Two of the test holes were supplemented with a dynamic cone penetration test (DCPT) soundings to determine the in-situ density of the upper soils. The soils were logged in the field and samples were collected for laboratory moisture content analysis. The test hole logs are included in Appendix A, following the text of this report.

Prior to any drilling, a BC One Call and utility locate was completed using the sub-contracted services of Municon West Coast to clear the test hole locations of any underground utilities. The soils were logged in the field by a member of our geotechnical staff and samples were collected for laboratory testing. The test holes were backfilled upon completion of the logging and sampling of the soils according to Provincial abandonment requirements.

3.2 Test Pit Investigation

GeoPacific also completed a test pit investigation on February 22, 2024 using a track mounted excavator provided by D.W. Mini Excavating and Landscape of Langley, B.C. At that time, a total of four (4) test pits were excavated across the site and extended to depths up to 2.5 m below current site grade. Within the test pits, infiltration tests were conducted in order to determine the rate of infiltration of the native soils.

The test pits were supervised and the soils encountered were logged in the field by one of our technical staff and selected samples were taken to our laboratory for testing. The test pits were backfilled upon completion of logging and after the completion of the infiltration testing in accordance with provincial abandonment requirements.

The approximate location of the test holes and test pits are shown on our Drawing No. 23725-01, following the text of this report.

4.0 SUBSURFACE CONDITIONS

According to the Geological Survey of Canada Map 1484A, the region under investigation is described to be underlain by Pre-Vashon deposits. The Pre-Vashon deposits are characterized as Quadra fluvial channel fill and floodplain deposits, cross bedded sand containing minor silt and gravel lenses and interbeds.

A general description of the subsurface materials encountered in our field investigation is given below:

Topsoil

The test holes and test pits are surfaced with topsoil that extends up to 0.7 m below existing site grades.

Silt (Glaciomarine)

The topsoil is underlain by silt at all the testing locations that extends up to 1.6 m below existing site grades. The silt is stiff to very stiff, moist, and tan to grey in colour. The moisture content of the silt is between 23 and 35% based on laboratory testing.

Sand and Gravel (Fluvial Channel Deposits)

The silt is underlain by sand and gravel that extends beyond the depth of the investigation. The sand and gravel is dense to very dense, moist to wet, and grey in colour. The moisture content of the sand and gravel is between 7 and 16% based on laboratory testing.

For a detailed summary of soil conditions encountered during drilling and well diagrams see the test hole logs attached in Appendix 'A'.

4.2 Groundwater Conditions

Groundwater was observed to be between 1.8 and 4.5 m below existing site grades at the time of our investigation. Based on our experience in the area, we expect the observed groundwater is perched. The static groundwater table is expected to be well below development grades. The groundwater levels are expected to vary seasonally with higher levels after prolonged periods of rain or in the wetter months of the year.

4.3 Infiltration

The infiltration rate of the soil on site ranges between 45 mm/hr and 150 mm/hr based on our testing.

5.0 DISCUSSION

5.1 General Comments

As mentioned in Section 1.0, the development would consist of a 6-storey residential building constructed over a single level of underground parking. We expect the below grade-parking would be reinforced concrete construction with the remaining levels being wood framed construction. We expect loading to be moderate.

Based on the observed ground conditions, we expect that the proposed structure can be founded on conventional pad and strip foundations bearing on the dense to very dense sand and gravel noted at our test hole locations. Our foundation recommendations are provided in Section 6.2.

To accommodate the proposed underground structure, we anticipate that temporary excavation depths may be up to 4.0 m below the adjacent grades. Certain excavation faces may require temporary shoring to support vertical cuts at the property lines; however, we expect that temporary excavations would be sloped where possible since it is more economical to do so. Shoring requirements will ultimately depend on the final site layout, footing elevations and presence of underground utilities.

The subsurface soils are not considered prone to liquefaction or other forms of ground softening under the design earthquake defined under the 2024 BC Building Code (BCBC 2024), which relies on the 2018 BCBC until March 2025.

We confirm from a geotechnical point of view that the proposed development is feasible provided that the recommendations outlined the following sections are incorporated into the overall design and construction.

6.0 RECOMMENDATIONS

6.1 Site Preparation

Prior to footing construction, any surficial debris, topsoil, vegetation or otherwise unsuitable materials should be stripped from the construction area to expose a subgrade of dense to very dense sand and gravel. We expect that the depth of stripping at this site will be dictated by the proposed footing elevations rather than the condition of soils present on-site.

We expect that grades may be reinstated with "engineered fill" where over-excavation may be required. In the context of this report, engineered fill within the portable classroom footprint is defined as clean sand, or sand and gravel fill, compacted in 300 mm loose lifts to a minimum of 95% of the Modified Proctor (ASTM D1557) maximum dry density at a moisture content that is within 2% of optimum for compaction.

Site stripping, engineered fill placement and compaction shall be reviewed by a GeoPacific geotechnical engineer.

6.2 Foundations and Bearing Capacity

Based on the design information provided and our test hole information, we anticipate that the new building foundations will be constructed on dense to very dense sand and gravel.

Footings which are founded on undisturbed dense to very dense sand and gravel, as described in Section 4.1, may be designed on the basis of a Serviceability Limit State (SLS) bearing pressure of 300 kPa. Factored Ultimate Limit State (ULS) bearing pressures, for transient loads such as those induced by wind and earthquakes, may be taken as 1.5 x the SLS bearing pressures provided above. Irrespective of the allowable bearing pressures given, pad footings should not be less than 600 mm by 600 mm and strip footings should not be less than 450 mm in width. The foundation should be buried at least 450 mm for frost protection.

Adjacent footings should achieve a maximum elevation difference equal to half of their horizontal distance to avoid superimposing the upper foundation loading to the lower foundation.

We expect that the settlement of footings designed as recommended should be within the normally acceptable limits of 25 mm maximum and up to about 20 mm differential over a 10 metres span.

The foundation subgrade must be reviewed by the geotechnical engineer.

6.3 Seismic Design of Foundations

We have considered the 2024 British Columbia Building Code (BCBC) which uses the 2018 BCBC until March 2025 design earthquake with a 2% probability of exceedance over a 50 year period which equates to a return period of 2475 years. Accordingly, we have considered an earthquake having a peak horizontal ground acceleration of 0.33 g for this site (Natural Resources Canada 2015, Site Coordinates: 49.248 N and 122.887 W).

The site qualifies as "Site Class C" as defined in Table 4.1.8.4.A of the 2018 BCBC. Based on our geotechnical investigation and previously undertaken investigations in the area, the subsurface soils are not considered prone to ground liquefaction or other forms of ground softening caused by earthquake induced ground motions.

6.4 Slab-On-Grade Floors

Floor slabs should be directly underlain by a minimum of 150 mm of free draining granular material, such as 19 mm clear crush gravel or 19 mm road mulch, compacted to a minimum of 95% Modified Proctor Dry Density (ASTM D1557) at a moisture content that is within 2% of optimum for compaction. General grade reinstatement or backfill beneath slab-on-grade areas should be done with engineered fill, as described in Section 6.1. The clear crush gravel layer should be hydraulically connected to the perimeter drainage system to facilitate the removal of any water which may accumulate below the floor slab.

Compaction of the slab-on-grade fill must be reviewed by the geotechnical engineer.

6.5 Foundation Drainage

The parkade level will be constructed above any static groundwater table; thus, we expect dewatering rates during excavation and construction to be light. We expect that conventional sumps and sump pumps will be an effective means to remove any perched groundwater from the excavation area during construction.

A conventional perimeter drainage system around the building will be required. It is important that a backfill placed against below grade foundation walls be free draining in order to prevent the build-up of water pressures against the foundation walls. Perched groundwater flow rates should be confirmed at the time of excavation.

6.6 Storm Water Management

Two tests were completed at depths of 1.1 m and 1.5 m below current site grades in native silt and sand and gravel. The results of the infiltration testing show that the soils in this area have a moderate infiltration potential. Unfactored infiltration rates are presented in Table 1 below. Detailed results are presented in Appendix B following the text of this report.

Table 1: Infiltration Rates

Location	Test Depth (m)	Infiltration Rate (mm/hr)
DRIT24-01	1.1	45
DRIT24-02	1.5	150

We recommend any stormwater management system be located within the sand and gravel deposit where an unfactored infiltration rate of 150 mm/hr can be considered. Any infiltration systems located within the silt strata will need to consider an unfactored infiltration rate of 45 mm/hr.

All subgrade soil beneath stormwater management systems that rely on natural infiltration should be reviewed by the geotechnical engineer prior to construction.

6.6 Temporary Excavation and Shoring

The site will be developed with a single level of below grade development. We anticipate the parkade may be set back from the property lines. We expect that temporary excavations would be sloped were possible. Temporary slopes cut at a maximum gradient of 1H:1V can be constructed in the near surface soils above the water table. For parkade structures near property lines, conventional tie-back shoring with anchors could be feasible. Hollow core anchor bars would likely be required for this application.

Excavations below the water table may induce groundwater flows. We envisage that groundwater inflows can generally be controlled with conventional sumps and sump pumps. Localized well pointing may be required for deeper sumps or elevator pits.

GeoPacific can provide an excavation/shoring design upon request. Installation of anchored shotcrete shoring must be reviewed by the geotechnical engineer.

6.7 Lateral Pressure on Foundation Walls

Earth pressures against the foundation walls are dependent on factors such as, available lateral restraint along the wall, surcharge loads, backfill materials, compaction of the backfill and drainage conditions. We recommend that the foundation walls be designed to resist the following lateral earth pressures:

Static: Triangular soil pressure distribution of $5 H$ kPa, where H is equal to the total wall height in metres.

Seismic: Inverted triangular soil pressure distribution of $2.5 H$ kPa, where H is equal to the total wall height in metres

The preceding loading recommendations assume that the synthetic drainage material provides a drained cavity around the perimeter of the foundation. We expect that the perimeter drainage system will be hydraulically connected to the synthetic drainage material and sufficiently lower the groundwater level such that hydrostatic pressures against the foundation walls are eliminated.

Any additional surcharge loads not specifically described herein should be added to the earth pressure given. All earth pressures are based upon unfactored soil parameters and are assumed to be unfactored loads.

The geotechnical engineer should be contacted for the review of all backfill materials and procedures.

6.8 Utility Design and Installation

Site utilities will be required beneath the slabs-on-grade. The design of these systems must consider the locations and elevations of the foundations. The service trenches and excavations required for the installation of the underground pipes, vaults and/or manholes must be located outside 1.5H:1V slope measured downward from the edge of adjacent foundations. Any excavations within the given slope should be backfilled with the lean-mix concrete in accordance with Section 6.1.

All excavations and trenches must conform to the latest Occupational Health and Safety Regulations supplied by the Worker Compensation Board of British Columbia.

Any excavation in excess of 1.2 m in depth requiring man-entry must be reviewed by the professional geotechnical engineer.

6.9 On-Site Roads and Parking

The recommended pavement thickness for any parking stalls within the development are shown in Table 1 below.

Table 1: Recommended Minimum Pavement Structure

Material	Thickness (mm)	CBR
Asphaltic Concrete	75	-
Crushed gravel base course – 19 mm minus	100	80
Clean sand and gravel sub-base course, well graded – 75 mm minus	200	20

Asphalt can be reduced to 65 mm in parking areas to be occupied by automobiles and light trucks only. The base and sub-base should also be compacted to the specifications outlined in Section 6.1.

Density testing should be conducted on the subbase and base materials and reviewed by the geotechnical engineer.

7.0 DESIGN REVIEWS AND CONSTRUCTION INSPECTIONS

The preceding sections make recommendations for the design and construction of the proposed development. We have recommended the review of certain aspects of the design and construction. It is important that these reviews are carried out to ensure that our intentions have been adequately communicated. It is also important that any contractors working on the site review this document prior to commencing their work.

It is the responsibility of the contractors working on-site to inform GeoPacific a minimum of 48 hours in advance that a field review is required. In summary, reviews are required by a geotechnical engineer for the following portions of the work:

- | | |
|---------------------|--|
| 1- Stripping: | Review of stripping depth. |
| 2- Excavation: | Review of temporary slopes and soil conditions. |
| 3- Shoring: | Review of shoring installation and anchor testing. |
| 4- Engineered Fill: | Review of materials and compaction degree. |
| 5- Foundations: | Review of foundation subgrade. |
| 6- Slab on Grade: | Review of subgrade/ under slab fill material and compaction. |
| 7- Backfill: | Review of placement of backfill along foundation walls. |

8.0 CLOSURE

This report has been prepared exclusively for our client for the purpose of providing geotechnical recommendations for the design and construction of the proposed portable classrooms and fire truck access road. The report remains the property of GeoPacific Consultants Ltd. and unauthorized use of, or duplication of this report is prohibited.

We are pleased to be of assistance to you on this project and we trust that our comments and recommendations are both helpful and sufficient for your current purposes. If you would like further details or would like clarification of any of the above, please do not hesitate to contact the undersigned.

For:
GeoPacific Consultants Ltd.

Austin Lockstidt, B.A.Sc., EIT
Engineer In Training

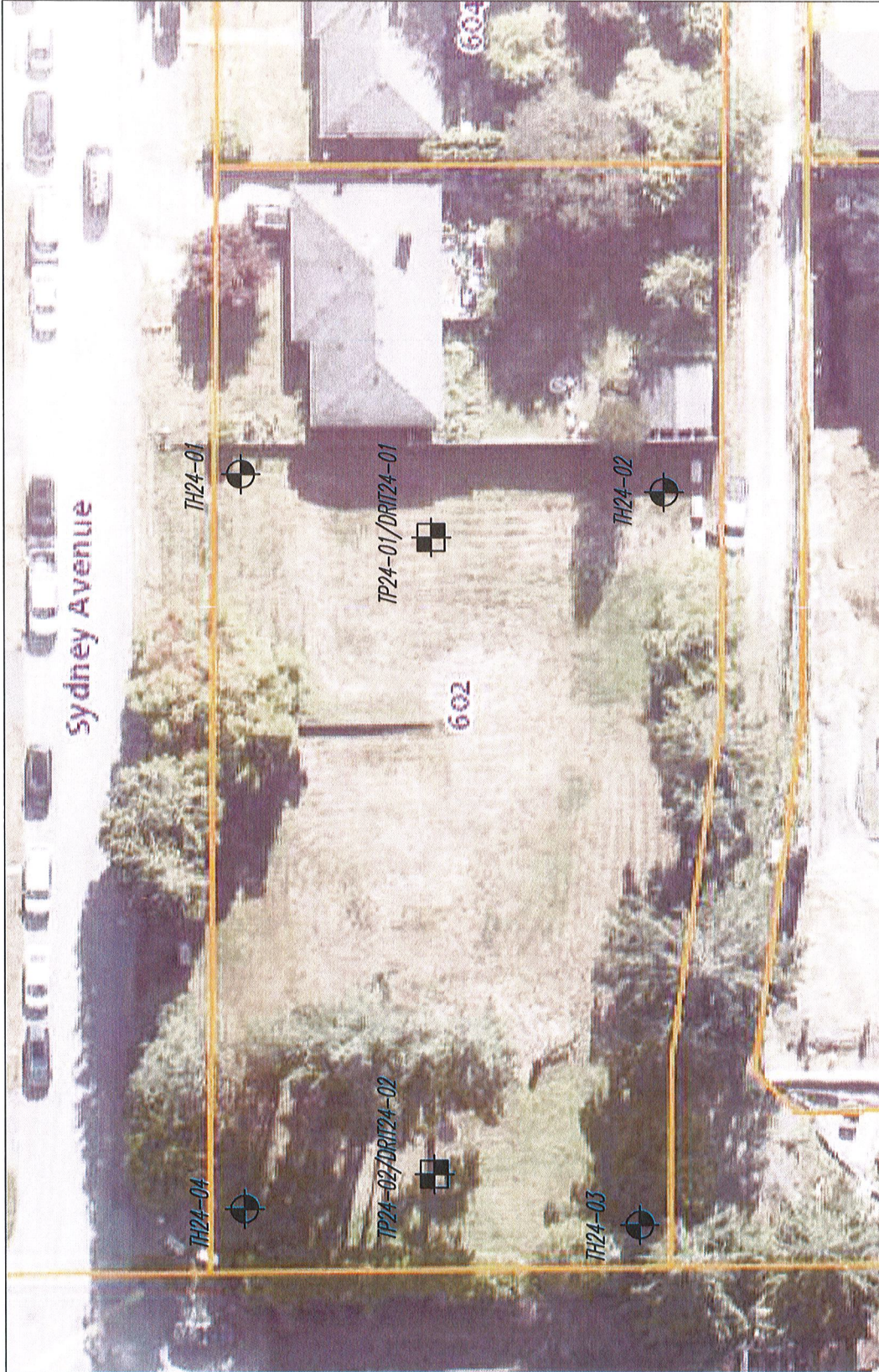
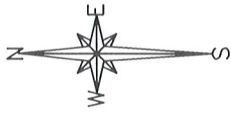
Reviewed By:



APR 04 2024

Permit to Practice
EGBC
1000782

Roberto Avendano, B.Eng., P.Eng.
Principal



LEGEND:

TH24-00  - APPROXIMATE TEST HOLE (TH) LOCATIONS

TP24-00  - APPROXIMATE TEST PIT (TP) LOCATIONS

REFERENCE:

FILE NO.: 23650
 DWG. NO.: 23650-01
 REVISIONS:
 A.
 B.
 C.

PROPOSED RESIDENTIAL DEVELOPMENT
 594-602 SYDNEY AVENUE, COQUITLAM, BC
 APPROXIMATE GEOTECHNICAL INVESTIGATION AREA

DATE: MARCH 1, 2024
 DRAWN BY: ALO
 APPROVED BY: RA
 REVIEWED BY: RA
 SCALE: NOT TO SCALE


GEOPACIFIC
 VANCOUVER | KALDERA | CALGARY
1770 W. 56th Avenue
 Vancouver, BC V6P 4P2
 TEL: 604-273-8822
 F: 604-273-8829

APPENDIX A – TESTING LOGS

Test Hole Log: TH24-01

File: 23650

Project: Proposed Seniors Rental Housing Development

Client: VanMar Constructors 1114 Inc.

Site Location: 594 - 602 Sydney Avenue, Coquitlam, BC



GEOPACIFIC
CONSULTANTS

1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax: 604-439-9189

INFERRED PROFILE				Moisture Content (%)	DCPT (blows per foot)	Groundwater / Well	Remarks
Depth	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)				
0		Ground Surface	0.0				
0		Topsoil	0.0		5		
1		Silt Silt, trace to some sand, stiff to very stiff, moist, tan to grey.		23.3	8		
2					11		
3					17		
4							
5		Sand and Gravel Coarse grained sand and gravel, very dense, moist, grey. Becomes wet around 1.8 m.	1.5	16.4			
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18		End of Borehole	5.3				
19							
20							

Logged: ALO
Method: Solid Stem Auger
Date: March 1, 2024

Datum: Ground Surface
Figure Number: A.01
Page: 1 of 1

Test Hole Log: TH24-02

File: 23650

Project: Proposed Seniors Rental Housing Development

Client: VanMar Constructors 1114 Inc.

Site Location: 594 - 602 Sydney Avenue, Coquitlam, BC



GEOPACIFIC
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1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax: 604-439-9189

INFERRED PROFILE				Moisture Content (%)	DCPT (blows per foot)	Groundwater / Well	Remarks
Depth	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)				
0		Ground Surface	0.0				
0 to 1		Topsoil	0.0				
1 to 3		Silt Silt, trace to some sand, stiff to very stiff, moist, tan to grey.	0.7	25.0			
3 to 6.1		Sand and Gravel Coarse grained sand and gravel, very dense, moist, grey. Becomes wet around 2 m.	1.6	10.8			
6.1		End of Borehole	6.1	13.5			
6.1 to 20				12.2			
20 to 25							

Logged: **ALO**
Method: **Solid Stem Auger**
Date: **March 1, 2024**

Datum: **Ground Surface**
Figure Number: **A.02**
Page: **1 of 1**

Test Hole Log: TH24-03

File: 23650

Project: Proposed Seniors Rental Housing Development

Client: VanMar Constructors 1114 Inc.

Site Location: 594 - 602 Sydney Avenue, Coquitlam, BC



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1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax: 604-439-9189

INFERRED PROFILE				Moisture Content (%)	DCPT (blows per foot)	Groundwater / Well	Remarks
Depth	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)				
0		Ground Surface	0.0				
0 to 0.7		Topsoil	0.0 to 0.7				
0.7 to 1.2		Silt Silt, trace to some sand, stiff to very stiff, moist, tan to grey.	0.7 to 1.2	34.5	4, 5, 6, 13		
1.2 to 6.1		Sand and Gravel Coarse grained sand and gravel, very dense, moist, grey. Becomes wet around 2.5 m.	1.2 to 6.1	8.0, 11.1, 10.6	50, >50		DCPT refusal at 1.8 m.
6.1 to 6.1		End of Borehole	6.1				

Logged: **ALO**
Method: **Solid Stem Auger**
Date: **March 1, 2024**

Datum: **Ground Surface**
Figure Number: **A.03**
Page: **1 of 1**

Test Hole Log: TH24-04

File: 23650

Project: Proposed Seniors Rental Housing Development

Client: VanMar Constructors 1114 Inc.

Site Location: 594 - 602 Sydney Avenue, Coquitlam, BC



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INFERRED PROFILE				Moisture Content (%)	DCPT (blows per foot)	Groundwater / Well	Remarks
Depth	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)				
0		Ground Surface	0.0				
0 to 1		Topsoil	0.0				
1 to 2		Silt Silt, trace to some sand, stiff to very stiff, moist, tan to grey.	0.4	34.4			
2 to 6		Sand and Gravel Coarse grained sand and gravel, very dense, moist, grey. Becomes wet around 4.5 m.	1.5	7.3			
6 to 21		End of Borehole	6.1	8.7			
21 to 25				11.0			

Logged: **ALO**
Method: **Solid Stem Auger**
Date: **March 1, 2024**

Datum: **Ground Surface**
Figure Number: **A.04**
Page: **1 of 1**

Test Hole Log: TP24-01/DRIT24-01

File: 23650

Project: Proposed Seniors Rental Housing Development

Client: VanMar Constructors 1114 Inc.

Site Location: 594 - 602 Sydney Avenue, Coquitlam, BC



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CONSULTANTS

1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax: 604-439-9189

INFERRED PROFILE				Moisture Content (%)	DCPT (blows per foot) • 10 20 30 40 •	Groundwater / Well	Remarks
Depth	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)				
0		Ground Surface	0.0				
0		Topsoil	0.0				
1		Silt Silt, trace to some sand, stiff to very stiff, moist, tan to grey.	0.3				
2							
3							
4							
5		Sand and Gravel Coarse grained sand and gravel, very dense, moist, grey.	1.5				
6		End of Borehole	1.8				
7							Infiltration rate of 44.6 mm/hr at 1.1 m.

Logged: **ALO**
Method: **Excavator**
Date: **March 1, 2024**

Datum: **Ground Surface**
Figure Number: **A.05**
Page: **1 of 1**

Test Hole Log: TP24-02/DRIT24-02

File: 23650

Project: Proposed Seniors Rental Housing Development

Client: VanMar Constructors 1114 Inc.

Site Location: 594 - 602 Sydney Avenue, Coquitlam, BC



GEOPACIFIC
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1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax: 604-439-9189

INFERRED PROFILE				Moisture Content (%)	DCPT (blows per foot)	Groundwater / Well	Remarks
Depth	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)				
0		Ground Surface	0.0				
0		Topsoil	0.0				
1		Silt Silt, trace to some sand, stiff to very stiff, moist, tan to grey.	0.3				
2							
3		Sand and Gravel Coarse grained sand and gravel, very dense, moist, grey.	0.8				
4							
5							
6		End of Borehole	1.6				Infiltration rate of 149.8 mm/hr at 1.5 m.

Logged: **ALO**
Method: **Excavator**
Date: **March 1, 2024**

Datum: **Ground Surface**
Figure Number: **A.06**
Page: **1 of 1**

APPENDIX B – INFILTRATION TEST RESULTS



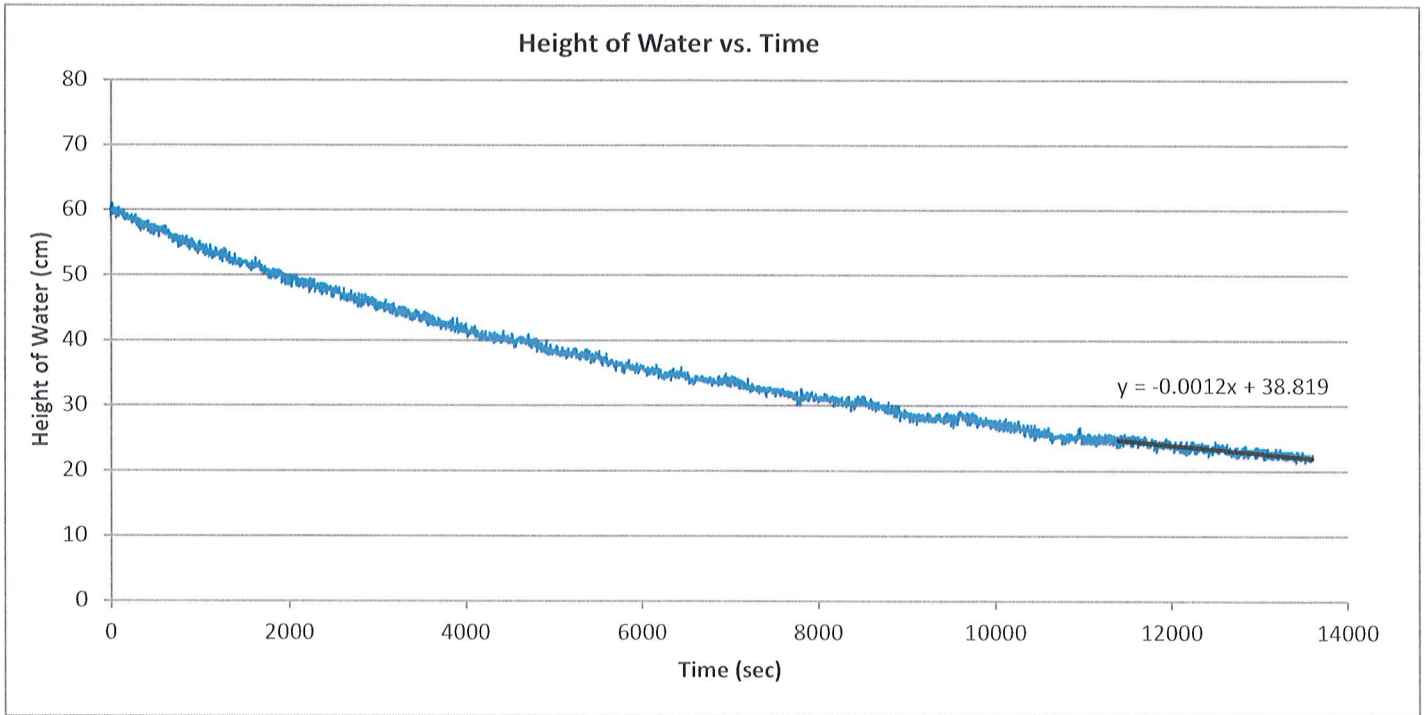
GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

**DOUBLE RING
INFILTRATION TEST
(ASTM D3385)**

Vancouver Lab
1779 West 75th Avenue
Vancouver, B.C
V6P 6P2

CLIENT:	VANMAR CONSTRUCTORS 1114 INC.	PROJECT #:	23650
PROJECT NAME:	PROPOSED SENIORS RENTAL HOUSING DEVELOPMENT	DATE:	01-Mar-2024 8:45
PROJECT LOCATION:	594 - 602 SYDNEY AVENUE, COQUITLAM, BC	TEST NO.:	DRIT24-01

ESTIMATED FIELD SATURATED INFILTRATION RATE:	44.6	mm/Hr
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TEST INFORMATION					
LIQUID USED:	WATER	AREA INNER CYLINDER:	72965.63 mm ²	DEPTH OF TEST BELOW CURRENT SITE GRADE (m):	1.1
LIQUID pH:	7.1	ANNULAR AREA:	209777.71 mm ²		
SOIL DESCRIPTION:	SILT, SOME SAND	CYLINDER ACCURACY:	± 0.5 mm	INFILTRATION RATE (cm/sec):	1.240E-03
SOIL TYPE:	NATIVE	LIQUID DEPTH INNER:	60.9 cm		
WEATHER ON SITE:	CLEAR	LIQUID DEPTH OUTER:	N/A	DEPTH TO WATER TABLE:	UNKNOWN

Comments:

Per: Austin Lockstid, B.A.Sc., EIT

Reviewed by: Jakub Szary, B.Sc., ASCT

Engineer In Training

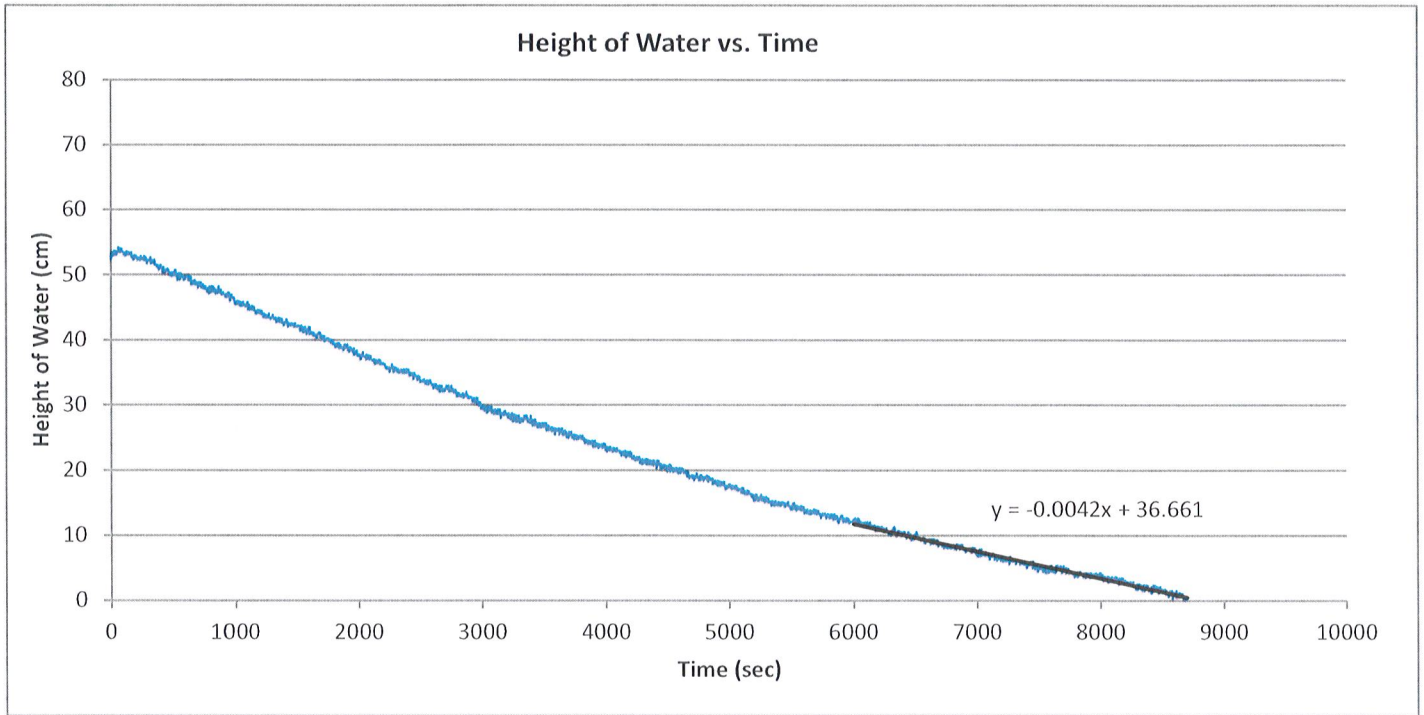
Lab Manager



**DOUBLE RING
INFILTRATION TEST
(ASTM D3385)**

CLIENT:	VANMAR CONSTRUCTORS 1114 INC.	PROJECT #:	23650
PROJECT NAME:	PROPOSED SENIORS RENTAL HOUSING DEVELOPMENT	DATE:	01-Mar-2024 9:30
PROJECT LOCATION:	594 - 602 SYDNEY AVENUE, COQUITLAM, BC	TEST NO.:	DRIT24-02

ESTIMATED FIELD SATURATED INFILTRATION RATE:	149.8	mm/Hr
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TEST INFORMATION					
LIQUID USED:	WATER	AREA INNER CYLINDER:	72965.63 mm ²	DEPTH OF TEST BELOW CURRENT SITE GRADE (m):	1.5
LIQUID pH:	7.1	ANNULAR AREA:	209777.71 mm ²		
SOIL DESCRIPTION:	SAND AND GRAVEL	CYLINDER ACCURACY:	± 0.5 mm	INFILTRATION RATE (cm/sec):	4.162E-03
SOIL TYPE:	NATIVE	LIQUID DEPTH INNER:	54.2 cm		
WEATHER ON SITE:	CLEAR	LIQUID DEPTH OUTER:	N/A	DEPTH TO WATER TABLE:	UNKNOWN

Comments:

Per: Austin Lockstid, B.A.Sc., EIT

Reviewed by: Jakub Szary, B.Sc., ASCT

Engineer In Training

Lab Manager