30 Gostick Place | North Vancouver, BC V7M 3G3 | 604.980.6011 | www.nhcweb.com

nhc
northwest hydraulic consultants ltd

NHC reference: 3004883

2019 August 19

Burgers Architecture
2448 Haywood Avenue
West Vancouver, BC, V7V 1Y1

To: Cedric Burgers, cedric@baiararchitects.com

cc: Suma Men, suma.men@me.com

Re: **Flood Hazard Assessment**
2859 Bellevue Ave, West Vancouver, BC

This letter report summarizes the coastal and riverine flood hazard assessment (FHA) conducted by Northwest Hydraulic Consultants Ltd. (NHC) in support of the future building permit for the proposed 2859 Bellevue Avenue development located within the District of West Vancouver (DWV) (Lot 3, Block 24, District Lot 556, New Westminster District, Plan 4878).

1 Background Information

A principal dwelling and a coach house are being proposed for 2859 Bellevue Avenue to replace an existing dwelling on the property. The property is located on the north shore of Burrard Inlet within the DWV (**Figure 1**). A number of creeks drain the steep slopes of the coastal North Shore mountains to outlet to Burrard Inlet near the project site; specifically, Pipe Creek located approximately 750 m northwest of the site, Marr Creek located 700 m east of the site, and Rodgers Creek which bisects the property. The property is potentially at risk from riverine flood hazards from Rodger's creek as well as coastal flood hazards from Burrard Inlet.

The objective of this assessment is to identify and evaluate the flood hazards that may affect the safe development and use of the property with respect to the proposed development to an acceptable safety threshold, either without or with mitigation. The currently accepted safety threshold in British Columbia is 0.5% annual exceedance probability (AEP) up to the year 2100. The 0.5% AEP event is often referred to as the 200-year event.

This report presents the findings of an assessment performed by NHC of flood hazards from Rodgers Creek and Burrard Inlet, accompanied with recommended measures to mitigate the hazard. The report has been structured as follows: the pertinent guidelines and references are described first, followed by site observations and coastal/riverine flood hazard assessment, and concluding with findings and recommendations.

Figure 1. Location map of study site

1.1 Existing FHA Requirements

The DWV requires all applicants for a building permit to construct buildings in coastal areas to provide a site-specific FHA report that confirms the land may be used safely for the use intended. The report prepared by a qualified engineer must:

- Be prepared in accordance with the most recent edition of the Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC published by Engineers and Geoscientists of BC (EGBC, 2018)
- Be prepared by a qualified registered engineer
- Be accompanied by the Flood Hazard and Risk Assurance Statement (Appendix A), and
- Identify all floor areas proposed to be constructed below the 4.5 m Geodetic Survey of Canada Datum (GSCD or GD) and specify use of these areas.

1.2 Referenced Guidelines

The following guidelines and regulations were reviewed as part of our investigation of the possible hydrotechnical hazards incident on the study property:

- Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC (EGBC, 2018)
- Flood Hazard Area Land Use Management Guidelines (BCMFLNRD, 2018)
- Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use – Draft Policy Discussion Paper (BC Ministry of Environment, 2011a)
- Coastal Floodplain Mapping – Guidelines and Specifications (BC Ministry of Environment, 2011b), and

- Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use – Guidelines for Management of Coastal Flood Hazard Land Use (BC Ministry of Environment, 2011c).

2 Site Inspection

In preparation for the site visit, the site survey (Appendix B) and proposed building drawings (Appendix C) provided by Burgers Architecture were studied by NHC. A site investigation was conducted on 14 May 2019 by Adrian Simpalean, EIT, and Johnson Li of NHC to examine the creek morphology and to identify the condition of existing structures on the property and surrounding area. The weather throughout the site inspection was cloudy with steady rain. Despite the rain, Rodger's Creek water level was low, which permitted a reasonable extent of the main channel and banks to be visually inspected and surveyed.

The property is bounded by Bellevue Avenue to the south and the Canadian National (CN) railroad to the north. Rodger's Creek bisects the site, flowing north to south from the northwestern corner of the property to the southeastern corner. A brick and asphalt driveway (El. 7.6 – 9.4 m GD) provides access to the existing 2 storey dwelling located on the northern part of the property.

Upstream (north) of the property, the flow of Rodgers Creek under the railroad is controlled by a vertical elliptical metal culvert (**Figure 2**) measuring 3.5 m wide and 3.6 m tall. The creek then flows across the property within an open channel. Channel substrate consists predominantly of boulders and cobbles. Several step pools have been identified and surveyed along the creek. To connect the north and south sections of the property, a foot-bridge currently crosses Rodgers Creek (**Figure 3**). Downstream (south) of the property, Rodgers Creek flows underneath a rectangular concrete culvert (**Figure 4**) with a width of 3.2 m and a maximum height of 1.6 m. The property is separated from the Burrard Inlet shoreline by a private house constructed on a land average grade of 6%. The natural foreshore area south of the properties is steeper, corresponding to a 20% slope. After crossing underneath Bellevue Avenue, Rodgers Creek flows an additional 60 m within an open channel to Burrard Inlet.

The creek banks are relatively steep. In the northwestern corner of the property, there is a covered swimming pool along the left bank of the creek. Along this section, the banks consist of vertical river rock walls (**Figure 5**). The river rock walls extend along the banks of the creek throughout the property. These walls do not show any sign of movement; however, evidence of scour along the toe of the concrete river wall was observed during the inspection (**Figure 6**), located adjacent to the dwelling's green house, and dislodged stones from the river walls were observed. Further, some scour and deposition was observed adjacent to the step pools. However, no signs of scour or channel migration were identified. Both culverts controlling the flow in and out of the property were in good conditions, without any debris obstructing the flow. Rodgers Creek's potential flood plain (property yard) was covered with short grass, typical riparian vegetation along the banks, and trees, across the property boundaries.

In addition to the field study, the land title record was examined for any drainage or flooding covenants. The property was found to be free of any relevant restrictions.

Figure 2. Rodgers Creek under railway, metal culvert – facing downstream (south)

Figure 3. Rodgers Creek, site pedestrian bridge - facing downstream (southeast)

Figure 4. Rodgers Creek under Bellevue Ave, concrete culvert – facing downstream (south)

Figure 5. Rodgers Creek, concrete grouted cobble river wall along the covered swimming pool and typical channel section – facing upstream (northwest)

Figure 6. Rodgers Cr, scour observed along the left (northern) bank adjacent to the greenhouse - facing northeast

3 Riverine Flood Hazard Assessment

Pipe, Rodgers, and Marr Creeks share a similar watershed area and length, with Rodgers being the largest and longest. Due to the steep topography of the coastal North Shore mountains and their location relative to the study area, Pipe and Marr Creeks are not expected to impose hydrotechnical hazards on the site. Therefore, this riverine assessment considers flood hazards from Rodgers Creek. As the watercourse bisects the property, other hydrotechnical hazards than just flood inundation may impact the site such as channel migration, scour, erosion, aggradation, or degradation.

3.1 Riverine Flood Inundation Hazard

3.1.1 Hydrology

Rodgers Creek does not have a long term record of water level or discharge. Therefore, flow was estimated using a regional analysis based on the long term data record from MacKay Creek (WSC 08GA061, 1970, 1972-2017) and checked through use of the Rational method. Watershed area to the project site was delineated from provincial TRIM map data. The two creeks are expected to share similar hydrology as the watershed are both on south facing slopes of the North Shore Mountains, with similar elevation range and area. Results from the regional analysis were transposed between sites using the equation $Q_1/Q_2 = (A_1/A_2)^n$; where *Q* is discharge, *A* is contributing watershed area, and *n* is a scaling factor estimated as 0.75 as per Eaton et al. (2002). Results of the analysis are summarized in **Table 1**.

To account for climate change, changes to rainfall intensity were investigated using the IDF-CC tool (intensity-duration-frequency climate-change; see Schardong et al., 2018). This suggests an increase in precipitation intensity of 13% to 30% for the 200-year event to the year 2100. The impact to flow may be variable due to changes in snow-pack, timing of events, and ground cover. However, adoption of 30% increase was assumed for this analysis to remain conservative.

Table 1. Design instantaneous flood flows (m^3/s).

Variable	MacKay Creek (WSC 08GA061)	Rodgers Creek (at 2859 Bellevue)
Watershed area (km^2)	3.28	2.6
50% AEP flow (2-year)	5.5	4.6
20% AEP flow (5-year)	8.1	6.8
10% AEP flow (10-year)	10.0	8.4
5% AEP flow (20-year)	12.0	10.1
2% AEP flow (50-year)	14.8	12.4
1% AEP flow (100-year)	17.1	14.3
0.5% AEP flow (200-year)	19.5	16.4
Year 2100, 0.5% AEP flow (200-year)[1]	25.3	21.3

Note 1. Considering a 30% increase in intensity due to climate change.
2. Frequency analysis done using Cunnane plotting position and Log-Pearson Type 3 distribution.

3.1.2 Hydraulic Analysis

To assess the hydraulic results of the design flood, a one-dimensional hydraulic model was constructed using the US Army Corps of Engineers' HEC-RAS software. The geometry used for the model is based on Rodgers Creek sections and channel slope information collected in the field by NHC during the site inspection (using RTK survey grade GPS and total station). The simulated floodplain geometry was constructed using the property survey provided by Burgers Architecture Inc. A Manning's roughness value of 0.06 was assigned to the main watercourse, estimated based on the site inspection. The roughness was reduced to 0.03 for the areas covered in grass. The numerical model extended from the culvert upstream of the property under the railway to the culvert downstream of the property under Bellevue Ave. The downstream culvert was assumed 30% blocked from sediment and debris during the flood event; water is expected to go over the road. Downstream boundary condition was set at El. 3.89 m based on the following coastal flood assessment to the year 2100. The downstream culvert dictates the model water level with minimal sensitivity to the downstream water level. From the model, a water level profile was calculated for the design flood event.

During this event, the velocity of the flow is estimated to be as high as 2.5 m/s. Stable bank material is expected to be close to 600 mm diameter (D50), based on a rough approximation[1]. The current bank material appears smaller in size, but is grouted. Despite this, erosion and localized bank failures are likely during an extreme flood event.

3.2 Riverine Flood Construction Level

The FCL is based on the water level during the design event plus an allowance of freeboard, to account for debris, local turbulence, and uncertainty in the data and analysis. Since the property's elevation varies and the creek flows at roughly 6% slope throughout the property, four FCLs were determined. The calculated FCLs are summarized in **Table 2** for the proposed main dwelling and the couch house. **Figure 7** illustrates where the FCLs were determined for both buildings. For clarity, the FCLs are given for corresponding creek stations (in meters) from the culvert face located under Bellevue Avenue.

The FCL isolines are noted along Rogers Creek. FCL across the property should be taken as parallel along the slope, roughly perpendicular to the creek. Erosion of the material along the banks can result in localized failure of the concrete grouted cobble walls and re-sloping of the banks. This can lead to the migration of the existing channel. Given the proximity of the two dwellings to the 5 m setback from the creek, the foundations of both structures should extend to a sufficient depth to account for potential erosion and scour. These depths correspond to the existing channel bed elevation, summarized in **Table 2** at the same locations as the FCLs.

Table 2. Riverine flood construction levels.

Building	Location	River Station (m)	Design water level (m GD)	Freeboard (m)	Flood construction level (m GD)	Channel bed elevation (m GD)
Main Dwelling	North Eastern Edge (upstream)	St. 52+000	9.7	0.6	10.3	7.4
	Centre of Dwelling	St. 34+00	8.5	0.6	9.1	6.7
	South Eastern Edge (downstream)	St. 16+000	7.9	0.6	8.5	6.0
Coach House	North Eastern Edge (upstream)	St. 25+000	8.3	0.6	8.9	6.4
	South Eastern Edge (downstream)	St. 10+000	7.6	0.6	8.2	5.8
Additional	Property Line	St. 52+000	9.7	0.6	10.3	7.9
	10.0 m GD FCL	St. 49+000	9.4	0.6	10.0	7.8

[1] This value is only an approximation and is not to be used as a design value.

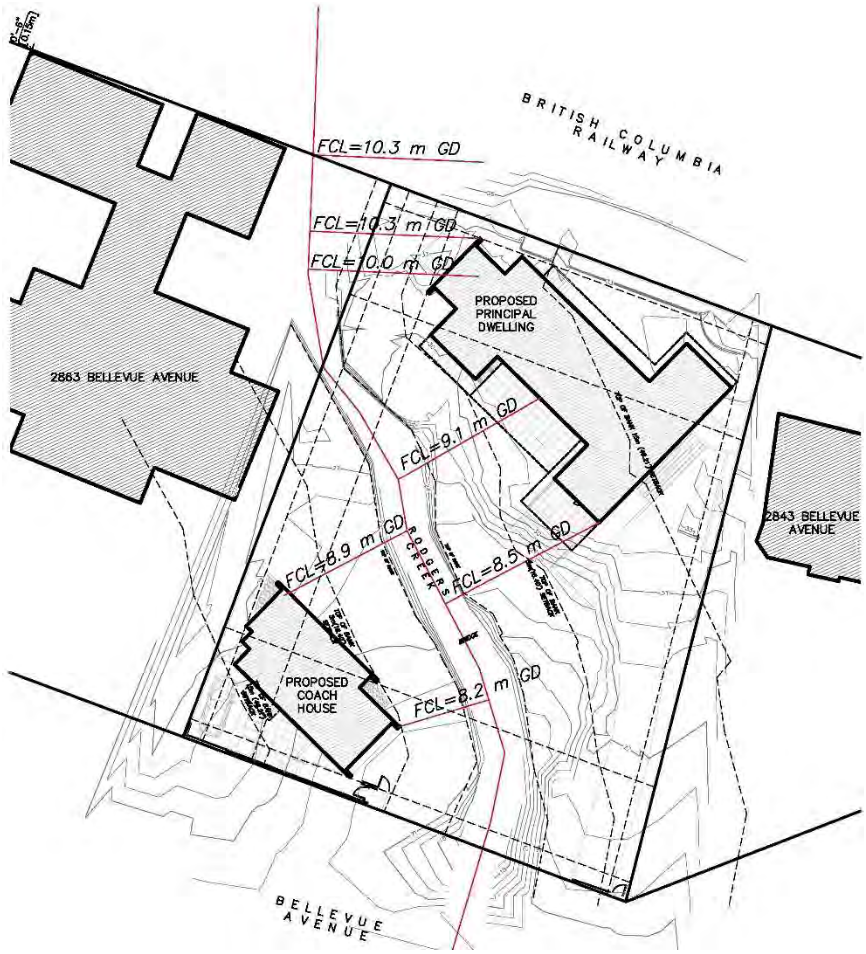

Figure 7. FCL Isolines Locations (adapted after Burgers Architecture Inc. - A101)

3.3 Other Hydrotechnical Hazards

Channel migration, scour, erosion, aggradation, or degradation are hazards that may impact the site. Based on 15 years of available aerial images of the site, channel migration is not believed to be a risk. Furthermore, the two culverts controlling the flow and the concrete and rock walls further improve the stability of the creek banks. Despite this, localized erosion is expected during the design event. The existing bridge may fail during a flood event and further redirect flows (leading to further erosion and scour) or block the downstream culvert (raising water levels and flood inundation).

Scour was observed during the site visit under a portion of the left bank river wall, adjacent to the green house. At this location, the creek slope changes to a milder slope, following the bend around the covered swimming pool and steeper section following the culvert. At this location, the flow direction also migrates slightly to the right. Both changes in flow direction and speed can be attributed to the formation of the scour hole. Therefore, it is recommended that the existing scour hole is filled with smaller materials from the creek, and covered with larger boulders. These will provide stability and will help reduce the local flow velocities, which will limit the expansion of the existing scour hole.

Channel erosion, aggradation, and degradation are processes related to the flow velocities, and creek bed material quantity, quality and size. Several step pools constructed using natural wood installed transversal to the flow direction were identified during the field visit. These structures are typically used for mountain streams, with materials consisting of a wide range of particles, but differing in diameter by several orders of magnitudes, such as Rodgers Creek. These hydraulic features act as flow energy dissipaters, influencing the local sediment transport. As the flow slows down, sediment aggregates inside the step pool sections. As a result, the local flow velocity increases which will facilitate degradation, until an equilibrium stage is reached. Overall, step pools system will increase the overall stability of the creek bed. As these are installed partially embedded in the creek banks, these should be monitored following prolonged precipitation events for any scour along the banks, or erosion along the channel bed. In that case, the area will not benefit from the hydraulic features that these system provides, and could increase the channel degradation and create scour under the river walls.

4 Coastal Flood Hazard Assessment

Coastal flood hazards are primarily dictated by flood inundation, but can include overflow and spray, shoreline erosion and scour, beach degradation and aggradation, or physical loading from hydraulic forces or wood debris.

Canadian Tide and Current Tables (2019 Volume 5) (**Table 3**) present the local tides at Point Atkinson, which is 5.3 km west of the study site. The average elevation of the study site is at 7.0 m GD, with a setback from the Burrard Inlet coastline of approximately 60 m. Despite the higher high water large tide (HHWLT) level being substantially lower than the property, storm surge, wave effects and long-term changes in global and local sea level could result in substantially higher coastal flood levels. Therefore, these effects are analyzed in the following sections.

Table 3. Tidal heights, extremes, and mean water level at Point Atkinson

Sea State	Tide Elevation (m GD)
Higher High Water, Large Tide (HHWLT)	1.9
Higher High Water, Mean Tide (HHWMT)	1.4
Mean Water Level (MWL)	0.0
Lower Low Water, Mean Tide (LLWMT)	-1.9
Lower Low Water, Large Tide (LLWLT)	-3.0

4.1 Coastal Flood Inundation Hazard

To reduce the likelihood of damage from coastal flood inundation, the coastal flood level was assessed and used to derive a minimum construction level – the flood construction level (FCL). The FCL provides a mitigation measure to limit the likelihood of flooding for developments located along the coast.

The FCL is generally based on an event with an AEP of 0.5%. In addition, due to global climate change and related sea-level rise, future conditions are considered up to the expected life of the project; often up to the year 2100 (roughly 80 years from present).

The BC Ministry of Environment's Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use (BC Ministry of Environment, 2011b) and the BC Ministry of Forests, Natural Resource Operations and Rural Development's amendment of the Flood Hazard Area Land Use Management Guidelines (BCMFLNRD, 2018) present two approaches for determining the 200-year FCL: 1) combined method and 2) probabilistic method. The components used in determining the FCL using each method are illustrated in **Figure 8** and **Figure 9**.

The combined method is based on the combined effects of tide, storm surge, wave run-up, and sea level rise (SLR). This deterministic approach generally results in conservative calculation of a design flood level, as it is often applied ignoring the probability of the various design events cooccurring. The probability that a 200-year storm surge occurs during HHWLT and 200-year wave event is less than an AEP of 0.025%, which is very conservative. Thus, For this assessment the probabilistic approach has been applied, as this method provides a more realistic estimate of a 0.5% AEP event.

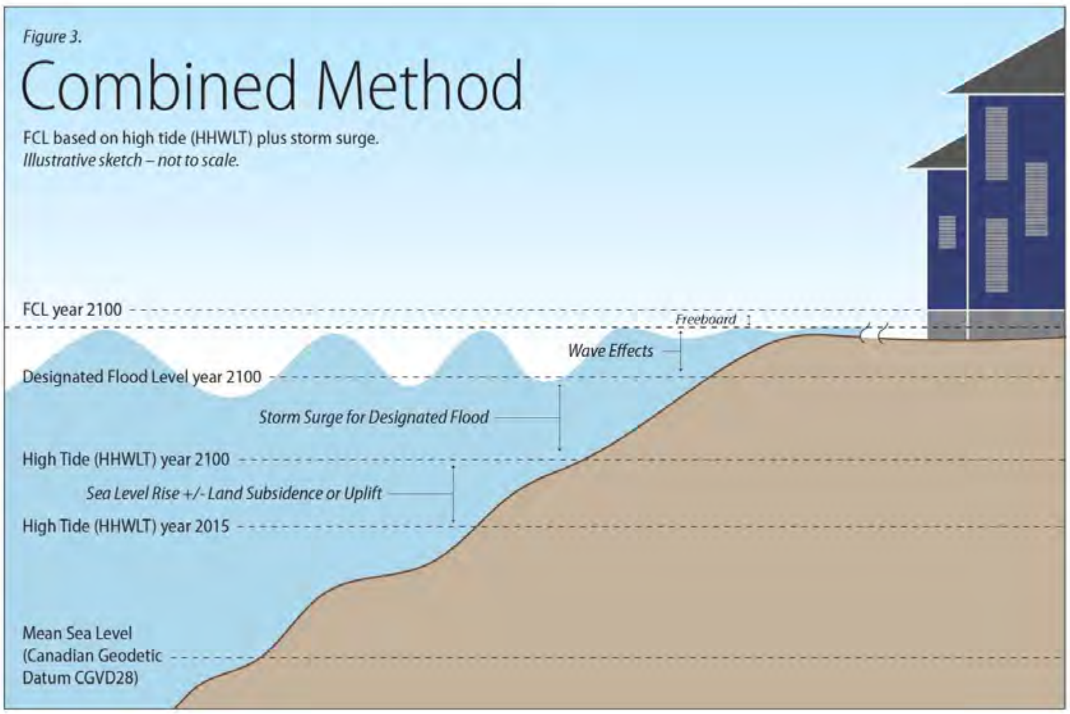

Figure 8. FCL based on combined method (BCMFLNRD, 2018)

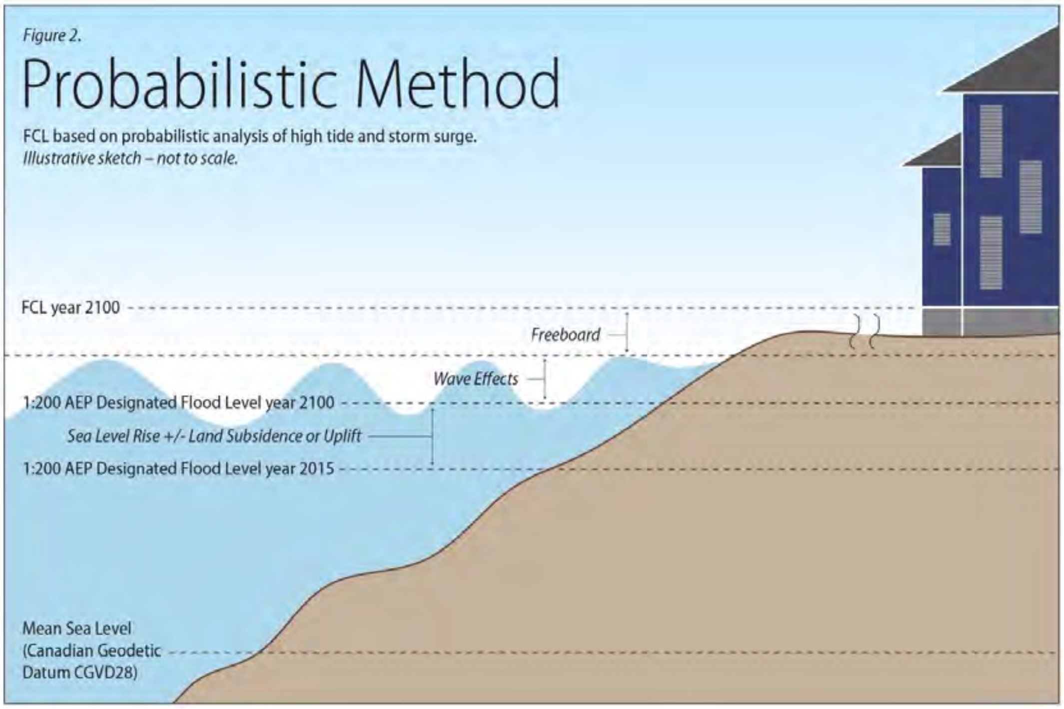

Figure 9. FCL based on probabilistic analysis (BCMFLNRD, 2018)

The coastal FCL using the probabilistic approach is the sum of:

- 0.5% AEP water level as determined by probabilistic analyses of tides and storm surge
- Allowances for future sea level rise (SLR) to the year 2100
- Allowance for regional uplift or subsidence to the year 2070

} Designated Flood Level

- Estimated wave effects associated with the designated storm with an 1-in-200 AEP, and
- Freeboard.

Each of these components are described in the following sections.

Predicted changes in storm intensity and frequency over the next 81 years, which could influence storm surge and wave effects, are highly variable and inconclusive. Such influence has not been incorporated in this analysis.

4.1.1 Joint Occurrence of Storm Surge and Tides

Coastal flood levels for the 0.5% AEP were developed by applying the Empirical Simulation Technique (EST) on the long term observed data (66 years) at Point Atkinson (NHC, 2008). The EST method is recommended by the Coastal Hydraulics Laboratory (of the US Army Corps of Engineers) and Federal Emergency Management Agency (of United States Department of Homeland Security) technical documentation for frequency related studies. The analysis determined that the 10.5% AEP water level is El. 2.89 m GD.

4.1.2 Sea Level Rise

Global climate change is expected to result in increased sea levels resulting from melting of global ice and increased ocean volume due to rising water temperature. Typically, projects are considered to have a service life of 80 years, resulting in designs often considering projections to the year-2100.

The BC Provincial Sea Dike Guidelines (BC Ministry of Environment, 2011c) recommend that SLR associated with global climate change will result, by the year 2100, in a base water level 1.0 m above that seen in the year 2000. The rate of SLR is projected to increase as the climate warms (**Figure 10**). Therefore, any increase incorporated in the past 19 years is expected to be minimal and hence ignored.

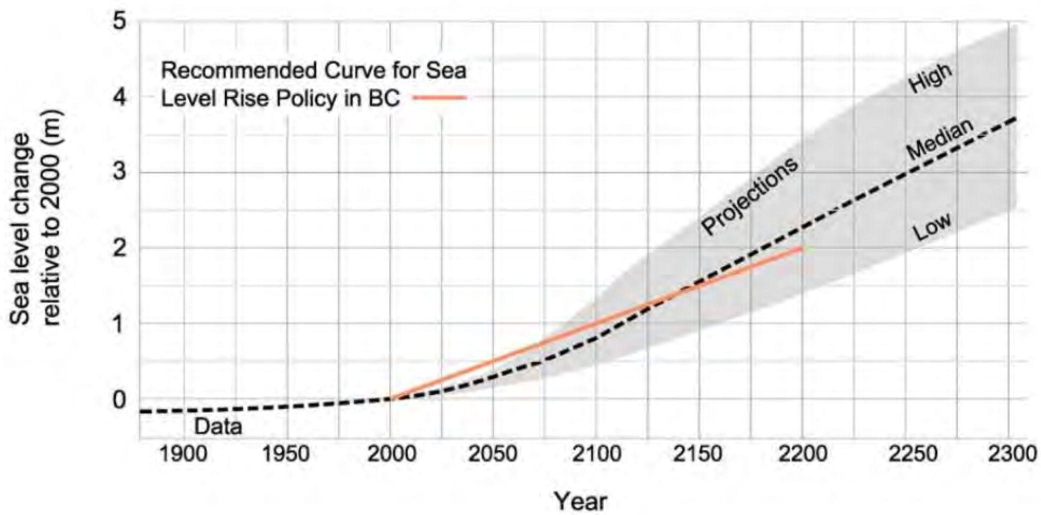

Figure 10. Projected climate change (BC Ministry of Environment, 2011c)

Note that the recommended SLR for planning and design in British Columbia is based on a 2008 study by Fisheries and Oceans Canada (Thomson et al., 2008) and MOE (Bornhold, 2008). The authors of those works acknowledge the design SLR for British Columbia is greater than the global mean SLR projected by the IPCC AR4 (2007) for the year 2100 (roughly 40 cm greater). However, more recent studies, such as IPCC AR5 (2014), suggests global mean SLR of up to 1 m or more by the year 2100. These values were based on the Paris Accord being adopted and adhered to, which appears not to be the case.

Other studies have investigated the potential effect of a collapse of the Antarctic ice sheet and have shown that such an event would result in far greater SLR, with estimates that are orders of magnitude larger than the 1 m to 2 m projected over the next 80 to 180 years. Recent changes in estimates of global mean SLR to the year 2100 or 2200 have not yet been addressed in the context of coastal British Columbia, but based on recent conversations with FLNRORD, the province is amidst a study of SLR to update the 2011 design values. This study is expected to be completed in 2019.

4.1.3 Local Subsidence

In addition to a rising sea, downward movement of the ground (subsidence) or upward movement (uplift) will influence the local relative sea level. Provincial guidelines (BC Ministry of Environment, 2011c) for local uplift are based on regional estimates and are less applicable than a more site-specific data source (Mazzotti et al., 2009), which suggests that subsidence for this location is to the order of 1 ± 0.5 mm/year (**Figure 11**). To the year 2100, this translates to a lowering of 0.12 m.

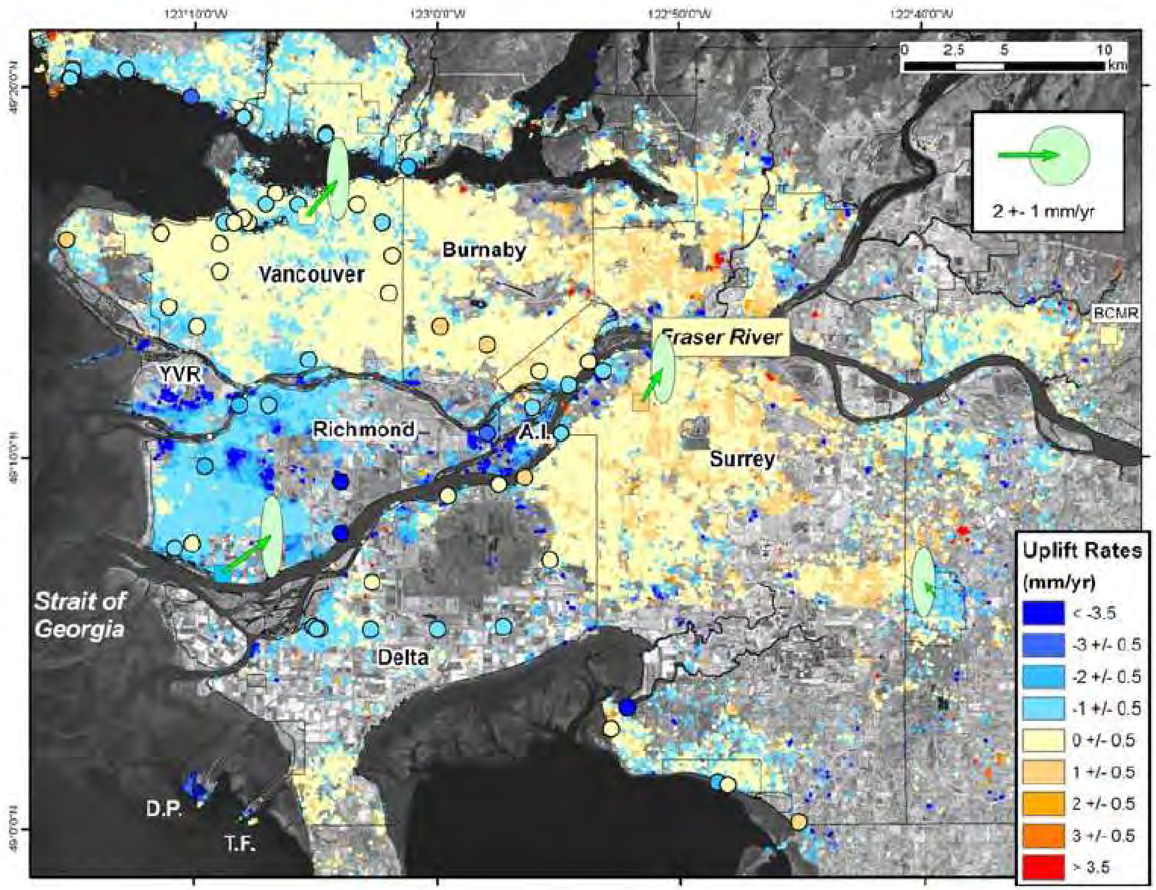

Figure 11. Local subsidence, shown as rate of uplift (Mazzotti et al., 2009)

4.1.4 Designated Flood Level

Table 4 summarizes the resulting designated flood level for the current condition and that predicted for the Year 2100.

Table 4. Designated Flood Level

Parameter	Year 2019 Elevation (m)	Year 2100 Elevation (m)
Tide + storm surge (joint probability)	2.89	2.89
+ Design sea level rise (to year 2100)	0.00	1.00
+ Subsidence (to year 2100)	0.00	0.12
Designated Flood Level (m GD)	**2.89**	**4.01**

4.1.5 Wave Effect Assessment

Since there is no comprehensive measurement of waves in the vicinity of the study site, a wind and wave analysis was conducted to determine the incident wave climate. The wave climate allows one to determine the wave height at the site which is used to perform the flood hazard assessment.

Wind Analysis

There is one Meteorological Service of Canada (MSC) station in the vicinity of the study area that has a long-term record suitable for wind analysis: Point Atkinson. Twenty years of hourly wind data was used for the study, as summarized in **Table 5**.

Table 5. Point Atkinson station information

Station	Station ID	Station Location	Period
Point Atkinson	1106200	480768 E 5464953 N	1997–2018

The local wind climate can be visualized using a wind rose plot, utilizing arrows at the cardinal and inter-cardinal compass points to show the direction from which the winds blow and the magnitude and frequency for a given period. A wind rose showing the direction and magnitude of the winds at Point Atkinson is shown in **Figure 12.**

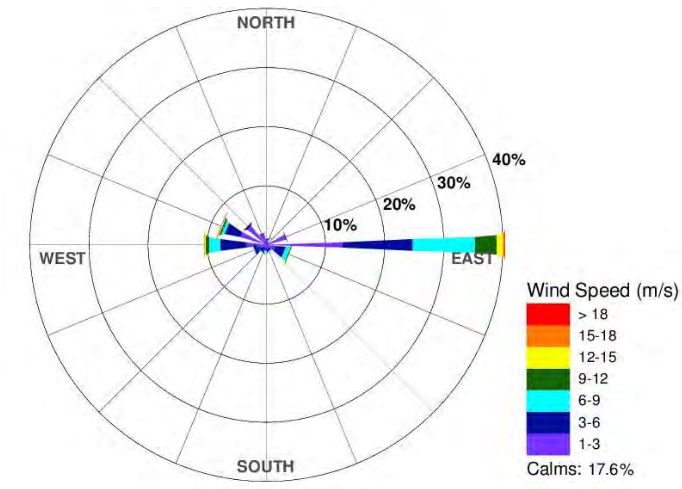

Figure 12. Wind rose based on data from Point Atkinson

The wind rose shows that wind experienced at Point Atkinson is most frequently from the east and secondly from the west. Frequency analysis was conducted on the Point Atkinson data to obtain the wind speed for the design easterly and westerly storm events. The results are summarized in **Table 6** with the westerly winds being slightly stronger than from the east for the same return frequency.

Table 6. Design wind speeds – Point Atkinson.

Event	Easterly		Westerly	
	Speed (m/s)	Speed (km/hr)	Speed (m/s)	Speed (km/hr)
20% AEP	20.4	73	21.0	76
10% AEP	20.9	75	22.3	80
2% AEP	22.2	80	25.2	91
0.5% AEP	23.3	84	27.7	100

Both (BC Ministry of Environment, 2011a) and (BCMFLNRD, 2018) guidelines suggest that the wave effect is to be based on the 0.5% AEP storm event in conjunction with the 0.5% AEP water level. Wave events are not directly dependent on tides and storm surge. Therefore, coincidence of the 0.5% AEP water level with the 0.5% AEP wave effects is an extremely conservative estimate. Accordingly, a 2% AEP storm event has been used for this flood hazard assessment. This is still a conservative estimate. Based on previous studies in the Strait of Georgia, NHC has found that, to design for 0.5% AEP, a wave event smaller than the 50% AEP wave is required along with the 0.5% water level.

<u>Nearshore Wave Modelling Analysis</u>

A nearshore wave model (Simulating Waves Nearshore or SWAN) of the Strait of Georgia and Burrard Inlet was developed to model wave generation and propagation from deep water into coastal areas and shorelines. SWAN incorporates physical processes such as wave propagation, wave generation by wind, white-capping, shoaling, wave breaking, bottom friction, sub-sea obstacles, wave setup and wave-wave interactions in its computations (Booij, N. et al., 2004). SWAN version 41.20 was used for this study.

Two model grid resolutions were used for the analysis: a fine grid model of the approaches at Burrard Inlet was nested in a coarse grid model of the Strait of Georgia. The coarse grid measures about 113 km southwest to northeast, and 253 km northwest to southeast, with each grid cell measuring 500 m by 500 m. The fine grid measures roughly 15 km east to west, and north to south, with each grid cell measuring 50 m by 50 m. The model's bathymetric grids were generated from digitized Canadian Hydrographic Charts and NOAA 3 arc-second resolution data.

The 2% AEP for the easterly and westerly wind directions were used to drive the SWAN model. For each event, a spatially varying Strait of Georgia wind field was developed and applied to both the coarse and fine grid models, based on the geographical location and frequency analysis results of the regional wind stations located along Straight of Georgia. The stations used to generate the spatially varying wind field are presented in **Table 8.**

Model results showing the 2% AEP waves from the east and west are presented in **Figure 13** and **Figure 14**. Wave height is shown by colour shading; wave direction and relative heights are shown by vectors with a 10 m spacing. Modelled wave information at the observation point shown in the figures are summarized in **Table 7**. The results show that the largest waves in the proximity of the project site are from the west.

Table 7. Simulation results of design waves near project site

Event	Easterly Event			Westerly Event		
	Hs (m)	Tp (s)	Dir (˚)	Hs (m)	Tp (s)	Dir (˚)
2% AEP	1.36	4.00	169	2.52	8.32	238

Table 8. Regional wind data sources

Station	Station ID	Period	Location
Entrance Island	EC ID 1022689	1994 – 2018 (Present)	49°12'31.195" N 123°48'38.001" W
Ballenas Island	EC ID 1020590	1994 – 2018 (Present)	49°21'01.000" N 124°09'37.000" W
Nanaimo Airport	EC ID 1025370	1954 – 2013	49°03'16.000" N 123°52'12.000" W
Nanaimo Airport	EC ID 1025365	2014 – 2018 (Present)	49°03'16.000" N 123°52'12.000" W
Sandheads CS	EC ID 1107010	1994 – 2018 (Present)	49°06'21.225" N 123°18'12.123" W
Saturna Island CS	EC ID 1017101	1994 – 2018 (Present)	48°47'02.067" N 123°02'41.082" W
Sisters Island	EC ID 2027403	1995 – 2018 (Present)	49°29'11.800" N 124°26'05.800" W
Victoria Int'l Airport	EC ID 1018620	1953 – 2013	48°38'50.010" N 123°25'33.000" W
Victoria Int'l Airport	EC ID 1018621	2013 – 2018 (Present)	48°38'50.000" N 123°25'33.000" W
Kelp Reefs	EC ID 1013998	1997 – 2018 (Present)	48°32'51.700" N 123°14'13.320" W
Halibut Bank	C46146	1992 – 2018 (Present)	49°20'24.000" N 123°43'48.000" W
Sentry Shoal	C46131	1992 – 2018 (Present)	49°54'36.000" N 124°59'24.000" W
Pat Bay	C46134	2001 – 2016	48°38'60.000" N 123°30'00.000" W

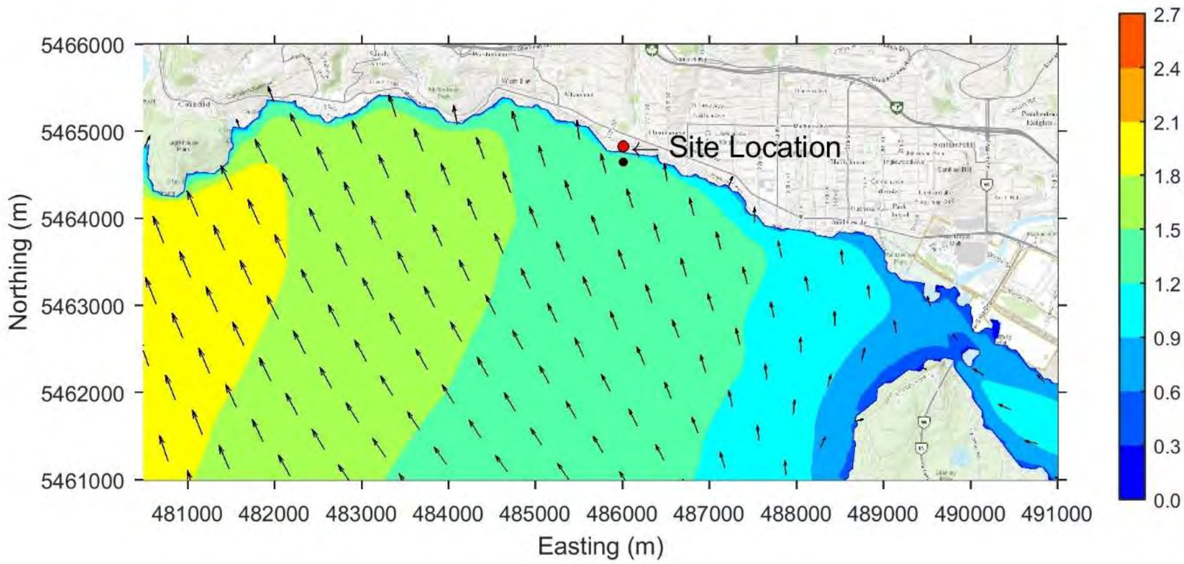

Figure 13. Significant wave height (Hs) and direction for simulated 50-year easterly event

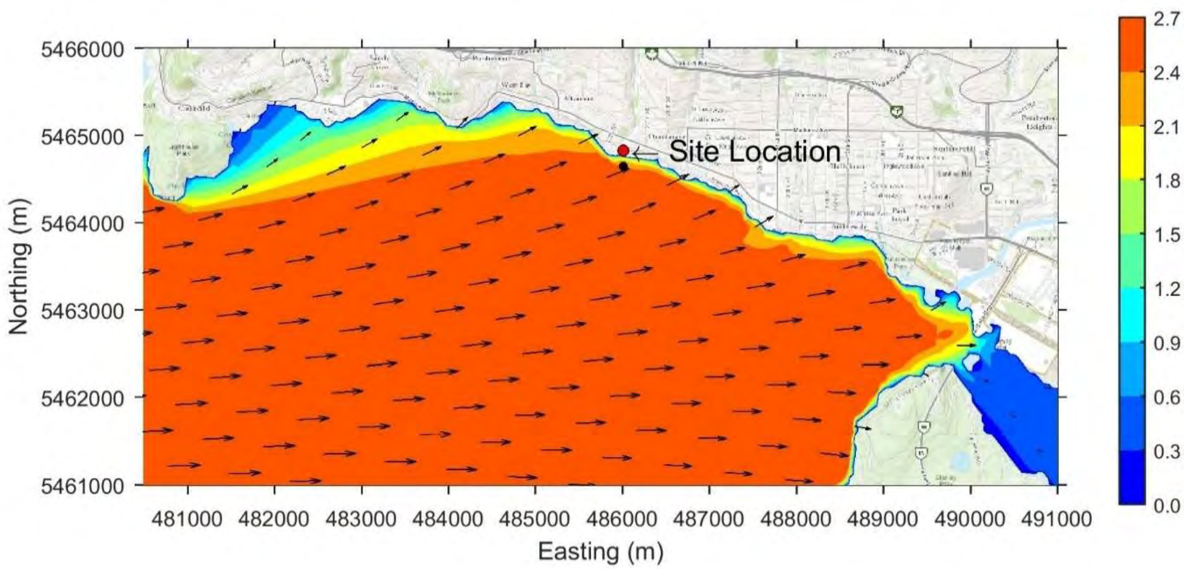

Figure 14. Significant wave height (Hs) and direction for simulated 50-year westerly event

Wave Runup and Wave Effect Analysis

Wave runup at the shoreline determines the extent over which waves act. Wave runup is therefore an important parameter to determine flood inundation extents from coastal storms. The BC Provincial Sea Dike Guidelines (BC Ministry of Environment, 2011b) accept the use of a few criteria for calculation of the wave run-up component for design elevation. As normally applied for runup analysis, the 2% exceedance level was adopted for this study – that is the run-up from a wave with a height that is expected to be exceeded by 2% of the waves occurring during a design event.

The wave run-up is estimated using methods described in EurOtop (2016), based on the westerly event design waves summarized in **Table 7**. Wave run-up was assessed based on an equivalent foreshore slope extending from Burrard Inlet to Bellevue Avenue, comprised of the beach section ascending at a 20% slope, and a 6% grade area representing the neighbouring property south of the study site . The results are summarized in the following table.

Table 9. Wave effects

Parameter	Year 2019 Elevation (m)	Year 2100 Elevation (m)
Design Wave Height (m)	1.85	1.89
Design Wave Period (s)	8.3	8.3
Equivalent Foreshore Slope (˚)	5.2	5.2
Designated Flood Level (m)	2.89	4.01
Wave Runup (m)	0.71	0.78

4.1.6 Freeboard

The freeboard is applied to account for temporal and spatial variances in wave climate and surge, as well as precision of the calculation overall. Freeboard for infrastructure according to the amendment to the guidelines (BCMFLNRD, 2018) is 0.6 m when using the joint probabilistic approach.

4.2 Coastal Flood Construction Level

Table 10 summarizes the resulting FCL for the current condition and that predicted for the Year 2100. As outlined in the BC Ministry of Environment (2011b) guidelines, the wave runup is taken as 50% of the runup elevation on natural shoreline for coastal flooding hazard purposes. This approach is only applicable to the property located at 2859 Bellevue Ave as it corresponds to the second row of houses from the coast, and therefore there is a considerable setback from the coast. The neighbouring south property however, is subject to the full runup effects. Since the foreshore conditions under future designated flood levels can be considered as natural shoreline, the wave effects are also given as 50% of the wave runup.

Table 10. Coastal flood construction levels.

FCL Input	Year 2019 Elevation (m)	Year 2100 Elevation (m)
Tide + storm surge (joint probability)	2.89	2.89
+ wave effect[1]	0.36	0.39
+ Design sea level rise (to year 2070)	0.00	1.00
+ Subsidence (to year 2070)	0.00	0.12
Coastal flood level	3.25	4.40
+ Freeboard (m)	0.60	0.60
Flood construction level (m GD)	**3.85**	**5.00**

Note: 1.Taken as 50% of the wave runup.

4.3 Tsunami Hazard

In addition to wave and storm events, high water and coastal property inundation could potentially occur from a tsunami event. Previously denoted as tidal waves, the Japanese term tsunami, is now used to denote long period waves (5 to 60 minutes) that radiate out from the rapid displacement of a large volume of water. The initial displacement can result from an earthquake, landslide, volcanic eruption, glacier calving, or impact from a meteorite. However, major tsunami events generally are a result of earthquakes that produce substantial vertical movement of the sea floor in sufficiently shallow water.

Assessment of tsunami hazards are beyond the scope of this project; however, previous studies suggest that the tsunami wave height reaching West Vancouver area would be roughly 10% of the tsunami wave height observed at Tofino on the west coast of Vancouver Island (Spaeth and Berkman, 1967) and that run up from a tsunami is expected to be less than 2 m on the North Shore from a tsunami originating from the Pacific Ocean (Clague et al., 2005).

The expected maximum tsunami run-up of less than 2 m would be for events far less frequent that the 0.5% event. Following the same 50% reduction in runup applicable to the study site wave effect estimations, the runup was added to higher high water mean tide (MWHHT = 1.4m GD), sea level rise, and subsidence. The resulting level is still below the coastal derived FCL minus freeboard (El. 3.5 m versus El. 4.4 m).

5 Summary and Recommendations

A coastal and riverine flood hazard assessment was conducted for the property located at 2859 Bellevue Avenue. It was found that flooding originating from Rodgers Creek is the governing hazard. From this study, the following recommendations are made for safe use of the proposed structures:

1) The calculated coastal flood depth is less than that calculated for riverine flooding, therefore the riverine FCL should be adopted for site design.

2) The recommended FCL for the proposed structures is:

a) Principal Dwelling
   a. Option 1 – FCL of 10.3 m GD at upstream face and FCL of 8.5 m GD at downstream face with FCL for intermediate locations being interpolated
   b. Option 2 – If the floor of the dwelling is designed to be at split levels (i.e., two or more distinct flood levels), the stated or interpolated FCL at the upstream face of each split level should be adopted for the entire area of that split level.

b) Coach House
   a. Upstream FCL of 8.9 m GD and downstream FCL of 8.2 m GD

3) No openings, such as windows, access ways or doors, have inverts or sills below the prescribed FCL. If windows are provided below FCL for health, safety, or ventilation, they should be floodproofed in accordance with the provincial Flood Hazard Area Land Use Management Guidelines.

4) All main electrical and mechanical infrastructure are to be above the FCL. Any electrical supply below the FCL (i.e. outlets or lighting) should be protected by GFCI (ground fault circuit interruption) located above the FCL, or other approach approved by an electrical engineer to be safe for use below the FCL.

5) The underside of any wooden floor systems, or the top of any concrete floor systems used for habitation, business, the storage of good damageable by floodwater, or the installation of fixed equipment is above the FCL.

6) Any structure below the FCL is to be designed to limit seepage and withstand hydrostatic loading up to the FCL and must include safe pedestrian egress to a location above the FCL.

7) Final building plans should be reviewed by a qualified registered engineer to ensure they meet the recommendations presented within this FHA prior to construction.

8) Structures adjacent to the top of bank of the channel may be susceptible to erosion during a flood event. The following measures should be adopted to manage the risk of erosion:

   a. Minor improvements can be made in armouring where deficiencies have been identified (e.g., scour observed along the left (northern) bank).
   b. Present bank armouring appears to be in good condition but it should be monitored at regular intervals and after each significant event (such as, greater than 5 years event flow which is 6.8 m^3/s).
   c. Foundation of structures is to extend to a depth suitable to resist expected potential erosion and scour. Since both structures are within 10 m of the edge of the creek, the foundation depths should extend below grade to the depth of the existing creek bed. These values are summarized below for each proposed structure.
      i. Upstream edge (NE) of main dwelling (River St. 54+000) – Bed El. = 7.4 m GD;
      ii. Downstream edge (SE) of main dwelling (River St. 24+000) – Bed El. = 6.0 m GD;
      iii. Upstream edge (NE) of coach house (River St. 34+000) – Bed El. = 6.4 m GD;
      iv. Downstream edge (SE) of coach house (River St. 14+000) – Bed El. = 5.8 m GD;

d. If relying on erosion protection, the protection (or improvements to the existing concrete grouted cobble walls) can be located along the banks of the creek. Additional protection can be provided between the creek and the structures. Erosion protection works should be designed by a professional qualified for designing such works (e.g. hydrotechnical engineer, fluvial geomorphologist).

Additionally, it is recommended that the property owner monitors and inspects the channel bed for scour, erosion, aggradation and degradation, and the culverts for blockages, on a semi-annual basis and following prolonged or intense rainfall events. Debris should be cleared as needed, banks repaired if damaged, and a professional hydrotechnical engineer retained if signs of erosion, scour and channel migration are identified.

This flood hazard assessment was conducted following EGBC 2018 Class 1 flood hazard assessment guidelines. A summary of the EGBC criteria for such an assessment is presented in **Table 11**.

Hazards other than flood hazards from Rodgers Creek and Burrard Inlet, such as geotechnical, fire, and wildlife hazards have not been assessed as part of this assessment. Stormwater and sediment management has not been designed or assessed through this study and may also impose hazards if not adequately addressed.

Table 11. **Summary of EGBC typical Class 1 flood hazard assessment methods and deliverables.**

EGBC Flood Hazard Assessment Component	Notes
Typical hazard assessment methods and climate/environmental change considerations	
Site inspection and qualitative assessment of flood hazard	Completed by NHC 2019
Identify any very low hazard surfaces in the consultation area (i.e., river terraces)	Completed by NHC 2019
Estimate erosion rates along river banks	River erosion not evident. Coastal erosion not applicable to the site.
1-D or possibly 2-D modelling, modelling of fluvial regime and future trends in river bed changes, erosion hazard maps, possibly paleoflood analysis	2-D coastal and 1-D river modelling completed by NHC 2019
Identify upstream or downstream mass movement processes that could change flood levels (e.g., landslides leading to partial channel blockages, diverting water into opposite banks)	Potential blockage of culvert or sediment deposition in the channel considered possible mechanism of the flood scenario
Conduct simple time series analysis of runoff data, review climate change predictions for study region, include in assessment if considered appropriate	Completed by NHC 2019 including allowance for climate change as recommended by MWLAP (2004)
Quantify erosion rates by comparative air photograph analysis	N/A – erosion risk deemed low
Typical deliverables	
Letter report or memorandum with at least water levels and consideration of scour and bank erosion	Completed
Cross-sections with water levels, flow velocity and qualitative description of recorded historic events, estimation of scour and erosion rates where appropriate with maps showing erosion over time	Flow descriptions completed. Erosion risk deemed low
Maps with area inundated at different return period, flow velocity, flow depth, delineation of areas prone to erosion and river bed elevation changes, estimates of erosion rates	Areas and elevations inundated during the 200-year return period design event described

6 Closure

We hope this work and report meets your current needs. If you have any questions don't hesitate to contact Adrian Simpalean or DaleMuir by phone (604-969-3009) or by email (ASimpalean@nhcweb.com | DMuir@nhcweb.com).

Sincerely,

Northwest Hydraulic Consultants Ltd.

Prepared by:

08/20/19

Adrian Simpalean, EIT
Coastal Engineer

Prepared by:

2019 AUGUST 19

Rahul Ranade, P.Eng.,
Hydrotechnical Engineer

Reviewed by: Dale Muir, P.Eng. (Principal)

7 References

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DISCLAIMER

This document has been prepared by **Northwest Hydraulic Consultants Ltd.** for the benefit of **Burgers Architecture** and **Suma Men** for specific application to the **flood hazard assessment for a building permit on the property located at 2859 Bellevue Avenue, West Vancouver**. The information and data contained herein represent **Northwest Hydraulic Consultants Ltd.** best professional judgment in light of the knowledge and information available to **Northwest Hydraulic Consultants Ltd.** at the time of preparation, and was prepared in accordance with generally accepted engineering practices.

Except as required by law, this report and the information and data contained herein are to be treated as confidential and may be used and relied upon only by **Suma Men**, its officers and employees. **Northwest Hydraulic Consultants Ltd.** denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this report or any of its contents.

Appendix A

Flood Hazard and Risk Assurance Statement

FLOOD ASSURANCE STATEMENT

Note: This statement is to be read and completed in conjunction with the current Engineers and Geoscientists BC *Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC* ("the guidelines") and is to be provided for flood assessments for the purposes of the *Land Title Act*, Community Charter, or the *Local Government Act*. Defined terms are capitalized; see the Defined Terms section of the guidelines for definitions.

To: The Approving Authority

District of West Vancouver

750-17th Street, West Vancouver BC V7V 3T3

Jurisdiction and address

Date: 2019 August 19

With reference to (CHECK ONE):

- ☐ *Land Title Act* (Section 86) – Subdivision Approval
- ☒ *Local Government Act* (Part 14, Division 7) – Development Permit
- ☐ Community Charter (Section 56) – Building Permit
- ☐ *Local Government Act* (Section 524) – Flood Plain Bylaw Variance
- ☐ *Local Government Act* (Section 524) – Flood Plain Bylaw Exemption

For the following property ("the Property"):

2859 Bellevue Ave, West Vancouver, BC

Legal description and civic address of the Property

The undersigned hereby gives assurance that he/she is a Qualified Professional and is a Professional Engineer or Professional Geoscientist who fulfils the education, training, and experience requirements as outlined in the guidelines.

I have signed, sealed, and dated, and thereby certified, the attached Flood Assessment Report on the Property in accordance with the guidelines. That report and this statement must be read in conjunction with each other. In preparing that Flood Assessment Report I have:

[CHECK TO THE LEFT OF APPLICABLE ITEMS]

___ 1. Consulted with representatives of the following government organizations:

____

x 2. Collected and reviewed appropriate background information

x 3. Reviewed the Proposed Development on the Property

x 4. Investigated the presence of Covenants on the Property, and reported any relevant information

x 5. Conducted field work on and, if required, beyond the Property

x 6. Reported on the results of the field work on and, if required, beyond the Property

x 7. Considered any changed conditions on and, if required, beyond the Property

8. For a Flood Hazard analysis I have:

x 8.1 Reviewed and characterized, if appropriate, Flood Hazard that may affect the Property

x 8.2 Estimated the Flood Hazard on the Property

x 8.3 Considered (if appropriate) the effects of climate change and land use change

___ 8.4 Relied on a previous Flood Hazard Assessment (FHA) by others

___ 8.5 Identified any potential hazards that are not addressed by the Flood Assessment Report

9. For a Flood Risk analysis I have:

___ 9.1 Estimated the Flood Risk on the Property

___ 9.2 Identified existing and anticipated future Elements at Risk on and, if required, beyond the Property

___ 9.3 Estimated the Consequences to those Elements at Risk

10. In order to mitigate the estimated Flood Hazard for the Property, the following approach is taken:
 x 10.1 A standard-based approach
___ 10.2 A Risk-based approach
___ 10.3 The approach outlined in the guidelines, Appendix F: Flood Assessment Considerations for Development Approvals
___ 10.4 No mitigation is required because the completed flood assessment determined that the site is not subject to a Flood Hazard

11. Where the Approving Authority has adopted a specific level of Flood Hazard or Flood Risk tolerance, I have:
___ 11.1 Made a finding on the level of Flood Hazard or Flood Risk on the Property
___ 11.2 Compared the level of Flood Hazard or Flood Risk tolerance adopted by the Approving Authority with my findings
___ 11.3 Made recommendations to reduce the Flood Hazard or Flood Risk on the Property

12. Where the Approving Authority has not adopted a level of Flood Hazard or Flood Risk tolerance, I have:
 x 12.1 Described the method of Flood Hazard analysis or Flood Risk analysis used
___ 12.2 Referred to an appropriate and identified provincial or national guideline for level of Flood Hazard or Flood Risk
 x 12.3 Made a finding on the level of Flood Hazard of Flood Risk tolerance on the Property
___ 12.4 Compared the guidelines with the findings of my flood assessment
 x 12.5 Made recommendations to reduce the Flood Hazard or Flood Risk

___ 13. Considered the potential for transfer of Flood Risk and the potential impacts to adjacent properties

___ 14. Reported on the requirements for implementation of the mitigation recommendations, including the need for subsequent professional certifications and future inspections.

Based on my comparison between:

[CHECK ONE]

☐ The findings from the flood assessment and the adopted level of Flood Hazard or Flood Risk tolerance (item 11.2 above)

☒ The findings from the flood assessment and the appropriate and identified provincial or national guideline for level of Flood Hazard or Flood Risk tolerance (item 12.4 above)

I hereby give my assurance that, based on the conditions contained in the attached Flood Assessment Report:

[CHECK ONE]

☐ For <u>subdivision approval</u>, as required by the *Land Title Act* (Section 86), “that the land may be used safely for the use intended”:

  [CHECK ONE]

  ☐ With one or more recommended registered Covenants.

  ☐ Without any registered Covenant.

☒ For a <u>development permit</u>, as required by the *Local Government Act* (Part 14, Division 7), my Flood Assessment Report will “assist the local government in determining what conditions or requirements it will impose under subsection (2) of this section [Section 491 (4)]”.

☐ For a <u>building permit</u>, as required by the Community Charter (Section 56), “the land may be used safely for the use intended”:

  [CHECK ONE]

  ☐ With one or more recommended registered Covenants.

  ☐ Without any registered Covenant.

☐ For flood plain bylaw variance, as required by the *Flood Hazard Area Land Use Management Guidelines* and the *Amendment Section 3.5 and 3.6* associated with the *Local Government Act* (Section 524), “the development may occur safely”.

☐ For flood plain bylaw exemption, as required by the *Local Government Act* (Section 524), “the land may be used safely for the use intended”.

FLOOD ASSURANCE STATEMENT

I certify that I am a Qualified Professional as defined below.

Date

2019 AUGUST 19

Prepared by

RAHUL RANADE

Name (print)

Signature

30 GOSTICK PLACE

Address

NORTH VANCOUVER, BC V7M 3G3

604-980-6011

Telephone

Email

Dale Muir, P.Eng.

Reviewed by

DMUIR@NHCWEB.COM

Name (print)

Signature

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. R. RANADE
203203

(Affix PROFESSIONAL SEAL here)

If the Qualified Professional is a member of a firm, complete the following:

I am a member of the firm NORTHWEST HYDRAULIC CONSULTANTS LTD.
and I sign this letter on behalf of the firm. (Name of firm)

Appendix B

Received Site Survey

TOPOGRAPHIC PLAN OF LOT 3
BLOCK 24 DISTRICT LOT 556
NEW WESTMINSTER DISTRICT PLAN 4878

PID: 007-654-430
SCALE: 1 INCH = 8 FEET

CIVIC ADDRESS: 2859 BELLEVUE AVENUE
WEST VANCOUVER, B.C.

LEGEND:

- DENOTES CATCH BASIN
- MH DENOTES MANHOLE
- DENOTES POWER POLE
- DENOTES WATER METER
- TW DENOTES TOP OF WALL
- TS DENOTES TOP OF STAIRS

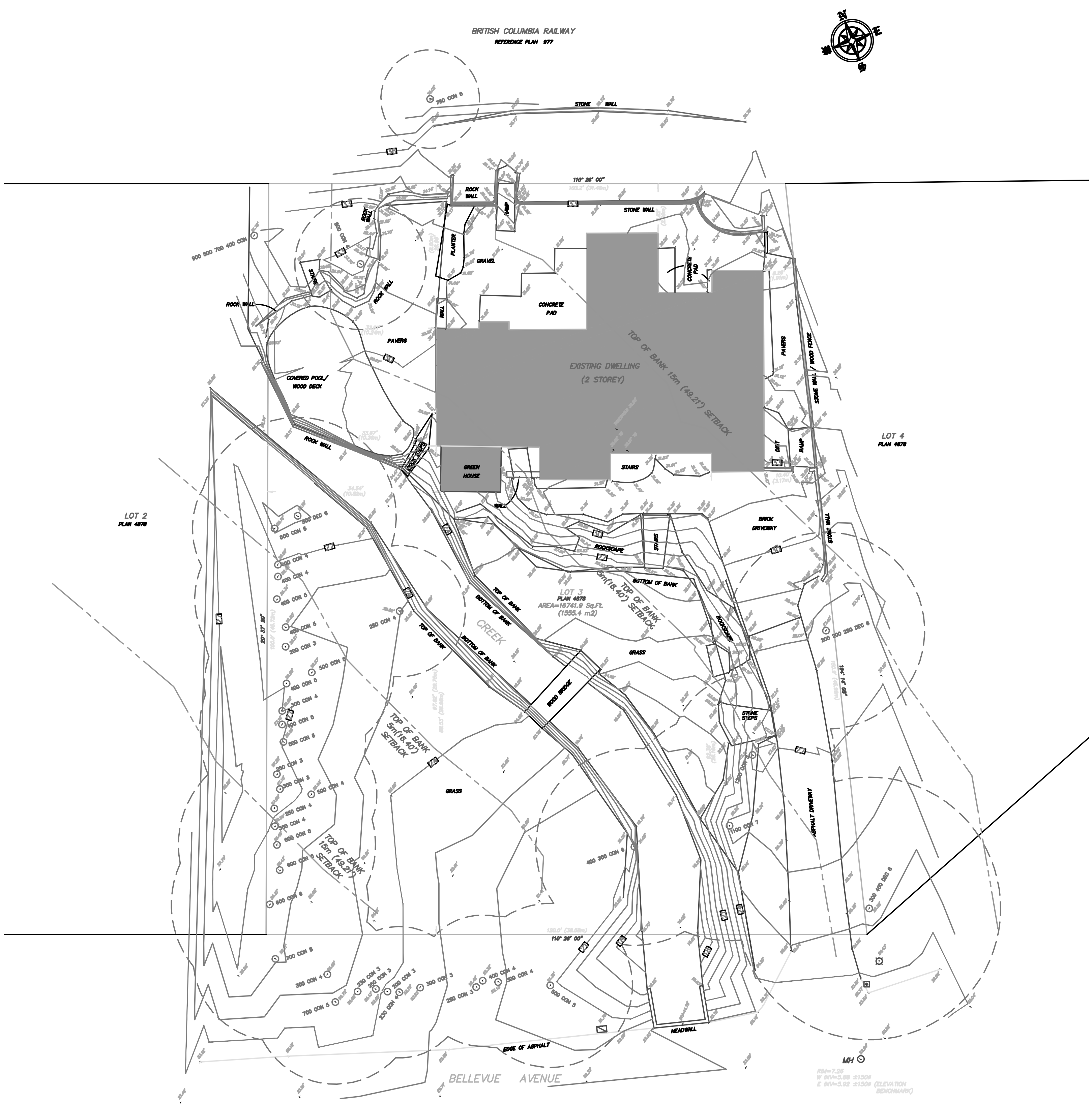
DENOTES CANOPY RADIUS (m)
XXXØ TREE TYPE X
CON=CONIFEROUS
DEC=DECIDUOUS
DENOTES TREE CALIPER (mm)

NOTE:

- PROPERTY LINES ARE DERIVED FROM LAND TITLE OFFICE RECORDS.

ELEVATION DERIVATION

ELEVATIONS ARE DERIVED FROM THE DISTRICT OF WEST VANCOUVER BENCHMARK E. INVERT OF MANHOLE LOCATED ON BELLEVUE DRIVE ADJACENT TO 2859 BELLEVUE AVENUE.
ELEVATION = 19.43' (5.922m)



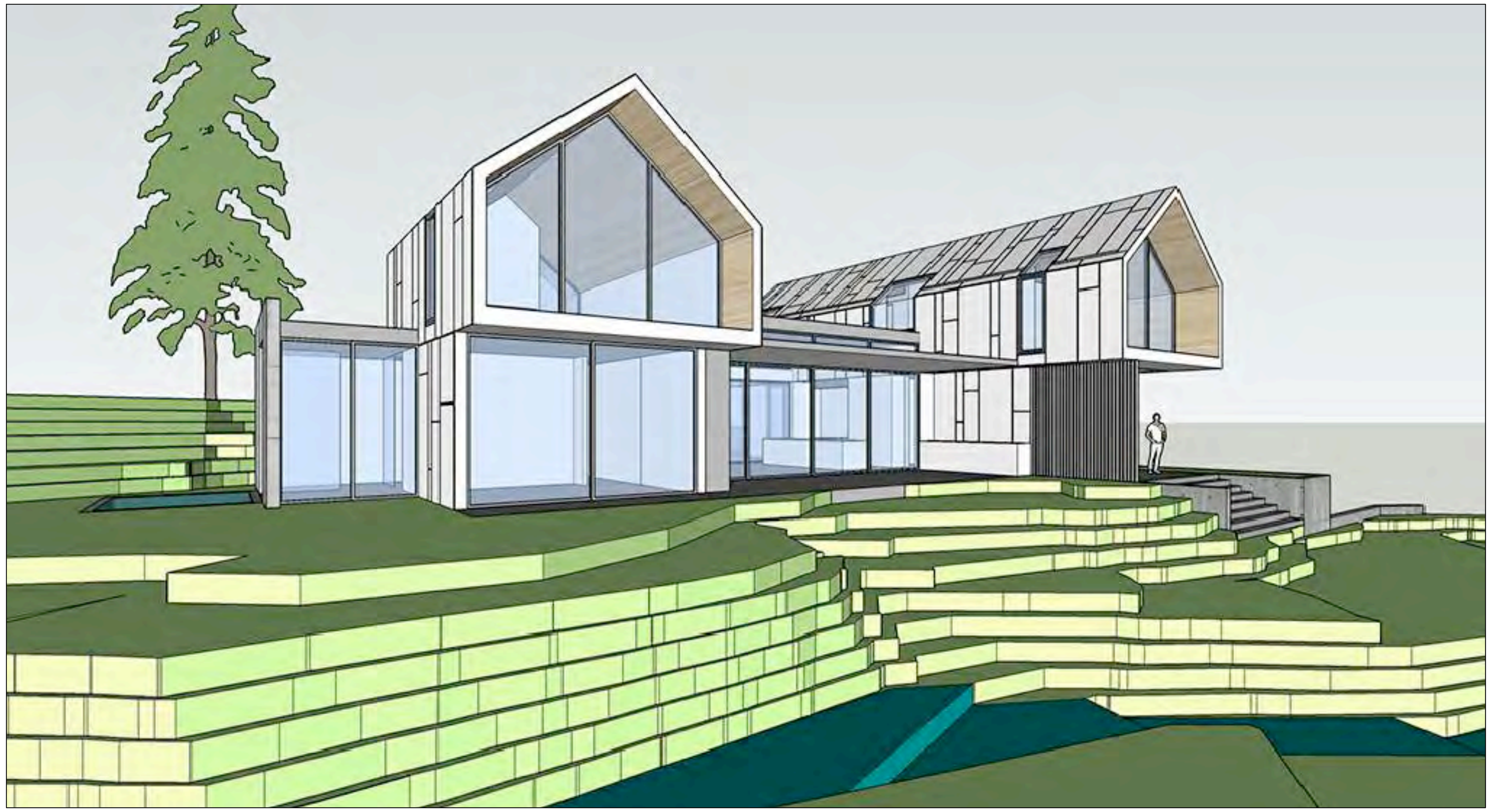
JULY 25, 2018

4 – 19089 94th Ave
Surrey, BC V4N 3S4
www.butlersundvick.ca
Tel. 604-513-9611

File: 4947
Dwg: 4947-T(MP)

Appendix C

Received Architectural Drawings



DEVELOPMENT PERMIT

DRAWING INDEX

ARCHITECTURAL

PROJECT TEAM

ARCHITECTURAL

Burgers Architecture Inc.
2488 Haywood Ave
West Vancouver, BC V7V 1Y1
604 926 6058
cedric@baiarchitects.com

LANDSCAPE

Ron Rule Consultants Ltd.
2221 Gordon Ave
West Vancouver, BC V7V 1W2
604 926 1696
ronruleconsultants@telus.net

ENVIRONMENTAL

Sartori Environmental
106-185 Forester Street
North Vancouver, BC V7H 0A6
604 987 5588
info@sartorienv.com

ARBORIST

Talus Consulting
604 354 7799
talusbc@gmail.com

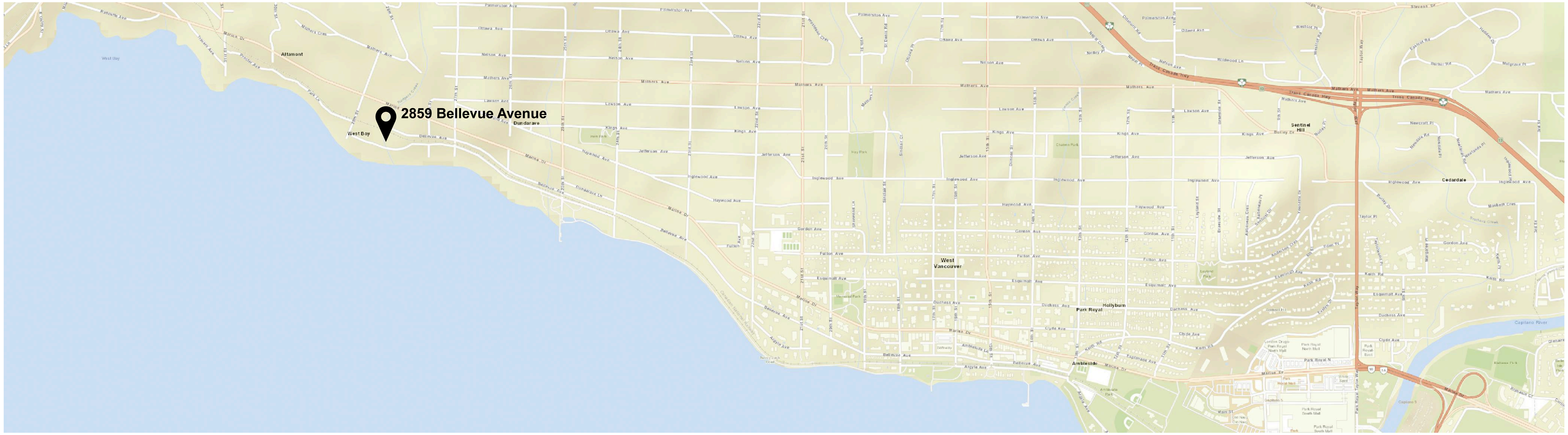
DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

bai
BURGERS ARCHITECTURE INC.
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

A000
COVER SHEET



1 **MAP OF WEST VANCOUVER**

Not to scale

CIVIC ADDRESS:	2859 BELLEVUE AVE, WEST VANCOUVER, BC
LEGAL DESCRIPTION:	LOT 3 BLOCK 24 DISTRICT LOT 556 NEW WESTMINSTER DISTRICT PLAN 4878
FOLIO:	07-0037
PARCEL IDENTIFIER (PID):	007-654-430
ZONING:	RS4
TYPE OF BUILD:	NEW CONSTRUCTION

LOT INFORMATION	ft²	m²
SITE AREA	16741.90	1555.37
	ft	m
LOT WIDTH	116.67	35.56

		PERMITTED		PROPOSED		
	PRINCIPAL DWELLING & COACH HOUSE	ft²	m²	ft²	m²	
Bylaw 204.05	SITE COVERAGE (30%)	5022.57	466.61	3393.00	315.22	PROPOSED SITE COVERAGE = 20.3%
Bylaw 204.06	FLOOR AREA (F.A.R. = 0.35)	5859.67	544.38	4622.39	429.43	PROPOSED F.A.R. = 0.28
	PRINCIPAL DWELLING	ft	m	ft	m	
	LOWEST AVERAGE GRADE	-	-	29.36	8.95	SEE A011 FOR CALCULATIONS
Bylaw 204.10	MEAN ROOF HEIGHT	54.36	16.57	53.19	16.21	
Bylaw 204.11	STOREYS	2 + BASEMENT		2 + BASEMENT		UPPER STOREY WIDTH < 2/3 OF MAIN STOREY WIDTH
Bylaw 204.07	FRONT YARD	29.86	9.10	29.86	9.10	
Bylaw 204.08	REAR YARD	29.86	9.10	5.00	1.52	VARIANCE REQUESTED
Bylaw 204.09(1)(a)	EAST SIDE YARD	5.00	1.52	5.00	1.52	DWELLING <2 FULL STOREYS
	WEST SIDE YARD	18.33	5.59	18.33	5.59	DWELLING <2 FULL STOREYS
Bylaw 204.09(1)(b)	COMBINED SIDE YARD	23.33	7.11	23.33	7.11	DWELLING <2 FULL STOREYS
Bylaw 204.13	OFF-STREET PARKING	1 MINIMUM		2		
	COACH HOUSE	ft	m	ft	m	
	LOWEST AVERAGE GRADE	-	-	22.51	6.86	SEE A012 FOR CALCULATIONS
Bylaw 130.051(1)(f)	MEAN ROOF HEIGHT	37.51	11.43	36.94	11.26	
Bylaw 130.051(1)(f)	STOREYS	2 + BASEMENT		1 + BASEMENT		
Bylaw 130.051(1)(e)	MIN. DISTANCE TO PRINCIPAL DWELLING	16.08	4.90	57.86	17.64	
	FRONT YARD	29.86	9.10	5.00	1.52	ALTERNATIVE SITING PROPOSED
Bylaw 130.051(1)(d)(i)	REAR YARD	5.91	1.80	105.55	32.17	
	EAST SIDE YARD	5.00	1.52	68.40	20.85	
	WEST SIDE YARD	18.33	5.59	5.00	1.52	ALTERNATIVE SITING PROPOSED
	COMBINED SIDE YARD	23.33	7.11	73.40	22.37	
Bylaw 130.051(1)(k)	OFF-STREET PARKING	1 MINIMUM		1		

2 **SITE PLAN**

Scale: 1/16" = 1'-0"

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

bai
BURGERS ARCHITECTURE INC.
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/16" = 1'-0"
5' 15 30

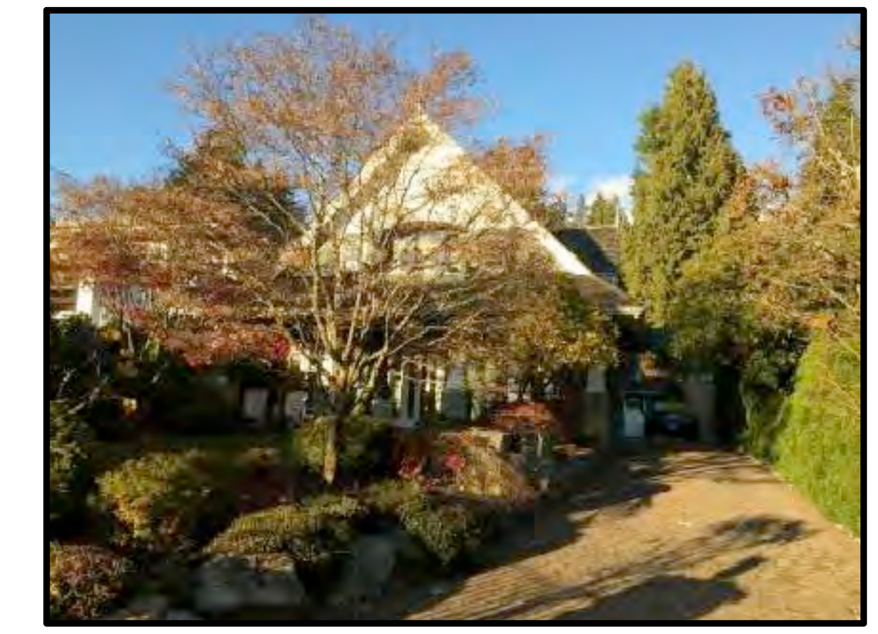
A001
CITY CONTEXT & PROJECT DATA

2897 Bellevue Avenue
Year Built: 1922

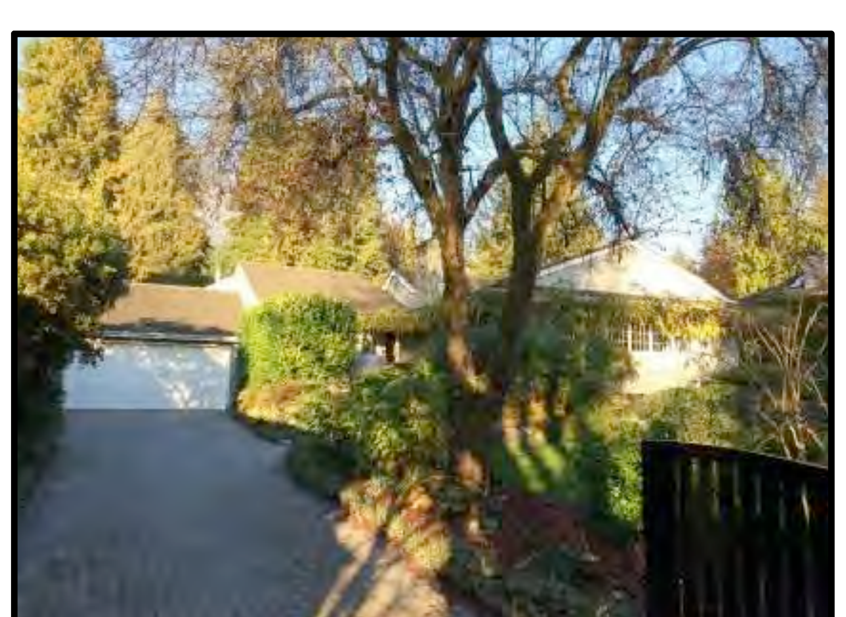
2893 Bellevue Avenue
Year Built: 2015

2881 Bellevue Avenue
Year Built: 2017

2879 Bellevue Avenue
Year Built: Under Construction



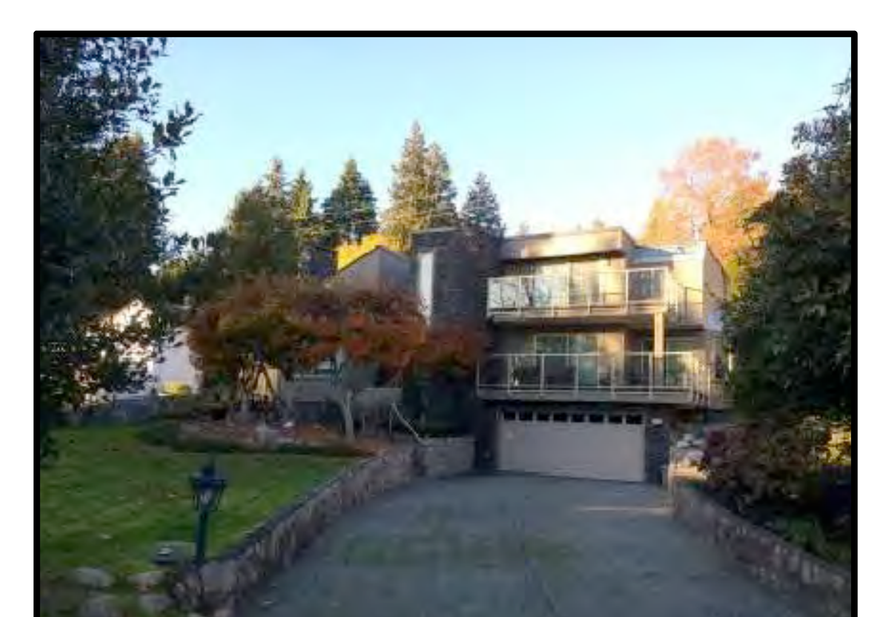
2877 Bellevue Avenue
Year Built: 2000



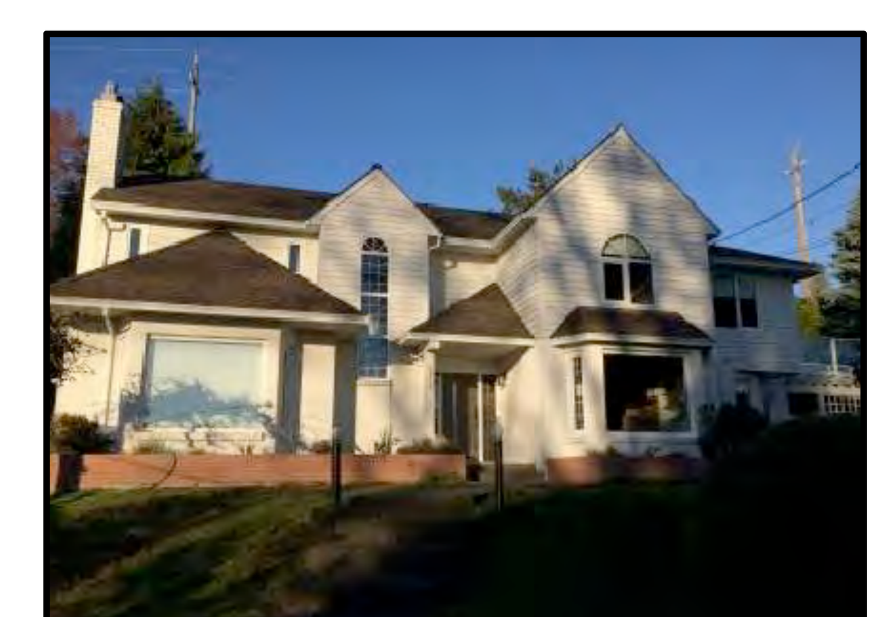
2867 Bellevue Avenue
Year Built: 1944

2863 Bellevue Avenue
Year Built: 2005

2859 Bellevue Avenue
Year Built: 1938



2843 Bellevue Avenue
Year Built: 1985



2829 Bellevue Avenue
Year Built: 1987

N

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

bai
BURGERS
ARCHITECTURE INC.
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

A002
NEIGHBOURHOOD CONTEXT
(BELLEVUE AVENUE NORTH)

2816 Bellevue Avenue
Year Built: 2006

2818 Bellevue Avenue
Year Built: 2005

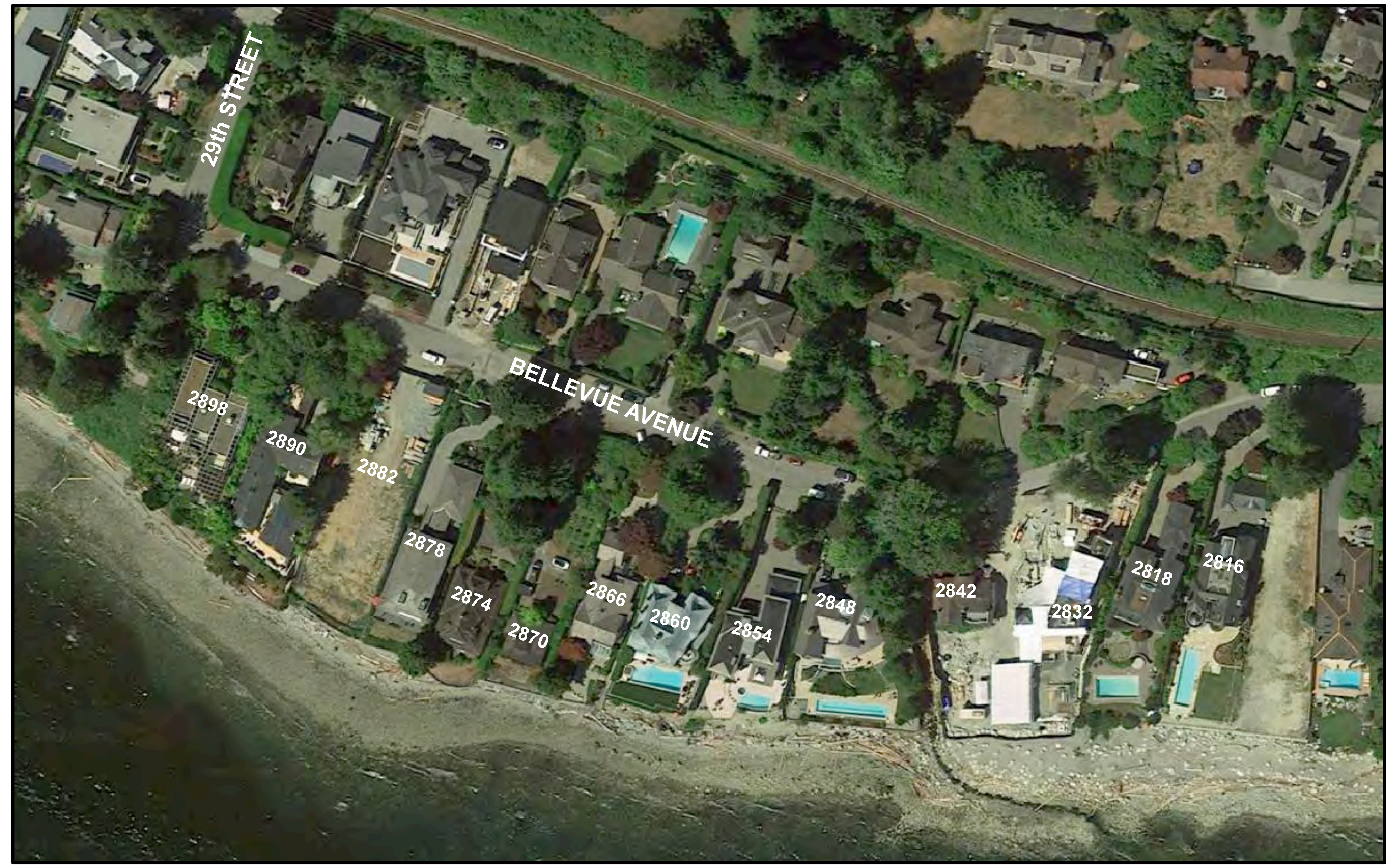
2832 Bellevue Avenue
Year Built: Under Construction

2842 Bellevue Avenue
Year Built: 1986

2848 Bellevue Avenue
Year Built: 1997

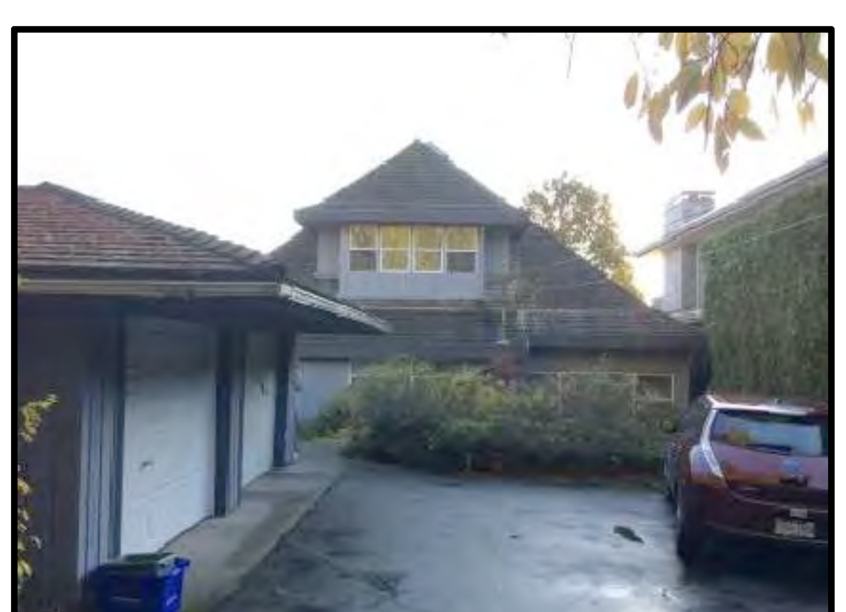
2854 Bellevue Avenue
Year Built: 2010

2860 Bellevue Avenue
Year Built: 1999



2866 Bellevue Avenue
Year Built: 1970

2870 Bellevue Avenue
Year Built: 1919



2874 Bellevue Avenue
Year Built: 1920

2878 Bellevue Avenue
Year Built: 2014

2882 Bellevue Avenue
Year Built: Under Construction

2890 Bellevue Avenue
Year Built: 1989

2898 Bellevue Avenue
Year Built: 1986

N

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V7V 1Y1

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EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

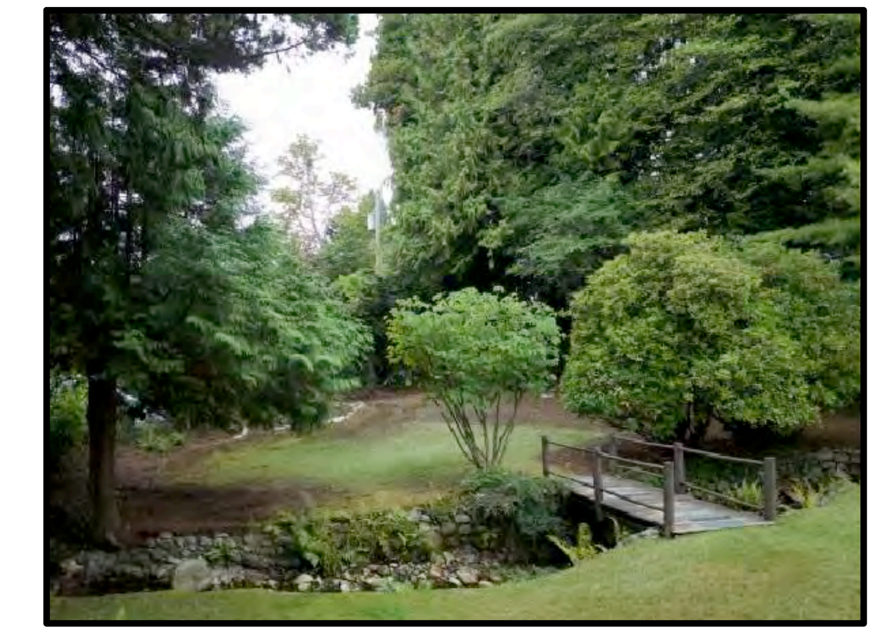
A003
NEIGHBOURHOOD CONTEXT
(BELLEVUE AVENUE SOUTH)


1. Pool / Deck


2. Rear yard

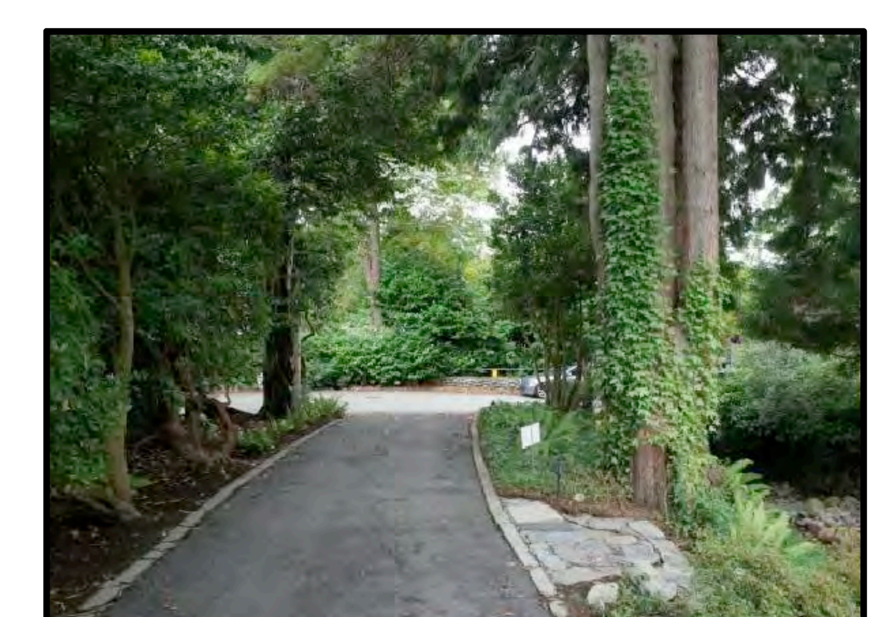

3. Cedar trees along West Property Line


4. Rodgers Creek looking upstream


5. Proposed coach house location


6. Existing house and 2843 Bellevue Ave.


7. Existing house


8. Driveway entrance

N

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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V7V 1Y1

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FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/16" = 1'-0"
5' 15 30

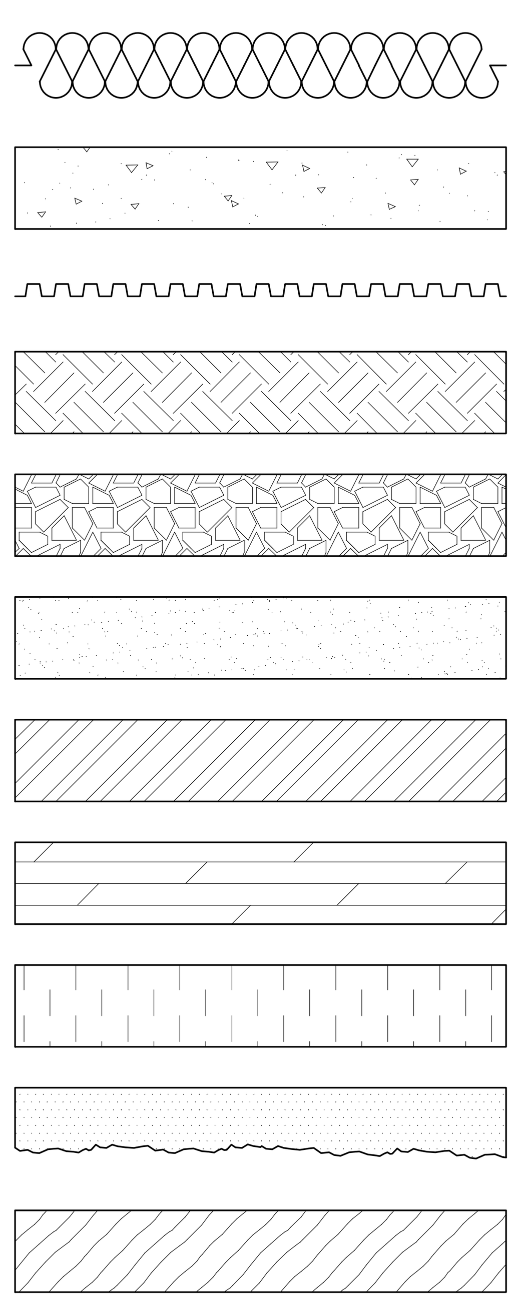
A004
SITE CONTEXT

GENERAL NOTES

1. ALL CODES AND DOCUMENTS REFERRED TO IN THESE DOCUMENTS ARE TO BE THE LATEST EDITION.
2. THE CONTRACTOR AND SUB-CONTRACTORS SHALL VERIFY ALL DIMENSIONS ON SITE AND REPORT ANY DISCREPANCY TO THE ARCHITECT PRIOR TO THE START OF CONSTRUCTION. FINAL DIMENSIONS OF ALL COMPONENTS ARE THE CONTRACTOR'S RESPONSIBILITY.
3. ALL EXTERIOR DIMENSIONS ARE TO FACE OF CONCRETE OR TO FACE OF PLYWOOD SHEATHING, UNLESS NOTED OTHERWISE.
4. ALL INTERIOR DIMENSIONS ARE TO FACE OF STUD, UNLESS NOTED OTHERWISE.
5. ALL LABOUR, MATERIALS, AND PRODUCTS TO COMPLY WITH THE REQUIREMENTS OF THE BC BUILDING CODE AND RELEVANT BYLAWS AND LEGISLATION.
6. PROVIDE ALL REQUIRED BLOCKING AND BACKING WHETHER INDICATED OR NOT AS DIRECTED BY ARCHITECT OR ENGINEER.
7. BUILDING TO BE SPRINKLERED TO NFPA AND BC FIRE CODE.
8. ALL FLOOR-TO-CEILING GLAZING TO BE STRUCTURAL SAFETY GLASS.

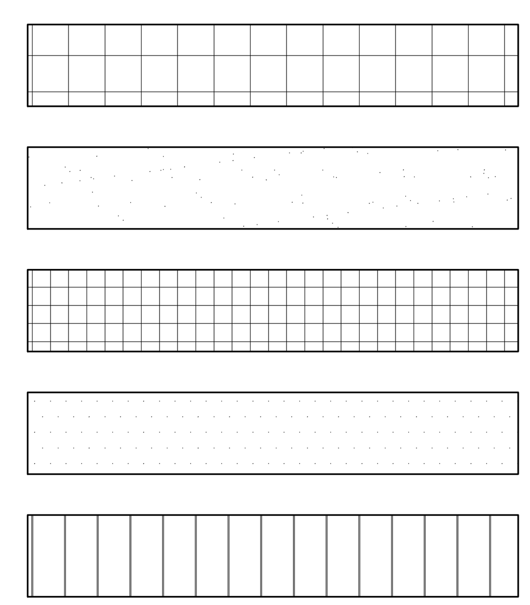
HATCHES

DETAIL / SECTION



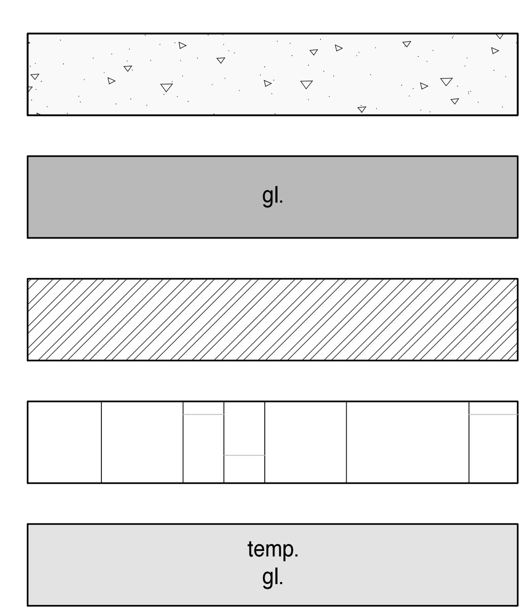
BATT INSULATION
CONCRETE
DIMPLED MEMBRANE
EARTH
GRAVEL
GYPSUM WALLBOARD
METAL
PLYWOOD
RIGID INSULATION
SPRAY FOAM INSULATION
WOOD

PLAN



CONCRETE PAVERS
GRAVEL
TILE
TORCH APPLIED ROOFING MEMBRANE
STANDING SEAM ZINC METAL ROOF

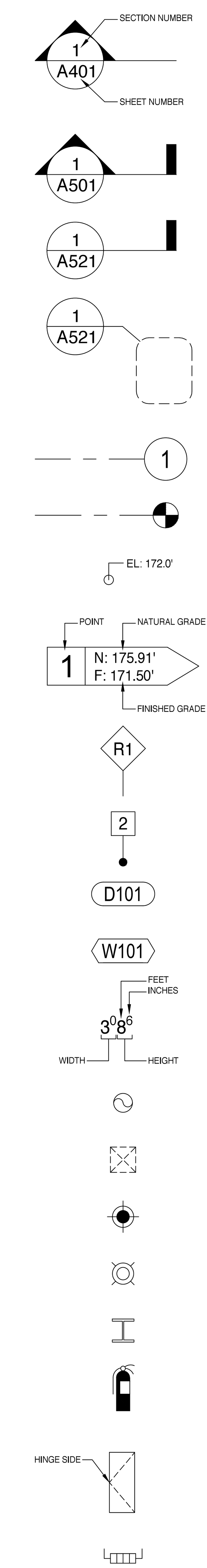
ELEVATION



CONCRETE
GLASS
METAL FLASHING
SWISS PEARL PANELS
TEMPERED GLASS

ABBREVIATIONS

& or +	AND
@	AT
℄	CENTER LINE
Ø	DIAMETER
#	NUMBER
±	PLUS/MINUS
ABV	ABOVE
A/C	AIR CONDITIONING
ADD'L	ADDITIONAL
AHU	AIR HANDLER UNIT
ARCH	ARCHITECTURAL
AVG	AVERAGE
BF	BRACED FRAME
BM	BEAM
B.O.	BOTTOM OF
BOW	BOTTOM OF WALL
CL	CENTER LINE
CLR	CLEAR
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
D	DRYER
DBL	DOUBLE
DIA	DIAMETER
DIAG	DIAGONAL
DN	DOWN
DP	DEEP
DW	DISHWASHER
DWG	DRAWING
EA	EACH
EFF	EFFECTIVE
EL	ELEVATION
ELEC	ELECTRIC(AL)
EP	EMBED PLATE
EQ	EQUAL
EQUIP	EQUIPMENT
EXT	EXTERIOR
F.A.R.	FLOOR AREA RATIO
FL	FLOOR
F.O.	FACE OF
FR	FRIDGE
FT	FOOT OR FEET
FTG	FOOTING
GFA	GROSS FLOOR AREA
GL	GLASS or GLAZED
GR	GRADE
HBF	HIGHEST BUILDING FACE
HD	HOLD DOWN
HORIZ	HORIZONTAL
HR	HOUR
HRV	HEAT RECOVERY VENTILATOR
HSS	HOLLOW STRUCTURAL STEEL
HT	HEIGHT
INSUL	INSULATION
INT	INTERIOR
LD	LIMITING DISTANCE
LSL	LAMINATED STRAND LUMBER
LT	LIGHT
LVL	LAMINATED VENEER LUMBER
MAX	MAXIMUM
MECH	MECHANICAL
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
N/A	NOT APPLICABLE
NO.	NUMBER
NTS	NOT TO SCALE
O.C. or O/C	ON CENTER
O.D.	OUTSIDE DIMENSION
P.L.	PROPERTY LINE
PSL	PARALLEL STRAND LUMBER
QTY	QUANTITY
R-	THERMAL RESISTANCE (U.S.)
RAD	RADIUS
REINF	REINFORCEMENT
REQ'D	REQUIRED
REV	REVISION
RM	ROOM
R.O.	ROUGH OPENING
RSI	THERMAL RESISTANCE (SI)
RWL	RAINWATER LEADER
SF	SQUARE FEET
SM	SQUARE METER
SP	SPRINKLER
SPEC	SPECIFICATIONS
SQ	SQUARE
ST	STRAP TYPE
STD	STANDARD
STRUCT	STRUCTURAL
SW	SHEARWALL
TBC	TO BE CONFIRMED
TBD	TO BE DETERMINED
TEMP	TEMPERATURE
T&G	TONGUE & GROOVE
THK	THICK
TJI	SOLID WEB TRUST JOIST
T.O.	TOP OF
TOW	TOP OF WALL
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
U.S. or U/S	UNDERSIDE
VERT	VERTICAL
W	WASHING MACHINE
WC	WATER CLOSET
W/	WITH
W/O	WITHOUT
XPS	EXTRUDED POLYSTYRENE



BUILDING SECTION
WALL SECTION
DETAIL SECTION
DETAIL SECTION
GRID NUMBER
FINISHED FLOOR / CEILING DATUM TAG
NEW ELEVATION TAG
NATURAL & FINISHED GRADE TAG
WALL / ROOF / FLOOR ASSEMBLY TAG
MATERIAL TAG
DOOR TAG
WINDOW TAG
DOOR / WINDOW SIZE (ROUGH OPENING)
RAINWATER LEADER
EXHAUST FAN
SMOKE ALARM
CARBON MONOXIDE (CO) DETECTOR
WIDE FLANGE STEEL COLUMN / BEAM
FIRE EXTINGUISHER
DOOR / VENTING WINDOW
ELECTRIC IN-WALL HEATER

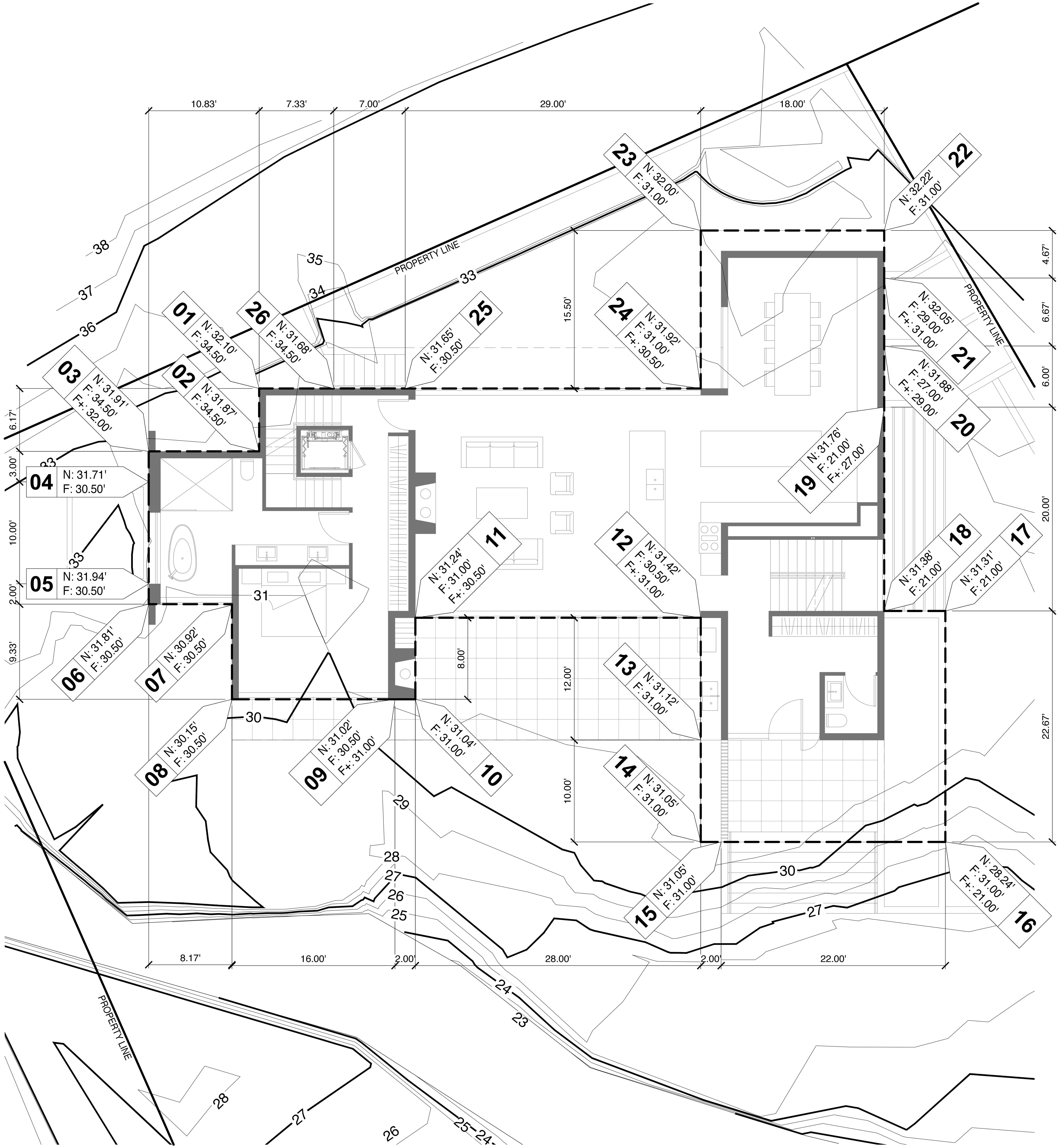
DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

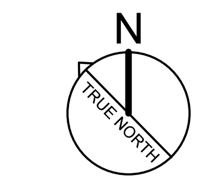
bai
BURGERS ARCHITECTURE INC.
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

A005
GENERAL NOTES, ABBREVIATIONS & SYMBOLS





AVERAGE NATURAL GRADE

POINT	GRADE	POINT	GRADE	AVERAGE	LENGTH	AVG x LGTH
01	32.10	02	31.87	31.99	6.17	197.24
02	31.87	03	31.91	31.89	10.83	345.48
03	31.91	03+	31.91	31.91	0.00	0.00
03+	31.91	04	31.71	31.81	3.00	95.43
04	31.71	05	31.94	31.83	10.00	318.25
05	31.94	06	31.81	31.88	2.00	63.75
06	31.81	07	30.92	31.37	8.17	256.15
07	30.92	08	30.15	30.54	9.33	284.99
08	30.15	09	31.02	30.59	16.00	489.36
09	31.02	09+	31.02	31.02	0.00	0.00
09+	31.02	10	31.04	31.03	2.00	62.06
10	31.04	11	31.24	31.14	8.00	249.12
11	31.24	11+	31.24	31.24	0.00	0.00
11+	31.24	12	31.42	31.33	28.00	877.24
12	31.42	12+	31.42	31.42	0.00	0.00
12+	31.42	13	31.12	31.27	12.00	375.24
13	31.12	14	31.05	31.09	10.00	310.85
14	31.05	15	31.04	31.05	2.00	62.09
15	31.04	16	28.24	29.64	22.00	652.08
16	28.24	16+	28.24	28.24	0.00	0.00
16+	28.24	17	31.31	29.78	22.67	674.90
17	31.31	18	31.38	31.35	6.00	188.07
18	31.38	19	31.76	31.57	20.00	631.40
19	31.76	19+	31.76	31.76	0.00	0.00
19+	31.76	20	31.88	31.82	6.00	190.92
20	31.88	20+	31.88	31.88	0.00	0.00
20+	31.88	21	32.05	31.97	6.67	213.10
21	32.05	21+	32.05	32.05	0.00	0.00
21+	32.05	22	32.22	32.14	4.67	149.96
22	32.22	23	32.00	32.11	18.00	577.98
23	32.00	24	31.92	31.96	15.50	495.38
24	31.92	24+	31.92	31.92	0.00	0.00
24+	31.92	25	31.65	31.79	29.00	921.77
25	31.65	26	31.68	31.67	7.00	221.66
26	31.68	01	32.10	31.89	7.33	233.86
					292.33	9138.32
						31.26

AVERAGE FINISHED GRADE

POINT	GRADE	POINT	GRADE	AVERAGE	LENGTH	AVG x LGTH
01	34.50	02	34.50	34.50	6.17	212.75
02	34.50	03	34.50	34.50	10.83	373.75
03	34.50	03+	32.00	33.25	0.00	0.00
03+	32.00	04	30.50	31.25	3.00	93.75
04	30.50	05	30.50	30.50	10.00	305.00
05	30.50	06	30.50	30.50	2.00	61.00
06	30.50	07	30.50	30.50	8.17	249.08
07	30.50	08	30.50	30.50	9.33	284.67
08	30.50	09	30.50	30.50	16.00	488.00
09	30.50	09+	31.00	30.75	0.00	0.00
09+	31.00	10	31.00	31.00	2.00	62.00
10	31.00	11	31.00	31.00	8.00	248.00
11	31.00	11+	30.50	30.75	0.00	0.00
11+	30.50	12	30.50	30.50	28.00	854.00
12	30.50	12+	31.00	30.75	0.00	0.00
12+	31.00	13	31.00	31.00	12.00	372.00
13	31.00	14	31.00	31.00	10.00	310.00
14	31.00	15	31.00	31.00	2.00	62.00
15	31.00	16	31.00	31.00	22.00	682.00
16	31.00	16+	21.00	26.00	0.00	0.00
16+	21.00	17	21.00	21.00	22.67	476.00
17	21.00	18	21.00	21.00	6.00	126.00
18	21.00	19	21.00	21.00	20.00	420.00
19	21.00	19+	27.00	24.00	0.00	0.00
19+	27.00	20	27.00	27.00	6.00	162.00
20	27.00	20+	29.00	28.00	0.00	0.00
20+	29.00	21	29.00	29.00	6.67	193.33
21	29.00	21+	31.00	30.00	0.00	0.00
21+	31.00	22	31.00	31.00	4.67	144.67
22	31.00	23	31.00	31.00	18.00	558.00
23	31.00	24	31.00	31.00	15.50	480.50
24	31.00	24+	30.50	30.75	0.00	0.00
24+	30.50	25	30.50	30.50	29.00	884.50
25	30.50	26	34.50	32.50	7.00	227.50
26	34.50	01	34.50	34.50	7.33	253.00
					292.33	8583.50
						29.36

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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BURGERS ARCHITECTURE INC.
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V7V 1Y1

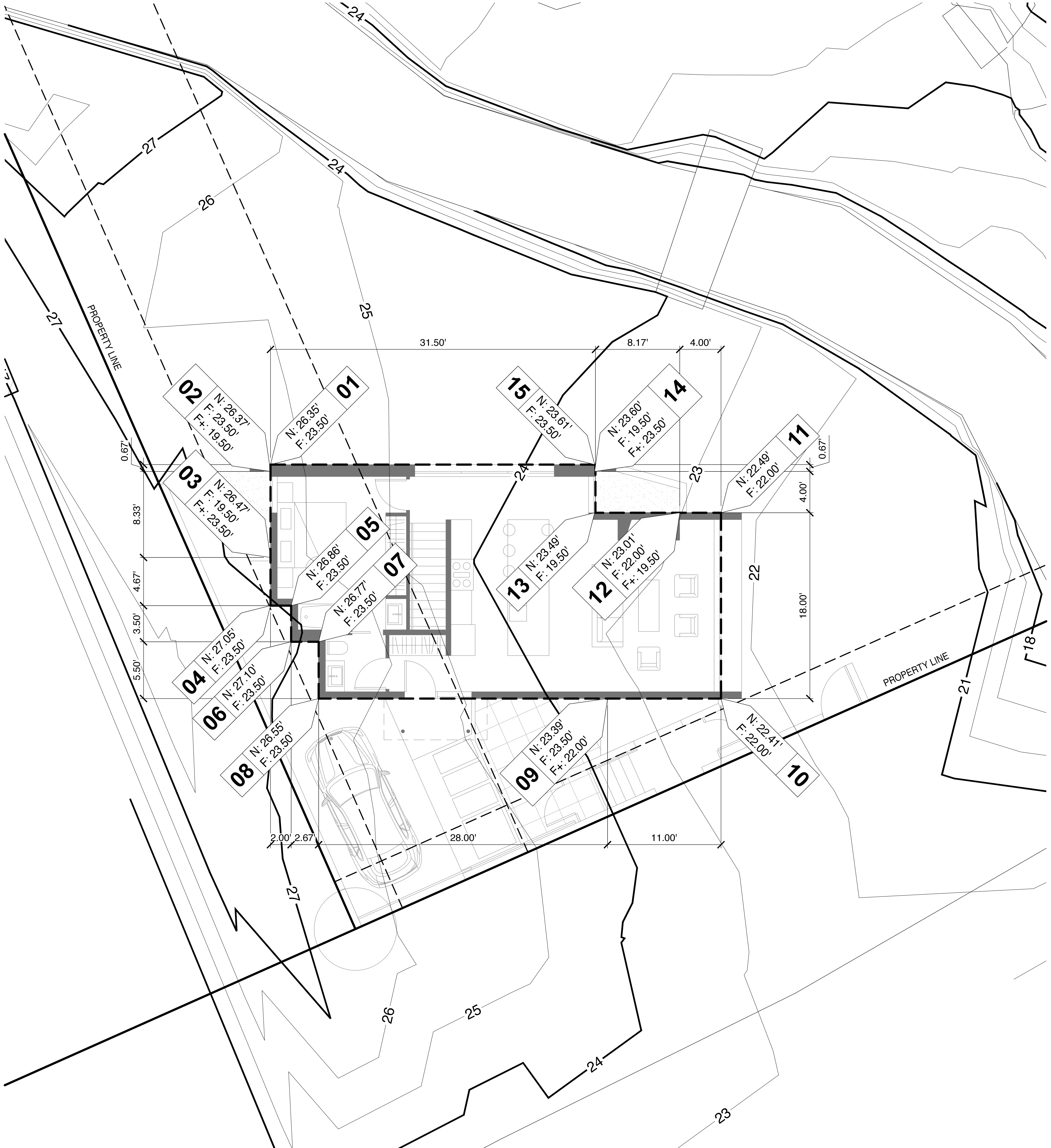
PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 3/16" = 1'-0"
1' 3 6 10

A011

CODE COMPLIANCE: AVERAGE GRADE (PRINCIPAL DWELLING)



AVERAGE NATURAL GRADE

POINT	GRADE	POINT	GRADE	AVERAGE	LENGTH	AVG x LGTH
01	26.35	02	26.37	26.36	0.67	17.57
02	26.37	02+	26.37	26.37	0.00	0.00
02+	26.37	03	26.47	26.42	8.33	220.17
03	26.47	03+	26.47	26.47	0.00	0.00
03+	26.47	04	27.05	26.76	4.67	124.88
04	27.05	05	26.86	26.96	2.00	53.91
05	26.86	06	27.10	26.98	3.50	94.43
06	27.10	07	26.77	26.94	2.67	71.83
07	26.77	08	26.55	26.66	5.50	146.63
08	26.55	09	23.39	24.97	28.00	699.16
09	23.39	09+	23.39	23.39	0.00	0.00
09+	23.39	10	22.41	22.90	11.00	251.90
10	22.41	11	22.49	22.45	18.00	404.10
11	22.49	12	23.01	22.75	4.00	91.00
12	23.01	12+	23.01	23.01	0.00	0.00
12+	23.01	13	23.49	23.25	8.17	189.88
13	23.49	14	23.60	23.55	4.00	94.18
14	23.60	14+	23.60	23.60	0.00	0.00
14+	23.60	15	23.61	23.61	0.67	15.74
15	23.61	01	26.35	24.98	31.50	786.87
					132.67	3262.24
						24.59

AVERAGE FINISHED GRADE

POINT	GRADE	POINT	GRADE	AVERAGE	LENGTH	AVG x LGTH
01	23.50	02	23.50	23.50	0.67	15.67
02	23.50	02+	19.50	21.50	0.00	0.00
02+	19.50	03	19.50	19.50	8.33	162.50
03	19.50	03+	23.50	21.50	0.00	0.00
03+	23.50	04	23.50	23.50	4.67	109.67
04	23.50	05	23.50	23.50	2.00	47.00
05	23.50	06	23.50	23.50	3.50	82.25
06	23.50	07	23.50	23.50	2.67	62.67
07	23.50	08	23.50	23.50	5.50	129.25
08	23.50	09	23.50	23.50	28.00	658.00
09	23.50	09+	22.00	22.75	0.00	0.00
09+	22.00	10	22.00	22.00	11.00	242.00
10	22.00	11	22.00	22.00	18.00	396.00
11	22.00	12	22.00	22.00	4.00	88.00
12	22.00	12+	19.50	20.75	0.00	0.00
12+	19.50	13	19.50	19.50	8.17	159.25
13	19.50	14	19.50	19.50	4.00	78.00
14	19.50	14+	23.50	21.50	0.00	0.00
14+	23.50	15	23.50	23.50	0.67	15.67
15	23.50	01	23.50	23.50	31.50	740.25
					132.67	2986.17
						22.51

DATE	NO.	DESCRIPTION	BY
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V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

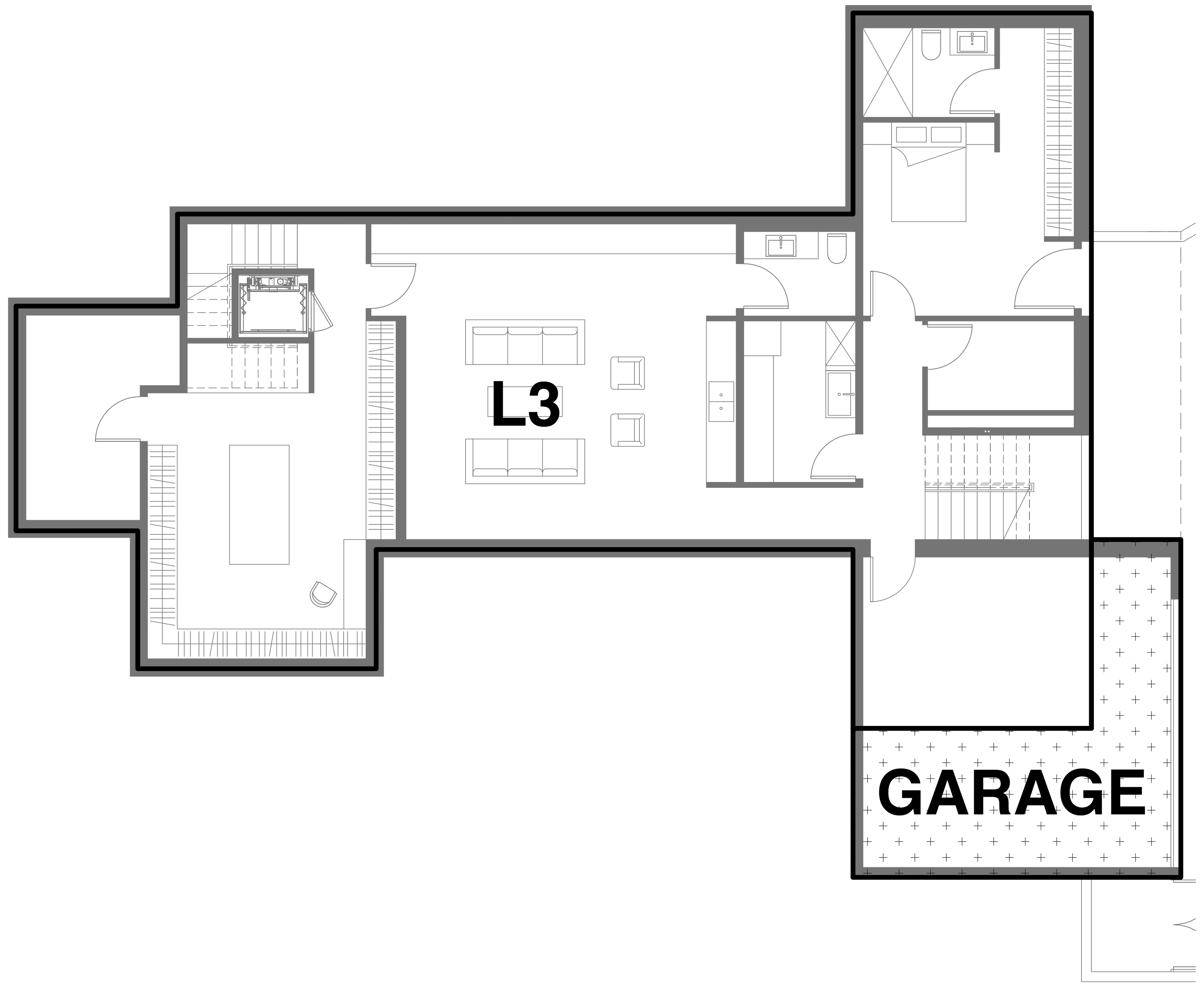
MEN / PEEVER RESIDENCE

2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

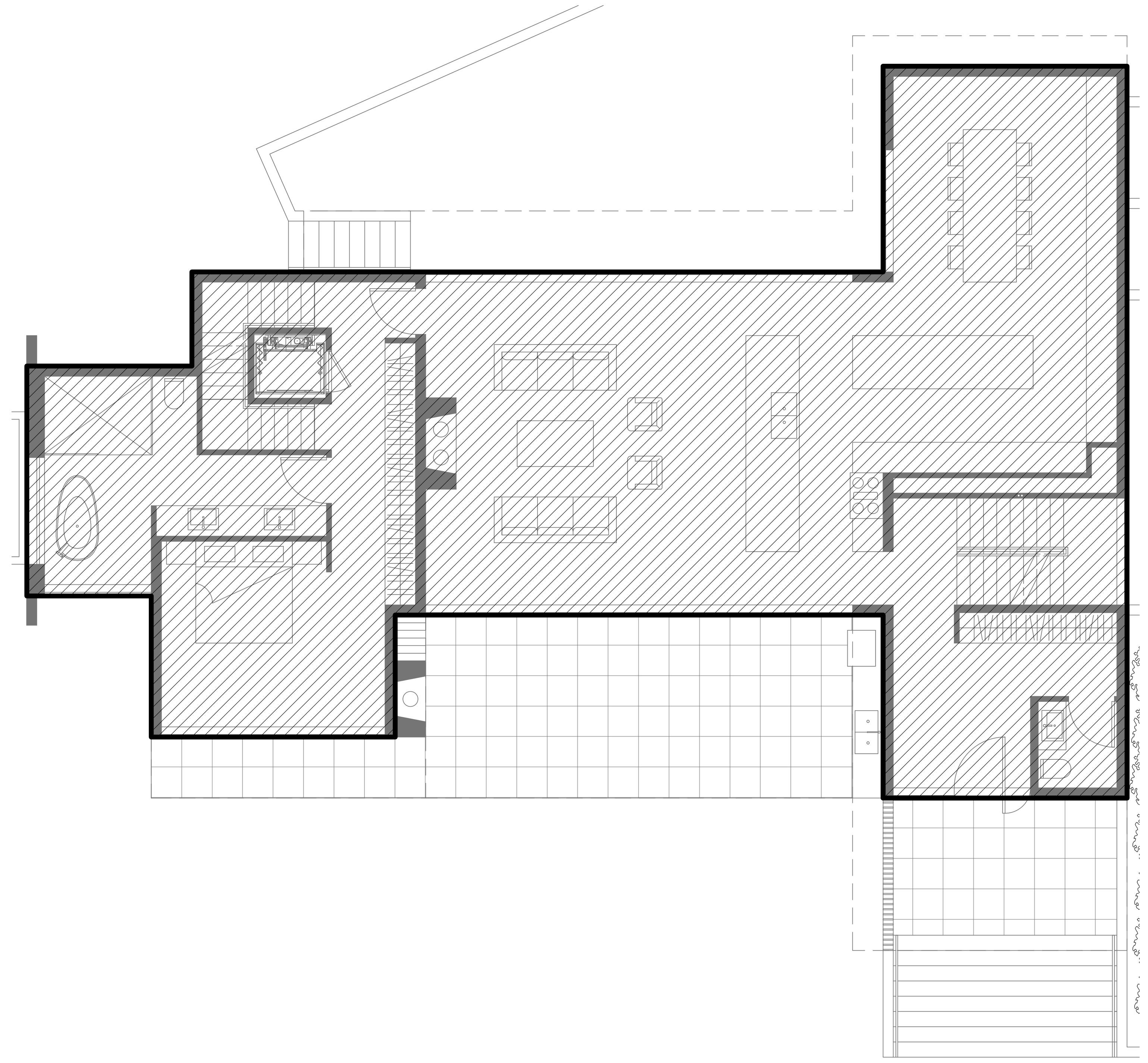
SCALE: 3/16" = 1'-0"

A012

CODE COMPLIANCE: AVERAGE GRADE (COACH HOUSE)

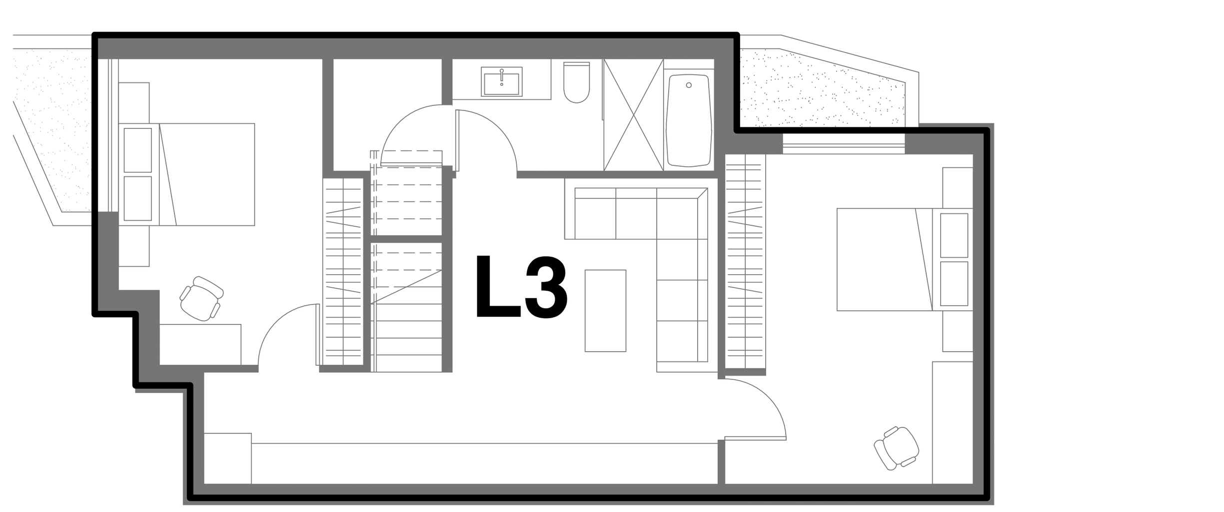


1 PRINCIPAL DWELLING BASEMENT FLOOR

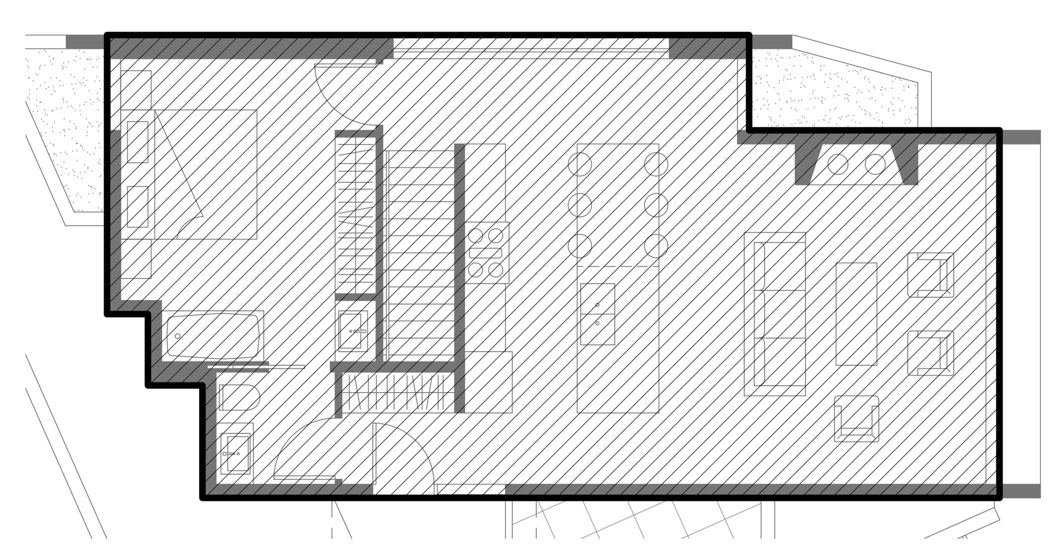


2 PRINCIPAL DWELLING MAIN FLOOR

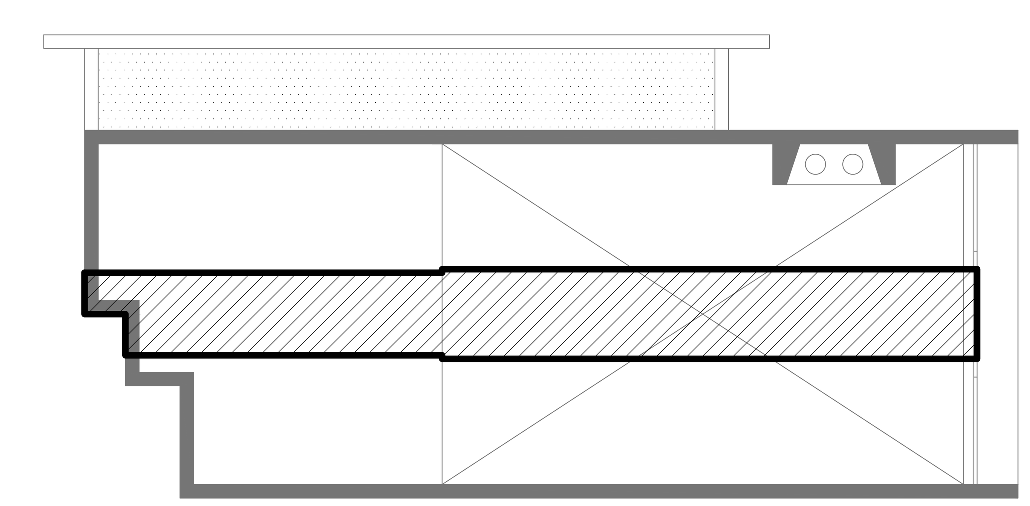
3 PRINCIPAL DWELLING UPPER FLOOR



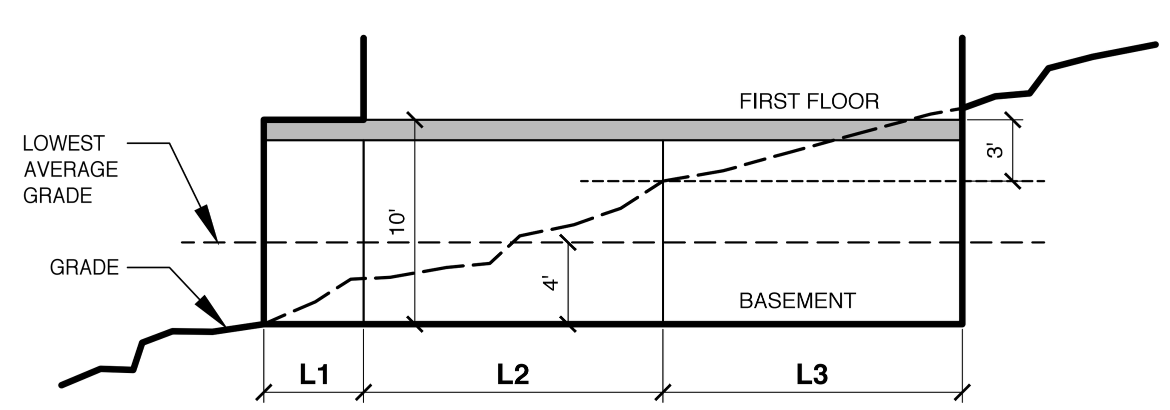
4 COACH HOUSE BASEMENT FLOOR



5 COACH HOUSE MAIN FLOOR



6 COACH HOUSE UPPER FLOOR



ZONING BYLAW No. 4662, 2010

130.08 - Floor Area - Single Family Dwelling Zones and Duplex Dwellings

L1 - Area beyond the perimeter of the storey above, so entirely included in F.A.R.

L2 - Area partially included.

$$\text{Percent Exempt} = \frac{\text{Lowest Average Grade - Basement Floor Elevation}}{\text{Main Floor Elevation - Basement Floor Elevation}} \times 100$$

L3 - Area where main floor elevation is 3' (0.9m) or less above the lower of natural or finished grade, so entirely excluded from F.A.R.

PRINCIPAL DWELLING

	ft²	m²
BASEMENT FLOOR		
GROSS FLOOR AREA	2423.24	225.13
L1 (100% INCLUDED IN F.A.R.)	296.00	27.50
L2 (PERCENTAGE INCLUDED IN F.A.R.)	0.00	0.00
L3 (100% EXEMPT FROM F.A.R.)	2127.24	197.63
GARAGE EXEMPTION (MAX. = 440 ft²)	296.00	27.50
NET FLOOR AREA INCLUDED IN F.A.R.	**0.00**	**0.00**
MAIN FLOOR		
GROSS FLOOR AREA INCLUDED IN F.A.R.	**2082.86**	**193.50**
UPPER FLOOR		
GROSS FLOOR AREA INCLUDED IN F.A.R.	**1457.94**	**135.45**
TOTAL GROSS FLOOR AREA	**3540.80**	**328.95**

COACH HOUSE

	ft²	m²
BASEMENT FLOOR		
GROSS FLOOR AREA	899.94	83.61
L1 (100% INCLUDED IN F.A.R.)	0.00	0.00
L2 (PERCENTAGE INCLUDED IN F.A.R.)	0.00	0.00
L3 (100% EXEMPT FROM F.A.R.)	899.94	83.61
GARAGE EXEMPTION (MAX. = 440 ft²)	0.00	0.00
NET FLOOR AREA INCLUDED IN F.A.R.	**0.00**	**0.00**
MAIN FLOOR		
GROSS FLOOR AREA INCLUDED IN F.A.R.	**899.94**	**83.61**
UPPER FLOOR		
GROSS FLOOR AREA INCLUDED IN F.A.R.	**181.65**	**16.88**
TOTAL GROSS FLOOR AREA	**1081.59**	**100.48**

FLOOR AREA RATIO (F.A.R.)

	ft²	m²	ratio
SITE AREA	16741.90	1555.37	
PROPOSED F.A.R.	**4622.39**	**429.43**	**0.28**
ALLOWABLE F.A.R.	5859.67	544.38	0.35

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

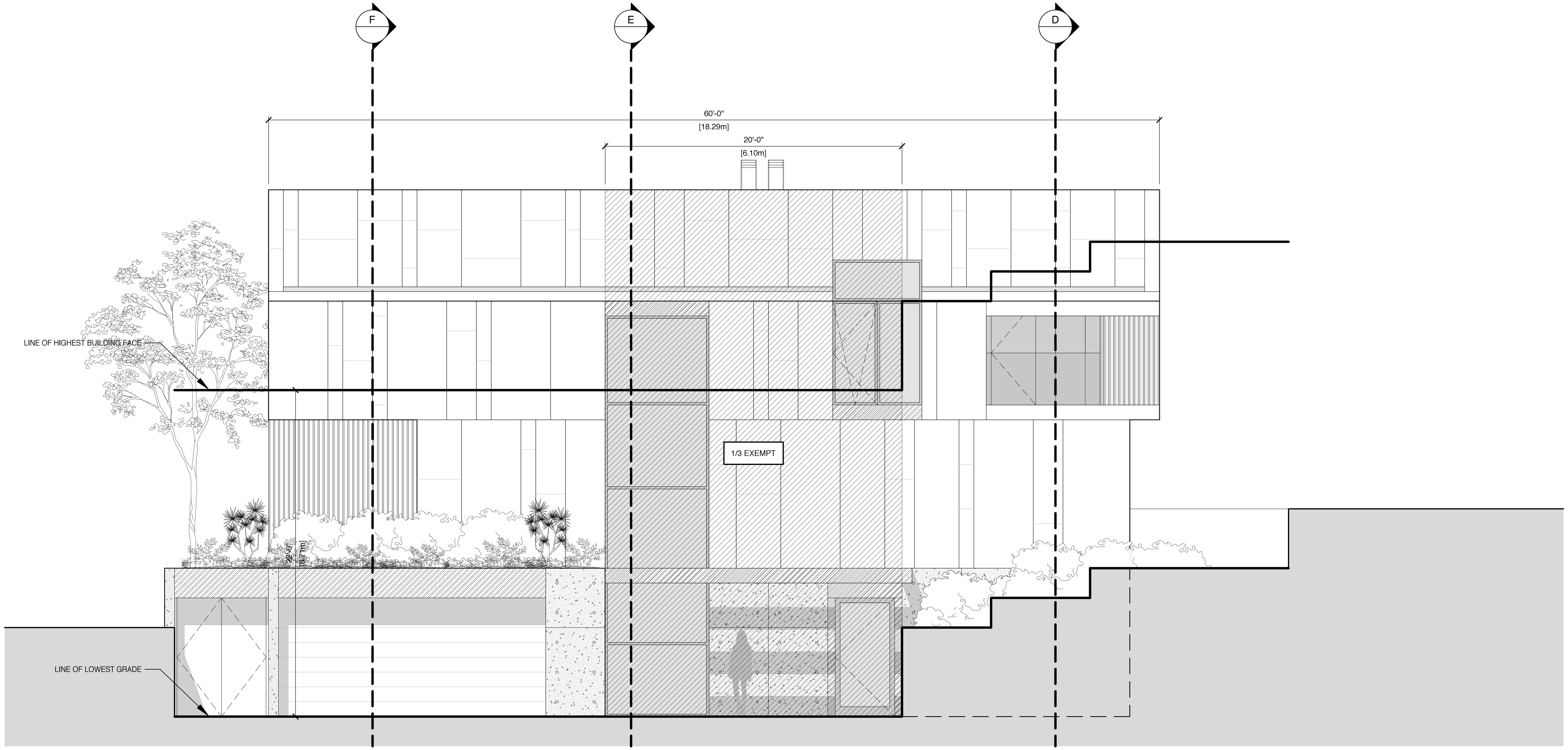
bai
BURGERS ARCHITECTURE INC.
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1
PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/8" = 1'-0"
1' 3 6 10 15

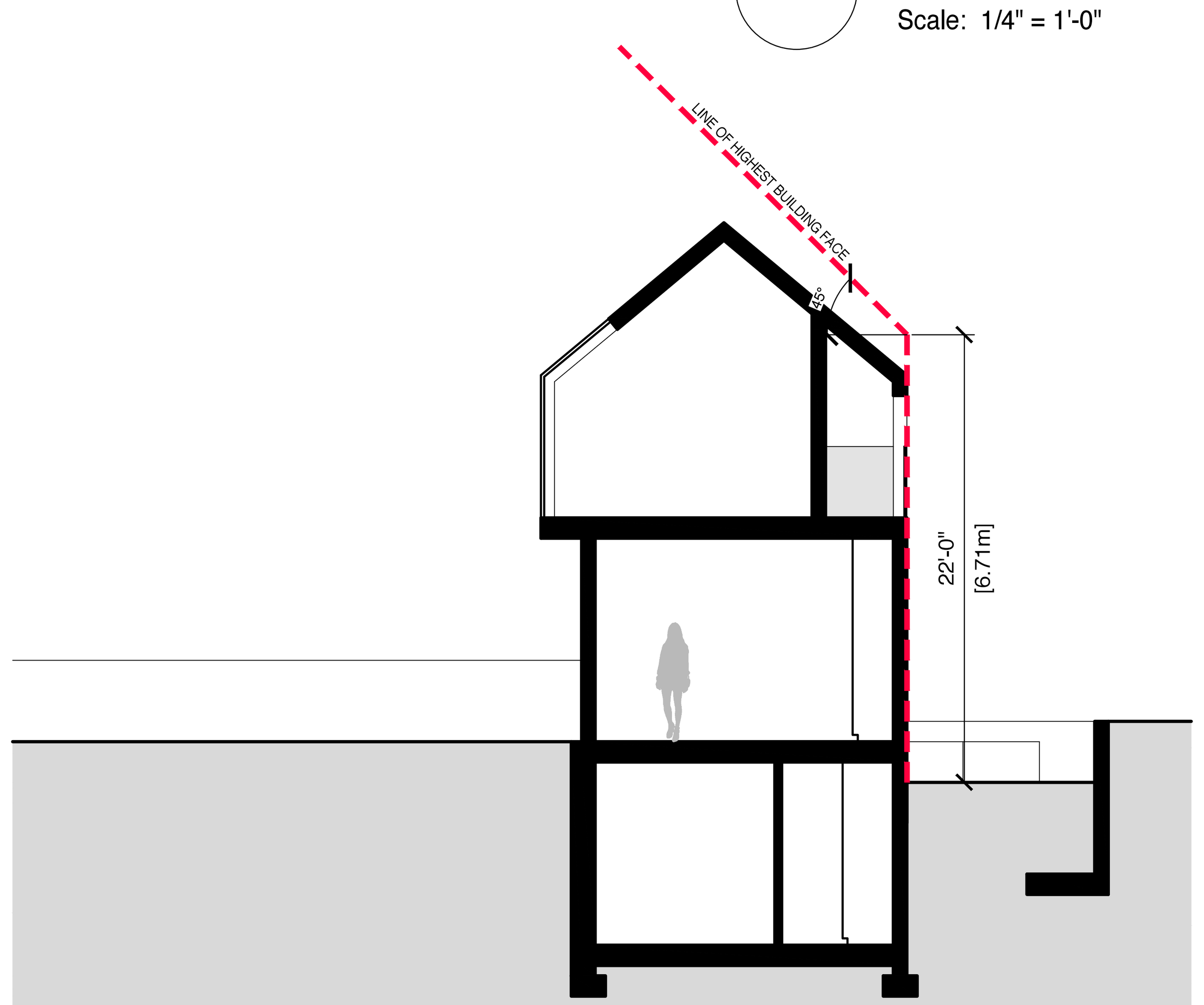
A013

CODE COMPLIANCE:
FLOOR AREA RATIO



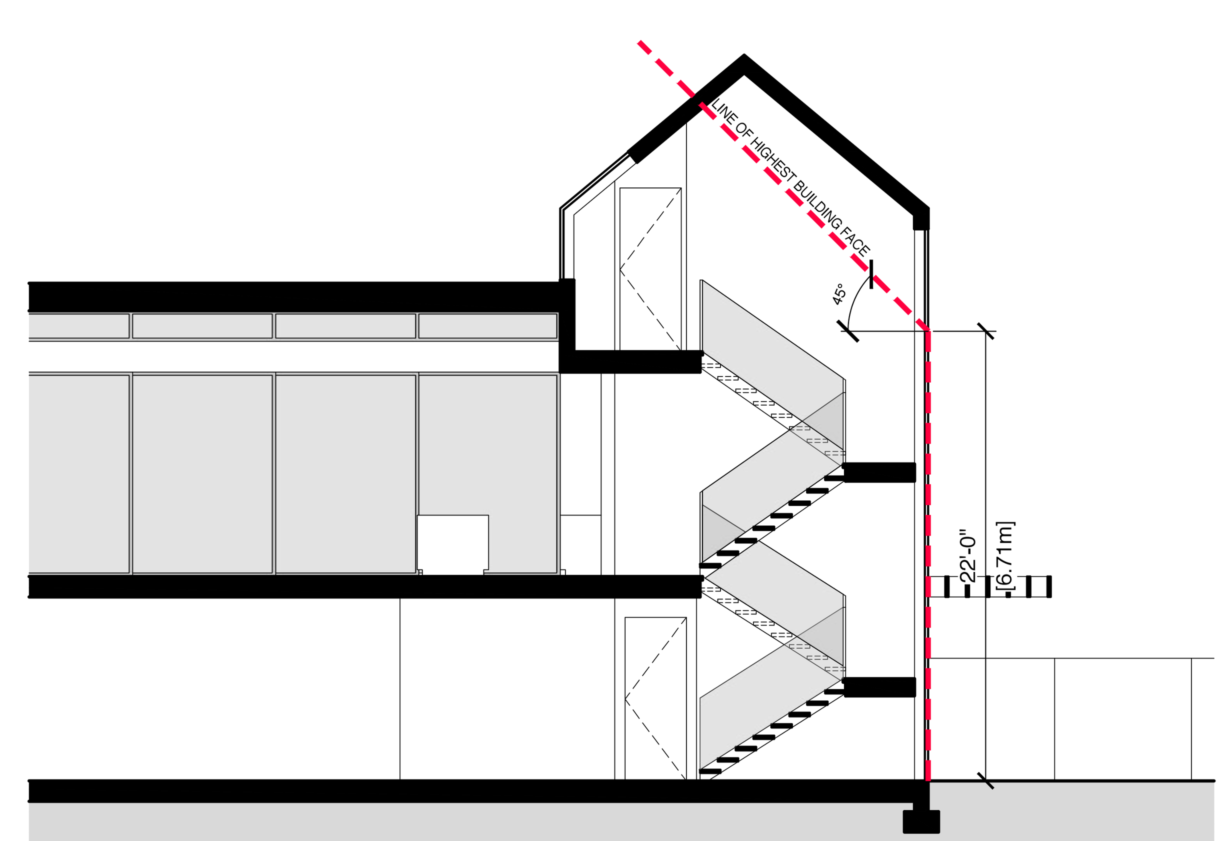
1 **EAST ELEVATION**

Scale: 1/4" = 1'-0"



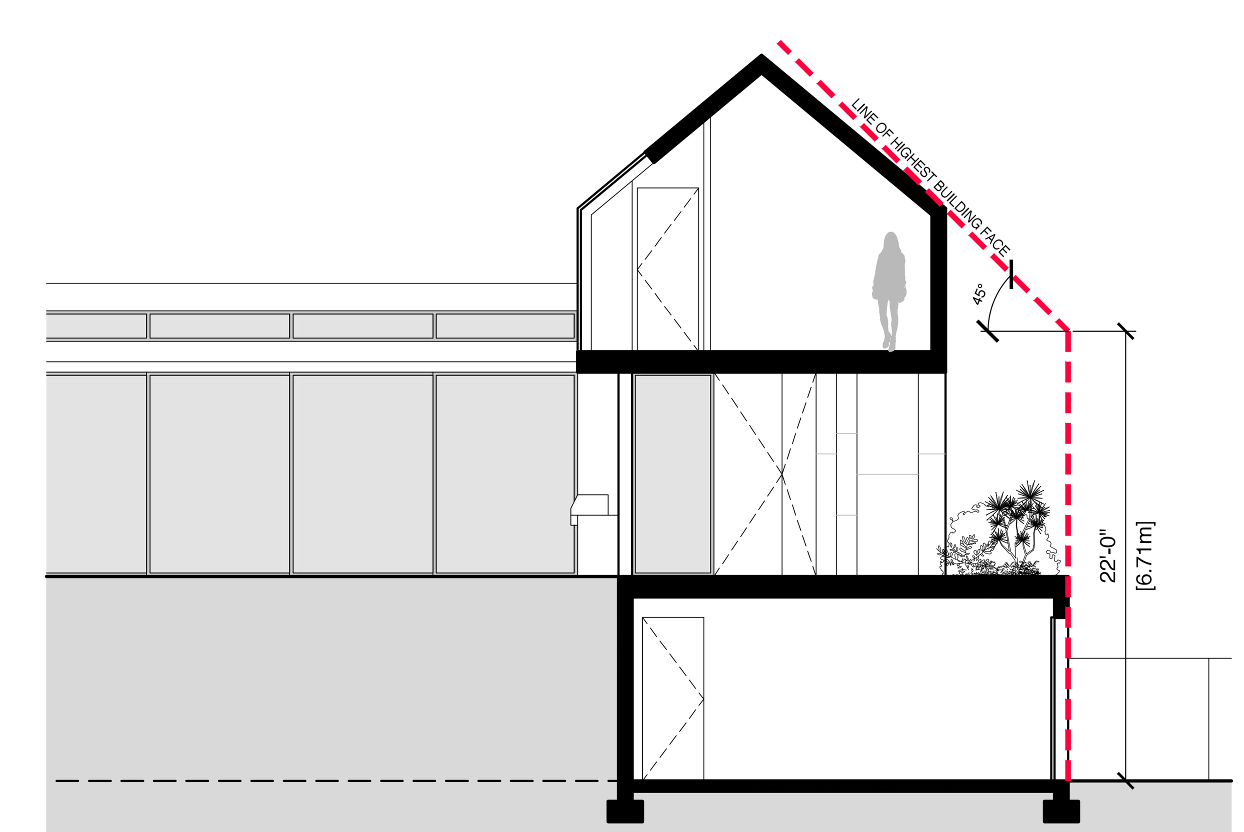
D **BUILDING SECTION - CONFORMING**

Scale: 1/8" = 1'-0"



E **BUILDING SECTION - NON-CONFORMING**

Scale: 1/8" = 1'-0"



F **BUILDING SECTION - CONFORMING**

Scale: 1/8" = 1'-0"

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE

2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A014

CODE COMPLIANCE:
HIGHEST BUILDING FACE
(PRINCIPAL DWELLING)

2018.12.21 ISSUED FOR DEVELOPMENT PERMIT RB

DATE NO. DESCRIPTION BY

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2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE

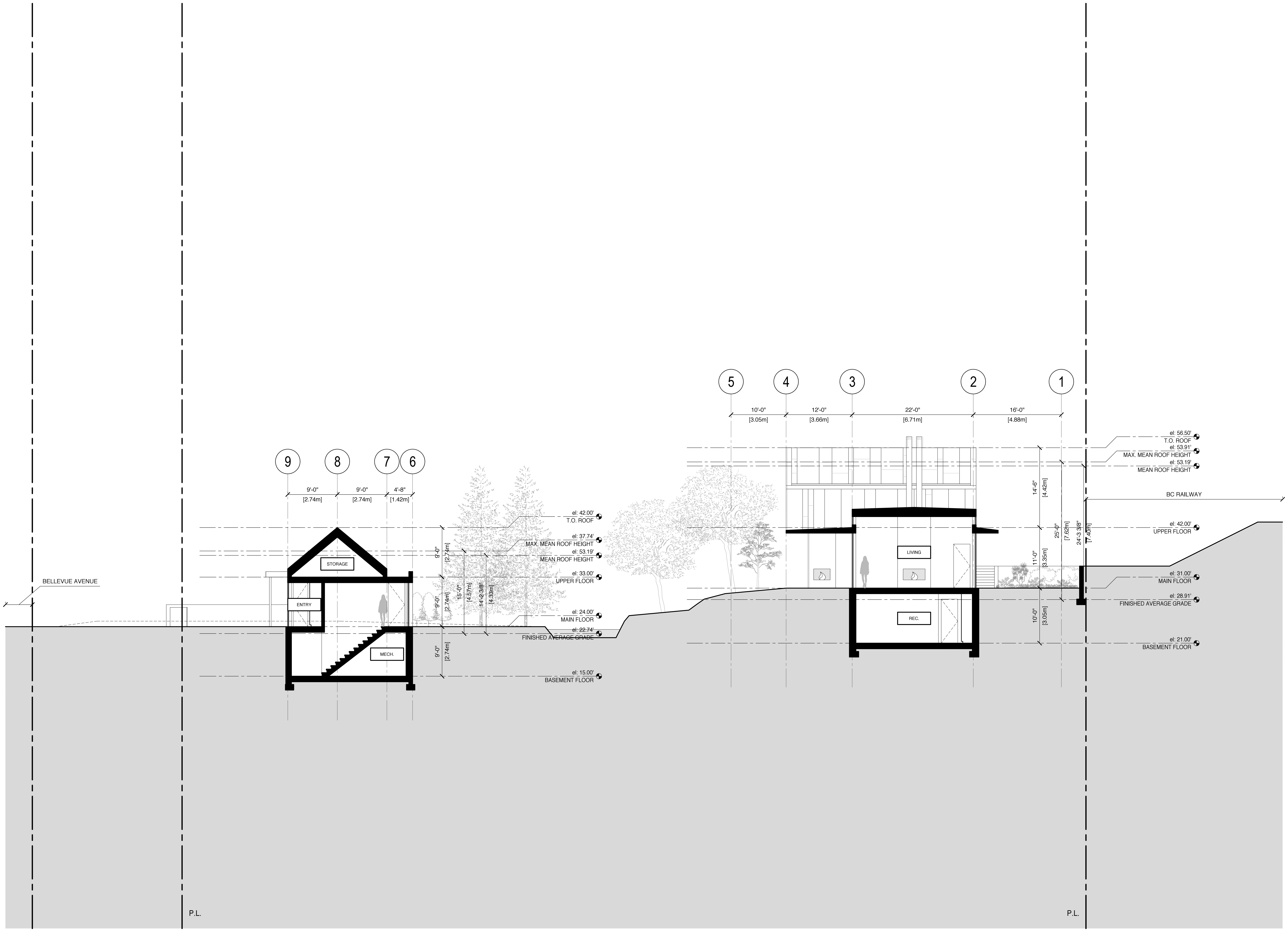
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/8" = 1'-0"

1' 3 6 10 15

A101

SITE PLAN



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2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
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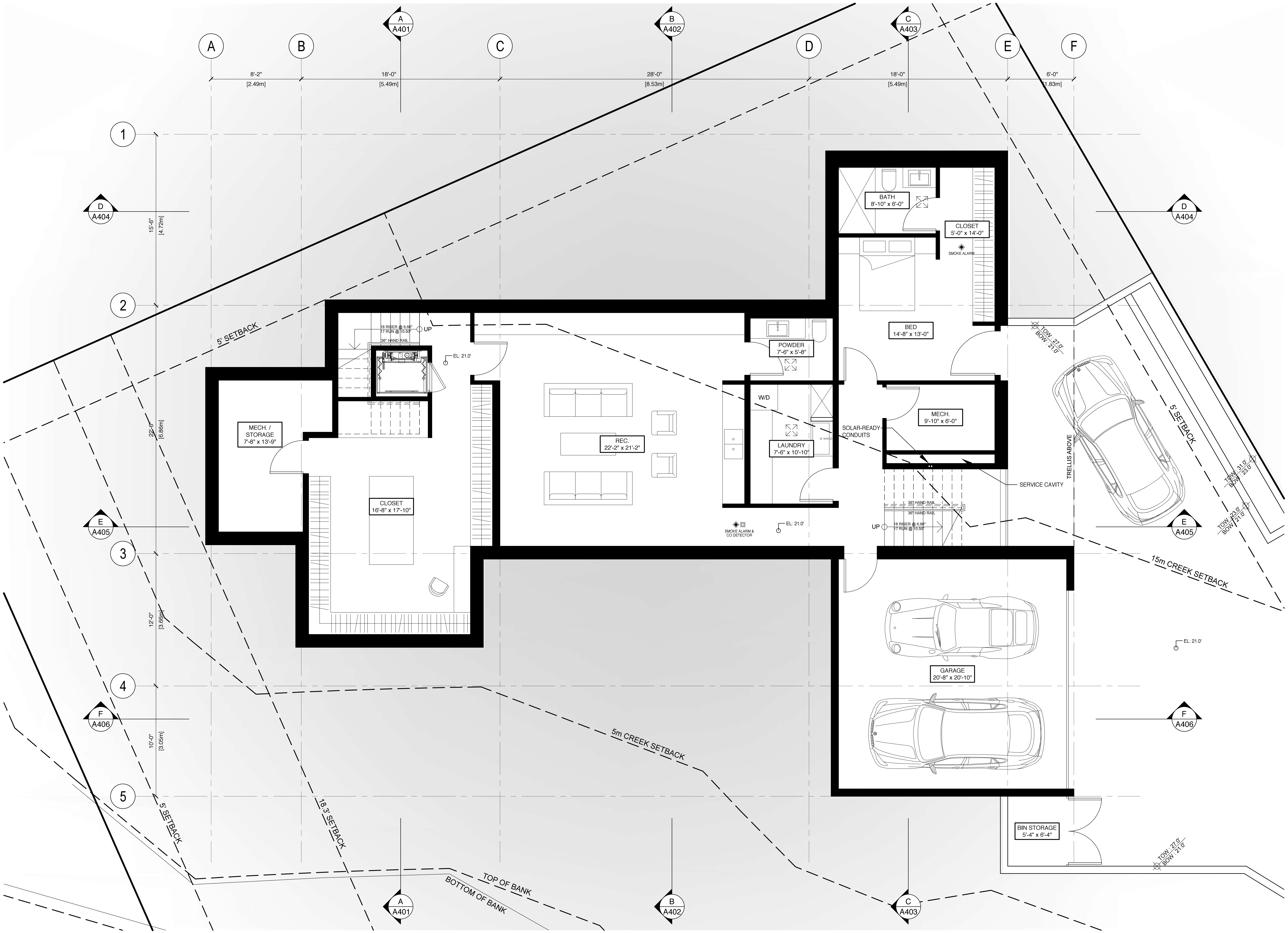
MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/8" = 1'-0"
1' 3 6 10 15

A102
SITE SECTION



GROSS FLOOR AREA

	ft²	m²
BASEMENT (w/ GARAGE)	2379	221
MAIN	2083	194
UPPER	1458	135
TOTAL	5920	550

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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MEN / PEEVER RESIDENCE
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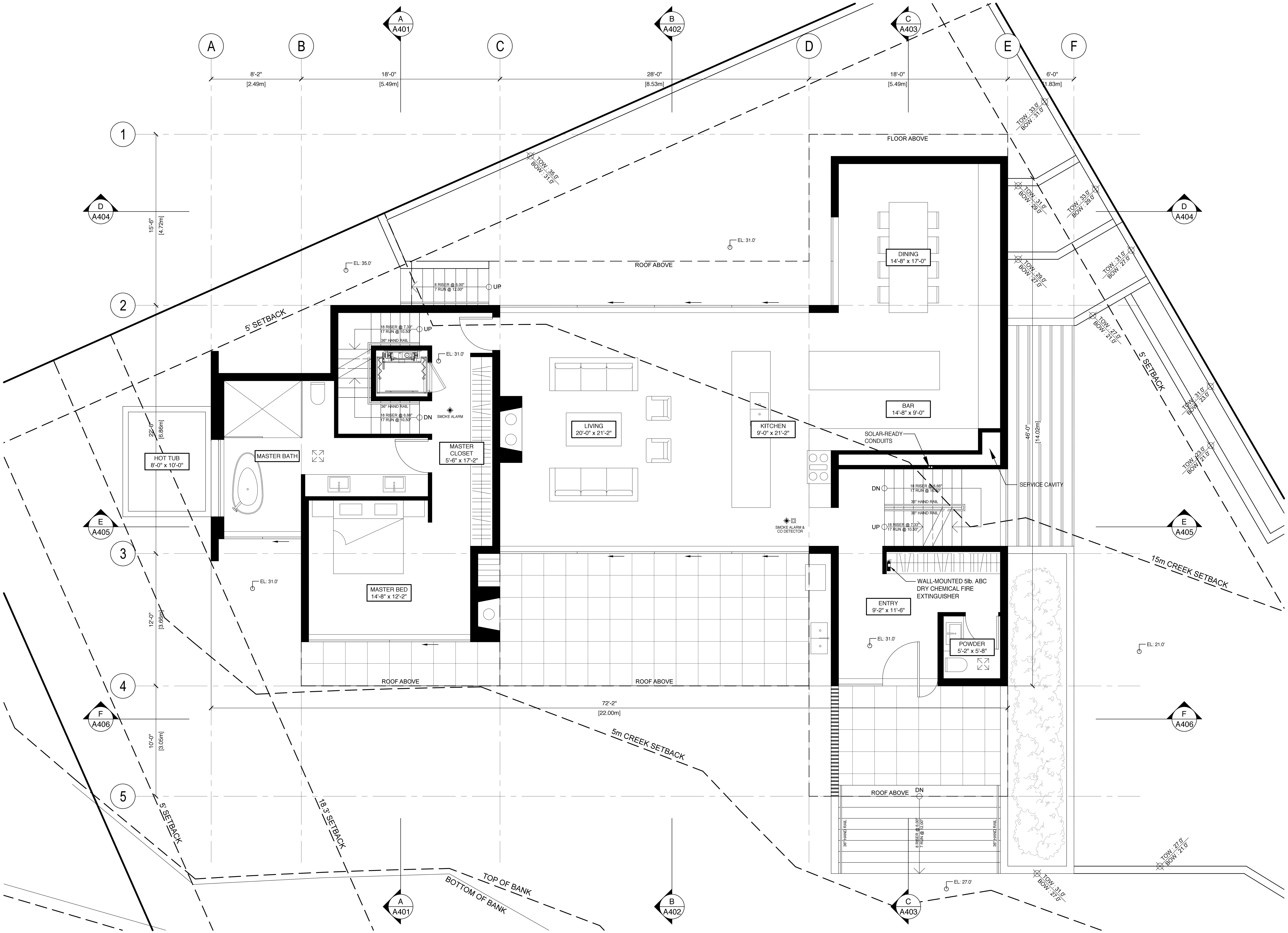
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A210
BASEMENT PLAN
(PRINCIPAL DWELLING)



GROSS FLOOR AREA

	ft²	m²
BASEMENT (w/ GARAGE)	2379	221
MAIN	2083	194
UPPER	1458	135
TOTAL	5920	550

DATE	NO.	DESCRIPTION	BY
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FAX 604 926 9141
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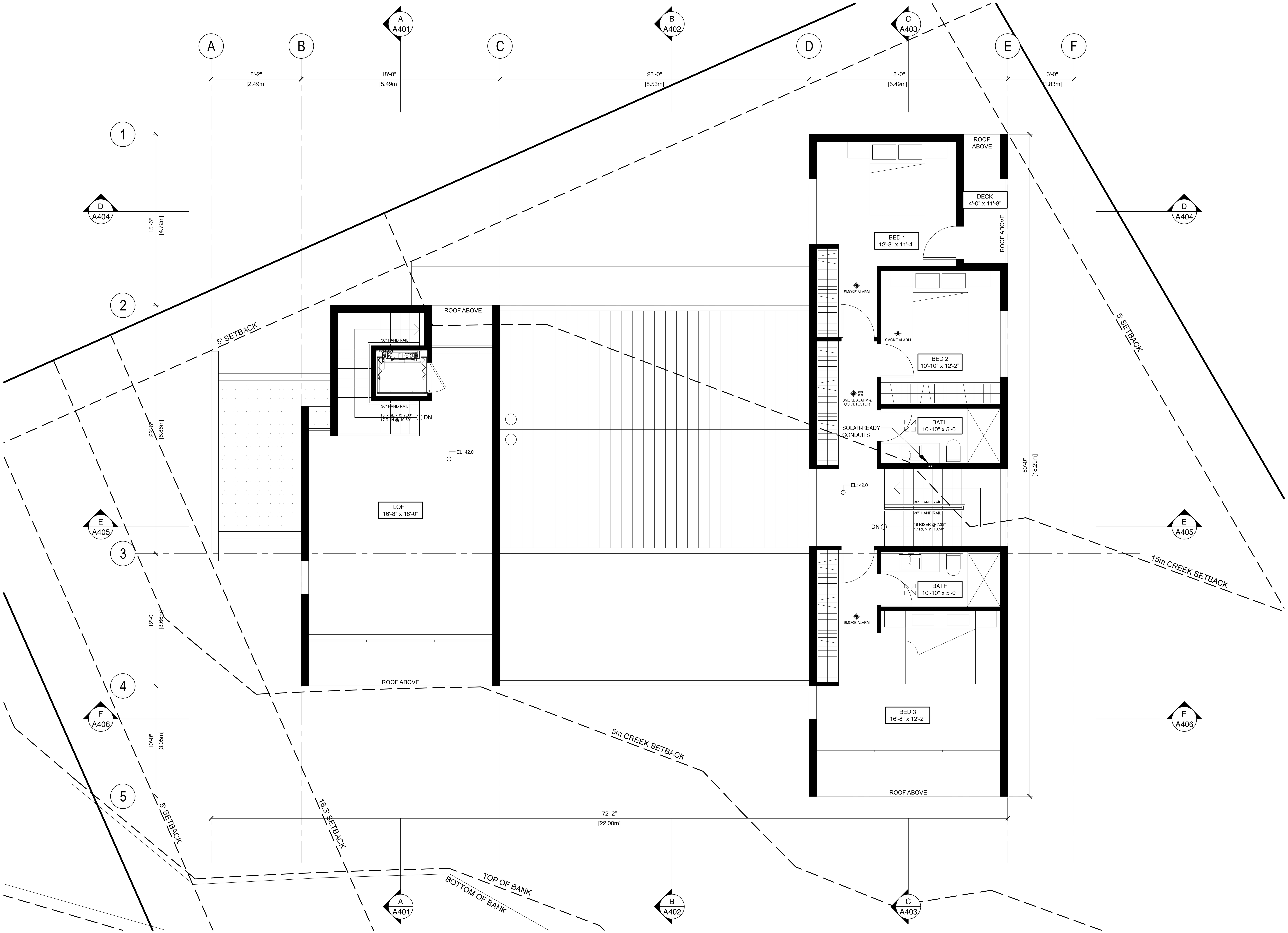
MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"

A220

MAIN PLAN
(PRINCIPAL DWELLING)



GROSS FLOOR AREA

	ft²	m²
BASEMENT (w/ GARAGE)	2379	221
MAIN	2083	194
UPPER	1458	135
TOTAL	5920	550

DATE	NO.	DESCRIPTION	BY
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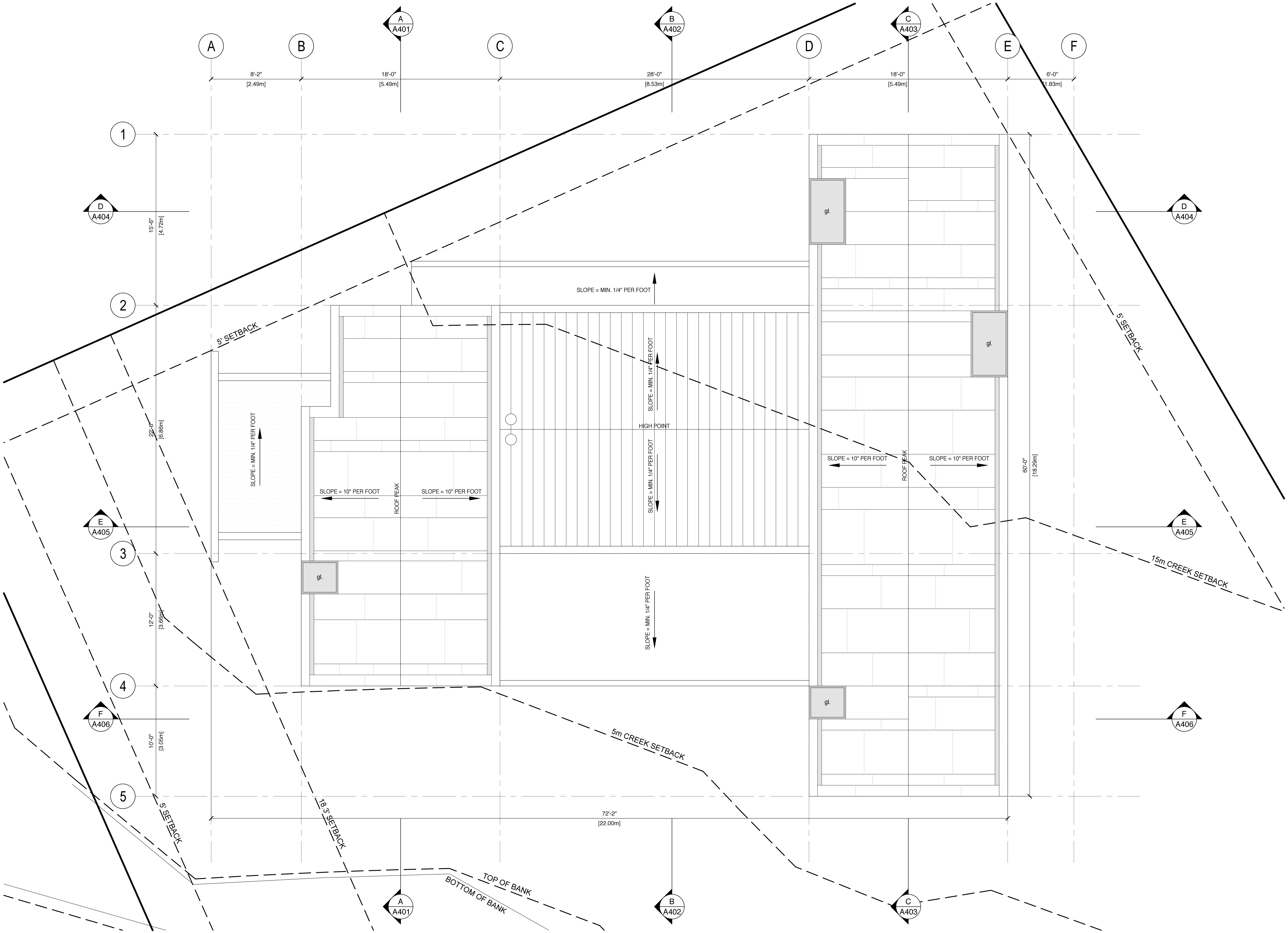
MEN / PEEVER RESIDENCE

2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"

A230

UPPER PLAN
(PRINCIPAL DWELLING)



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2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
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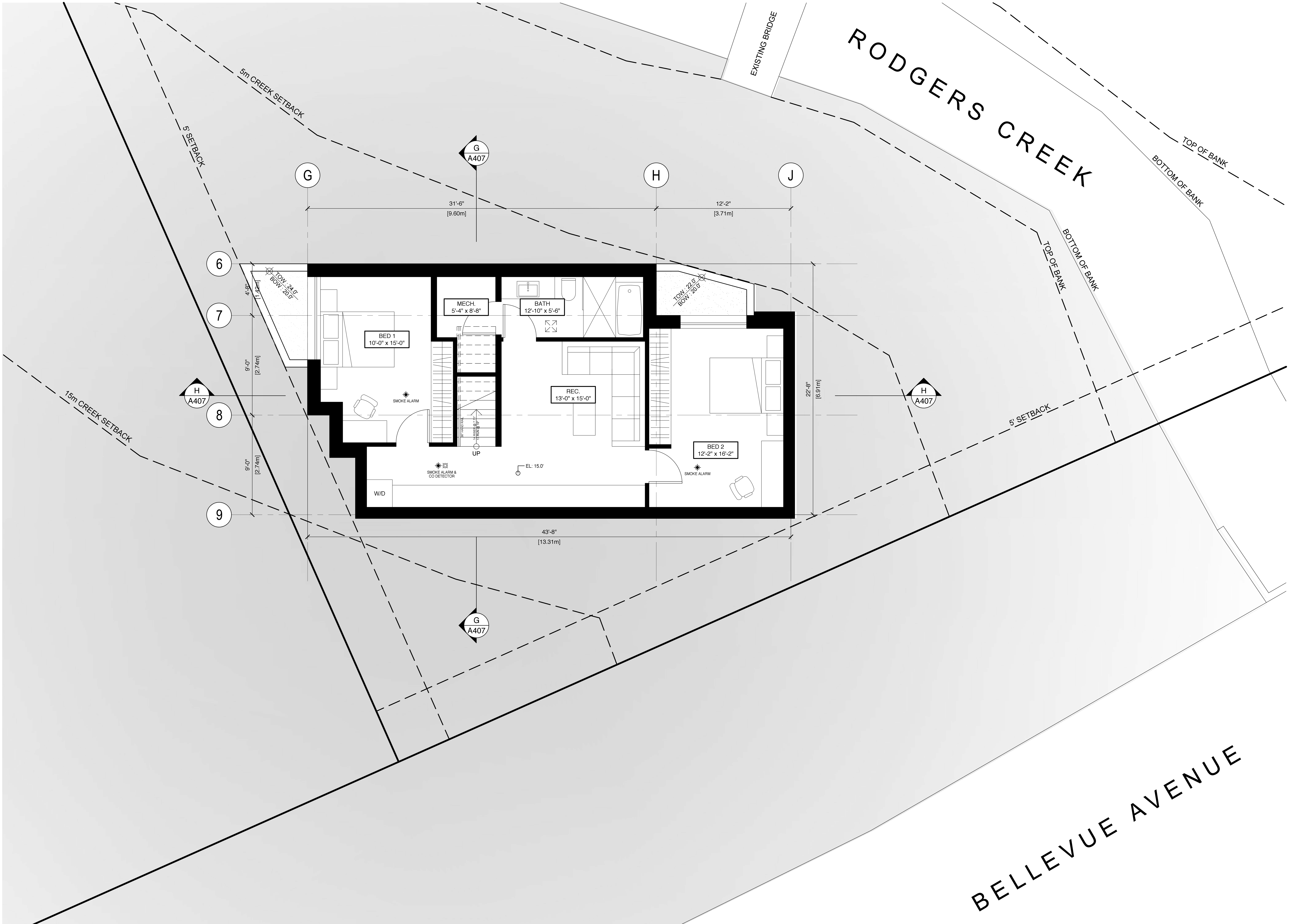
MEN / PEEVER RESIDENCE

2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A240

ROOF PLAN
(PRINCIPAL DWELLING)



GROSS FLOOR AREA

	ft²	m²
BASEMENT	900	84
MAIN	900	84
TOTAL	1800	167

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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BURGERS ARCHITECTURE INC.
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V7V 1Y1

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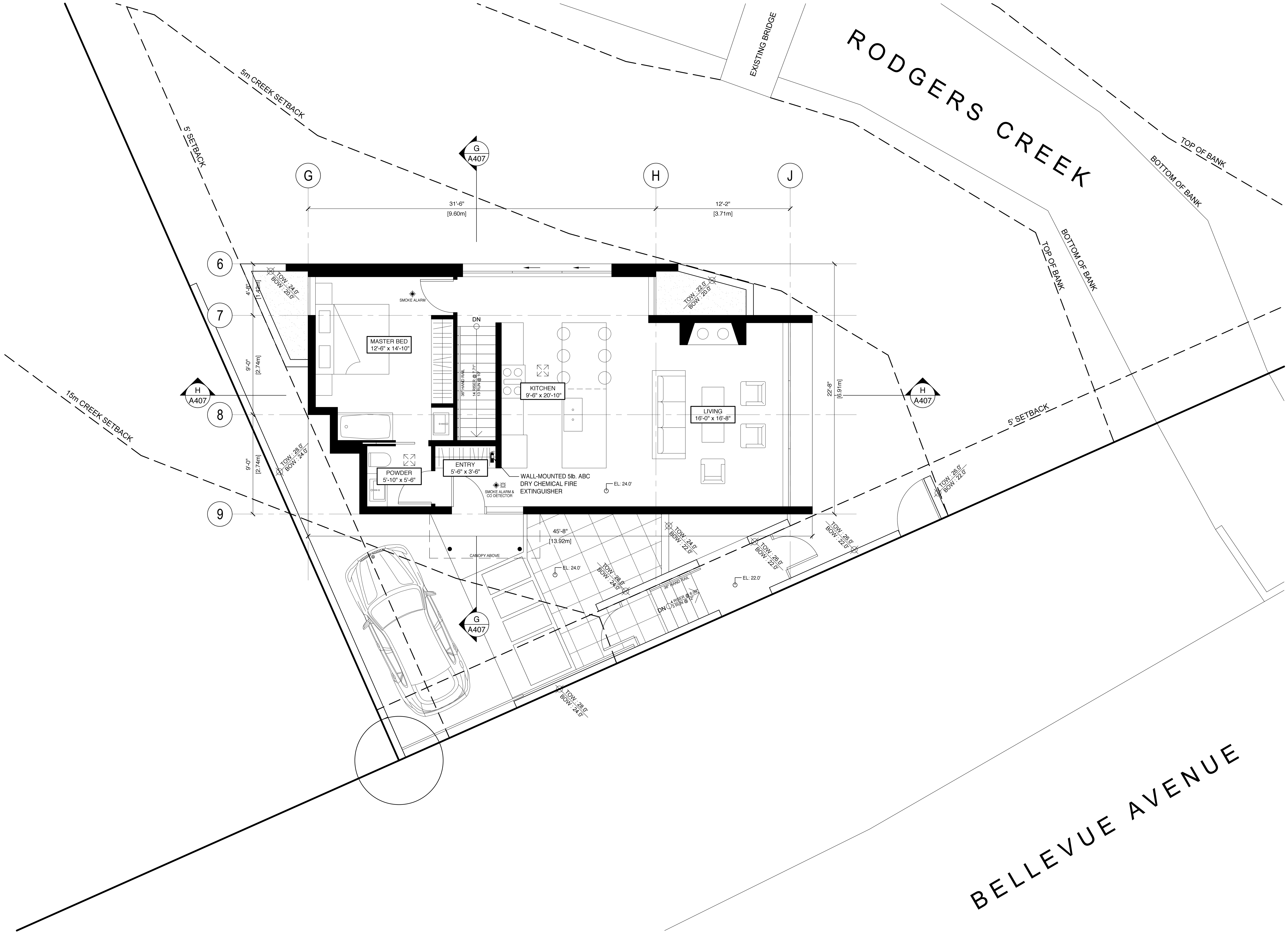
MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A250
BASEMENT PLAN
(COACH HOUSE)



GROSS FLOOR AREA

	ft²	m²
BASEMENT	900	84
MAIN	900	84
TOTAL	1800	167

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
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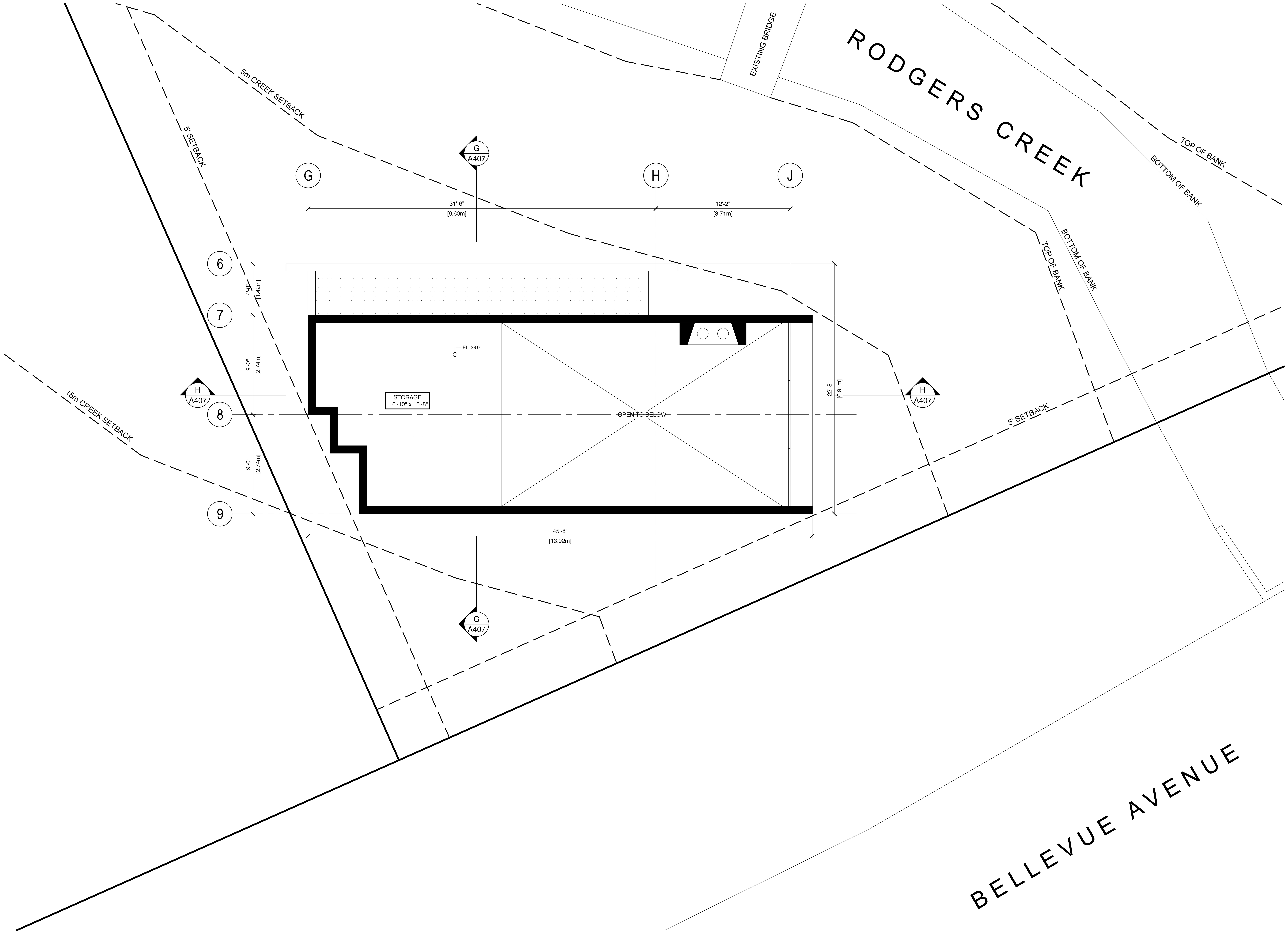
MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"

A260

MAIN PLAN
(COACH HOUSE)



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V7V 1Y1

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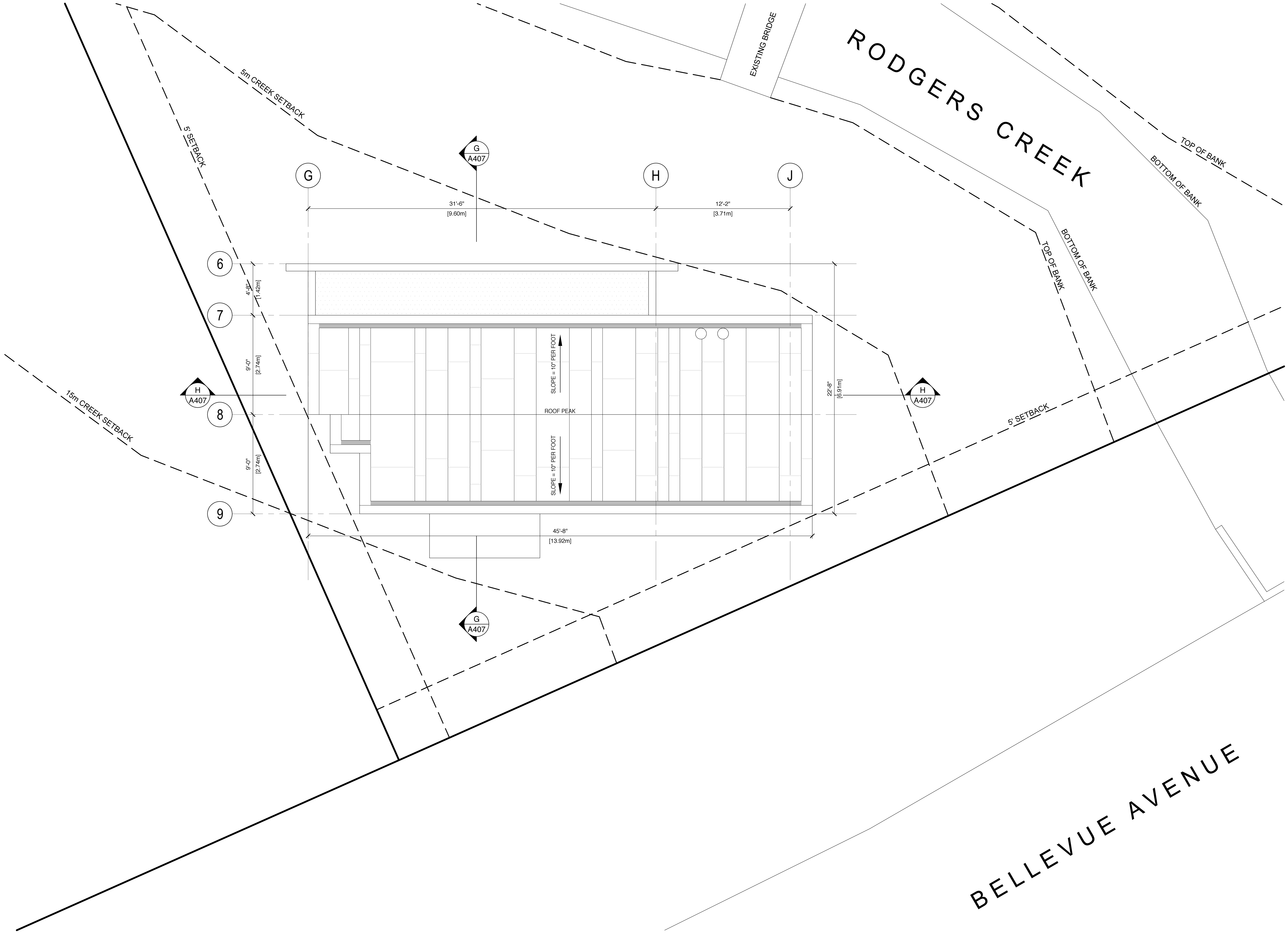
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A270

UPPER PLAN
(COACH HOUSE)



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2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

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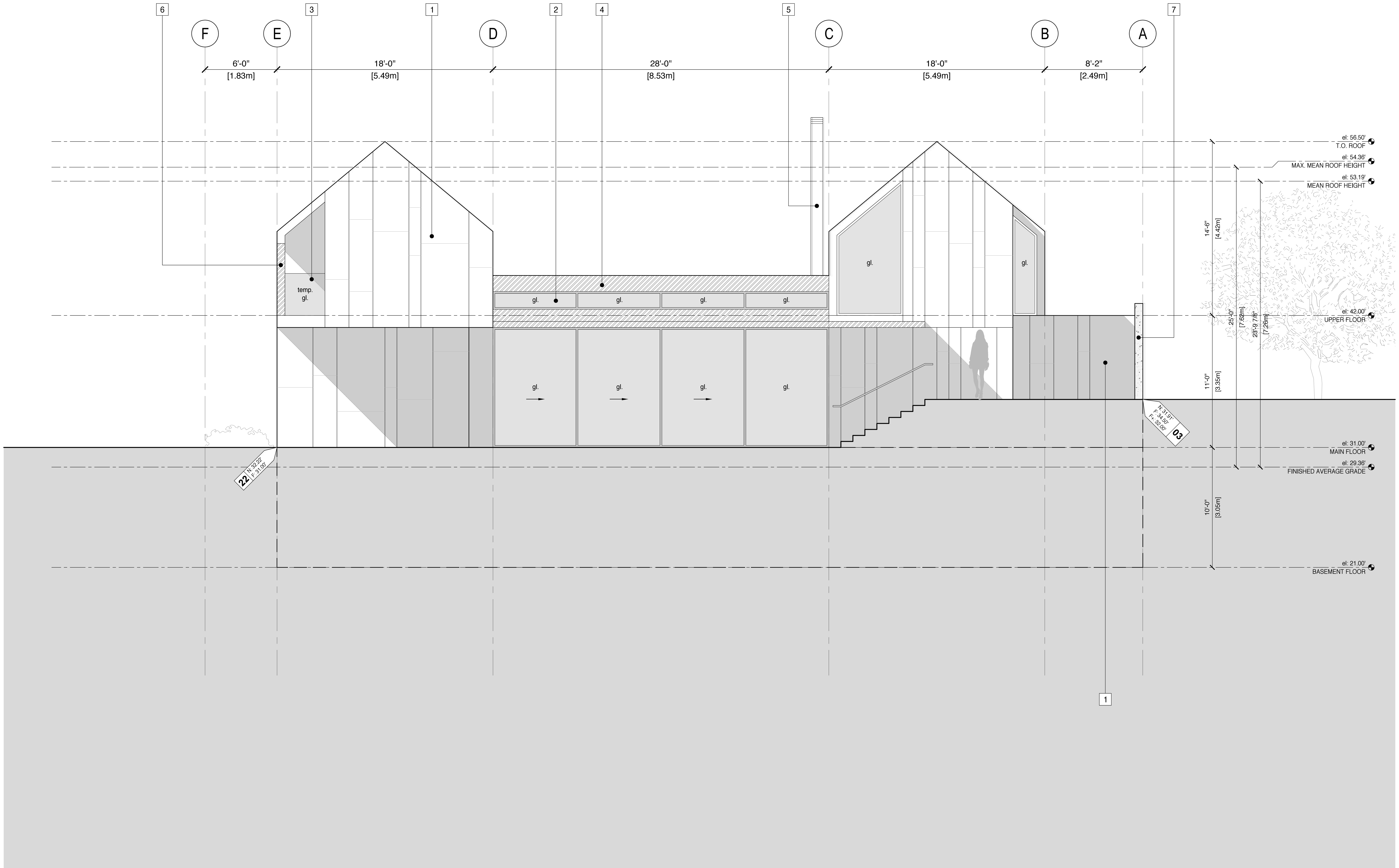
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A280

ROOF PLAN
(COACH HOUSE)



MATERIALS

1. SWISS PEARL CLADDING
2. GLAZING
3. STRUCTURAL GLASS GUARD RAIL
4. METAL FLASHING
5. METAL CHIMNEY
6. ALUMINUM FIN
7. CONCRETE

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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WEST VANCOUVER, BC
V7V 1Y1

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MEN / PEEVER RESIDENCE

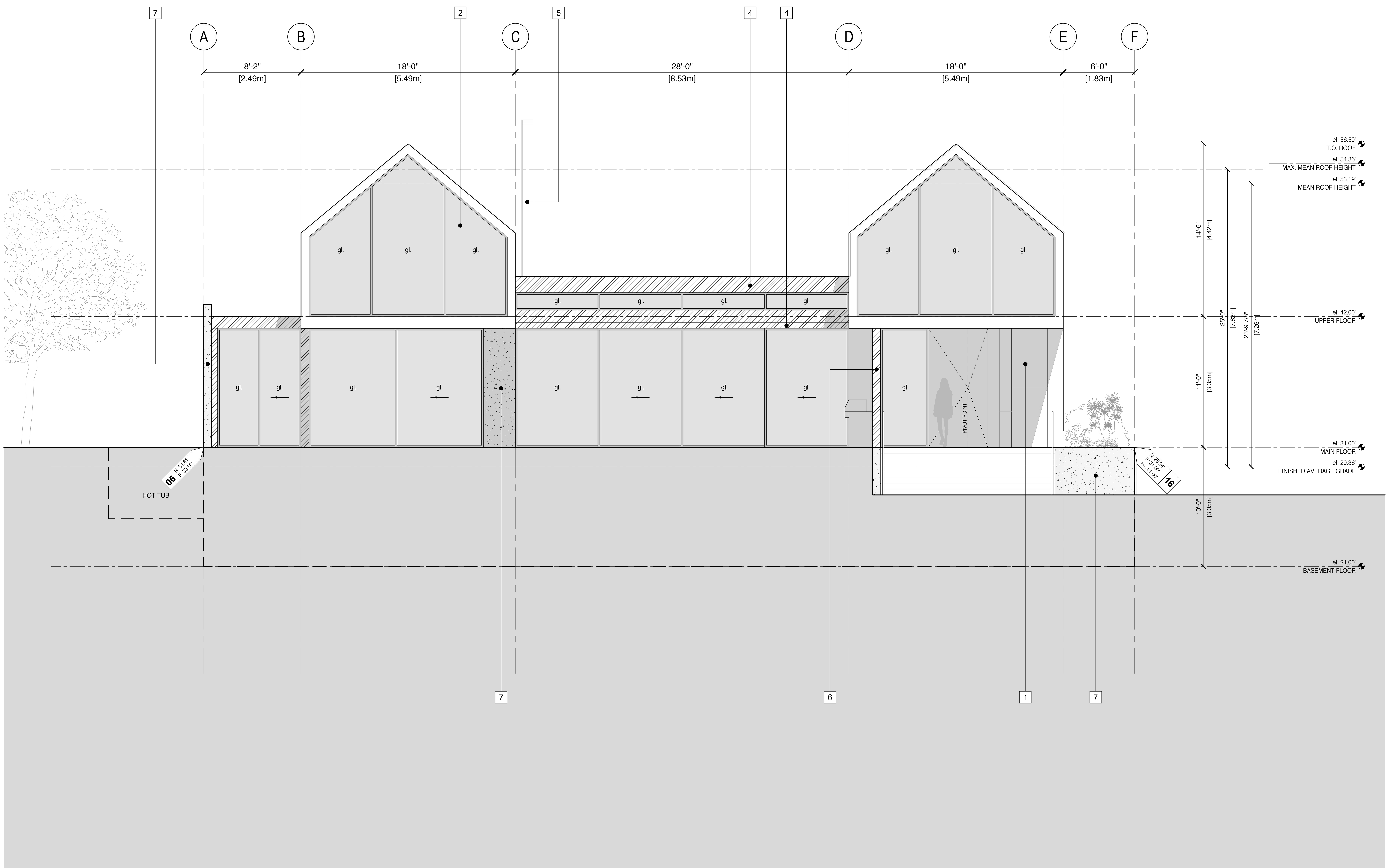
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"

1' 3 6 10

A301

NORTH ELEVATION
(PRINCIPAL DWELLING)



MATERIALS

1. SWISS PEARL CLADDING
2. GLAZING
3. STRUCTURAL GLASS GUARD RAIL
4. METAL FLASHING
5. METAL CHIMNEY
6. ALUMINUM FIN
7. CONCRETE

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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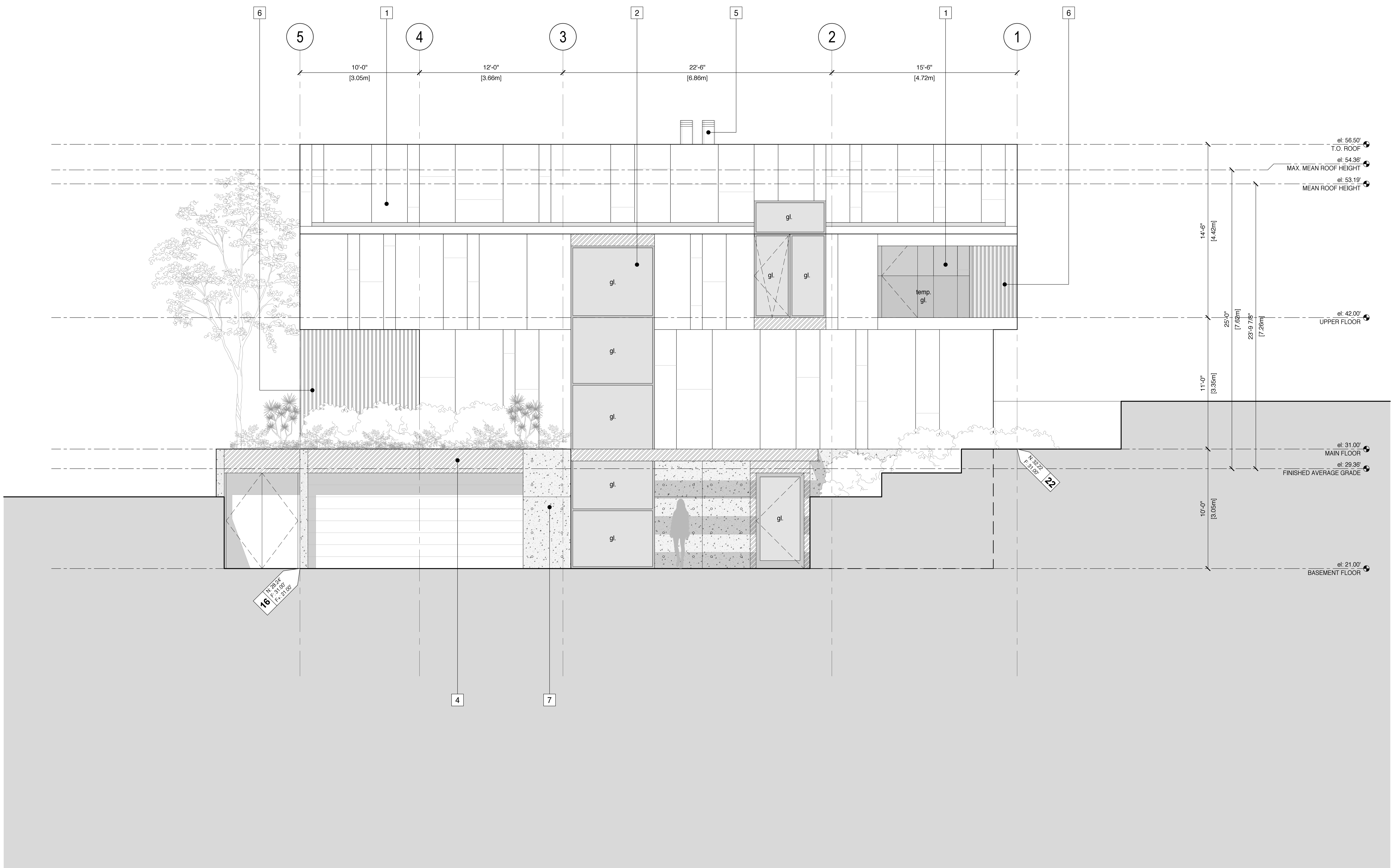
ARCHITECTURE INC.
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A302
SOUTH ELEVATION
(PRINCIPAL DWELLING)



MATERIALS

1. SWISS PEARL CLADDING
2. GLAZING
3. STRUCTURAL GLASS GUARD RAIL
4. METAL FLASHING
5. METAL CHIMNEY
6. ALUMINUM FIN
7. CONCRETE

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

bai
BURGERS ARCHITECTURE INC.
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

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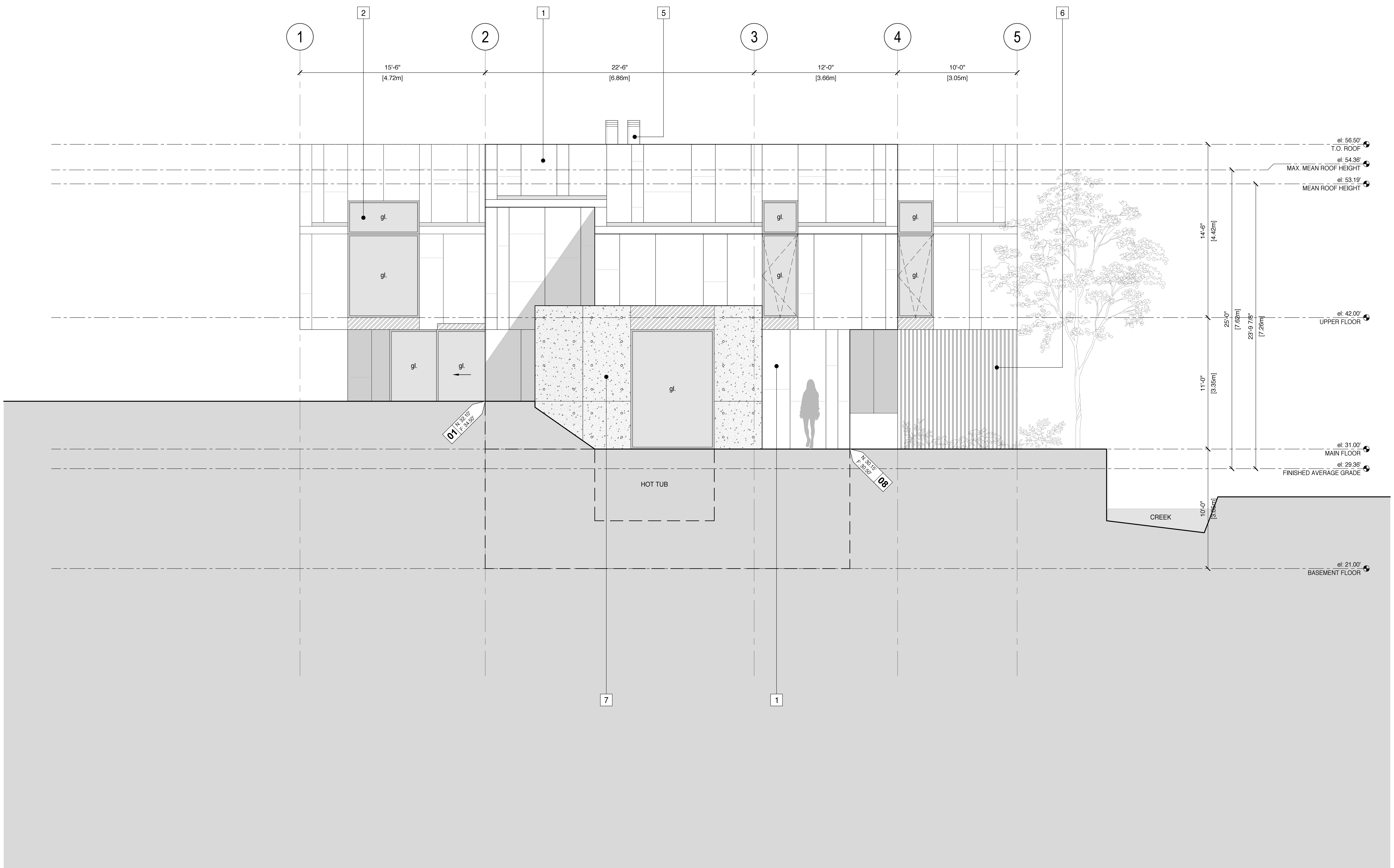
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A303
EAST ELEVATION
(PRINCIPAL DWELLING)



MATERIALS

1. SWISS PEARL CLADDING
2. GLAZING
3. STRUCTURAL GLASS GUARD RAIL
4. METAL FLASHING
5. METAL CHIMNEY
6. ALUMINUM FIN
7. CONCRETE

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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V7V 1Y1

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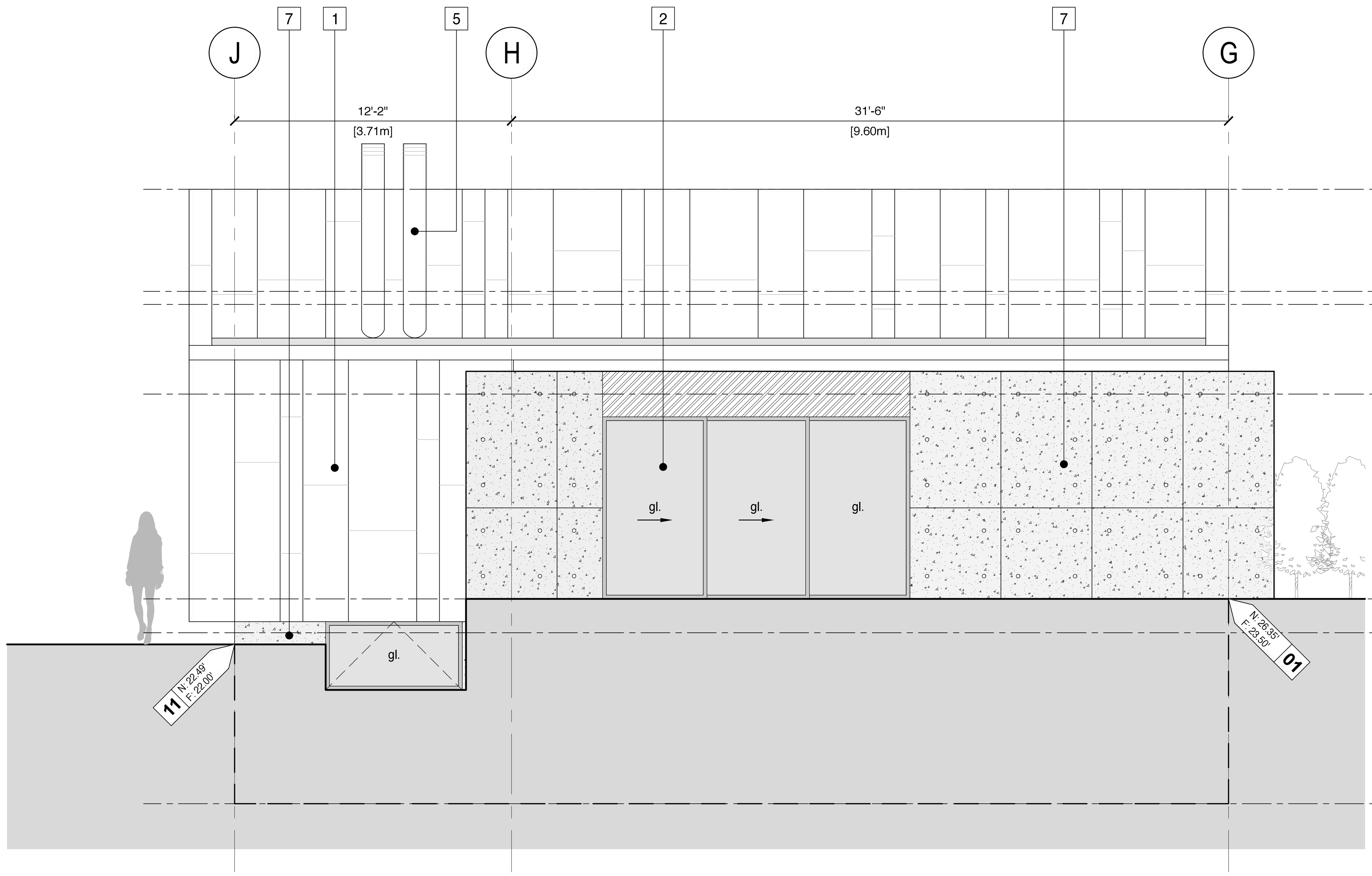
MEN / PEEVER RESIDENCE

2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

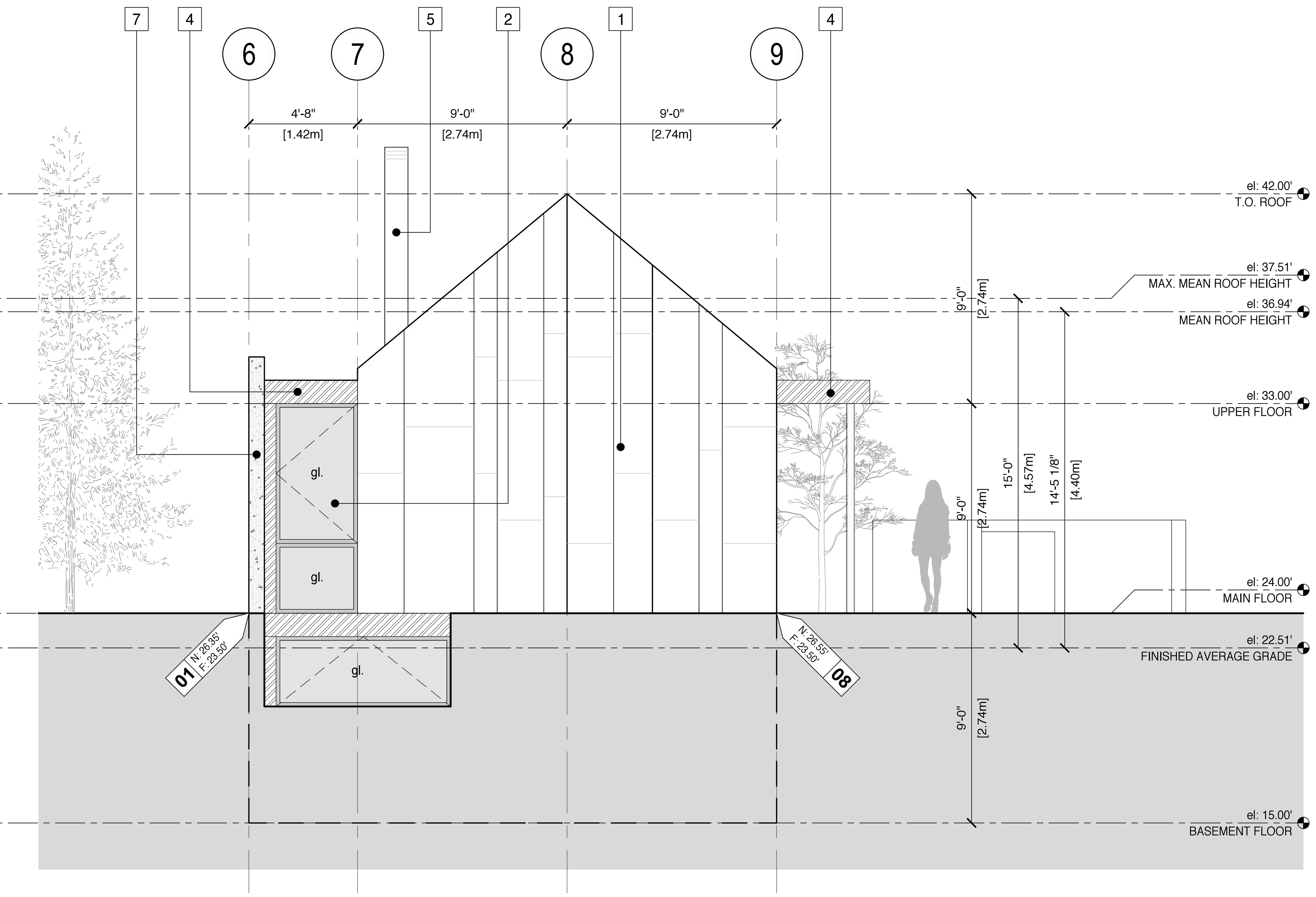
SCALE: 1/4" = 1'-0"
1' 3 6 10

A304

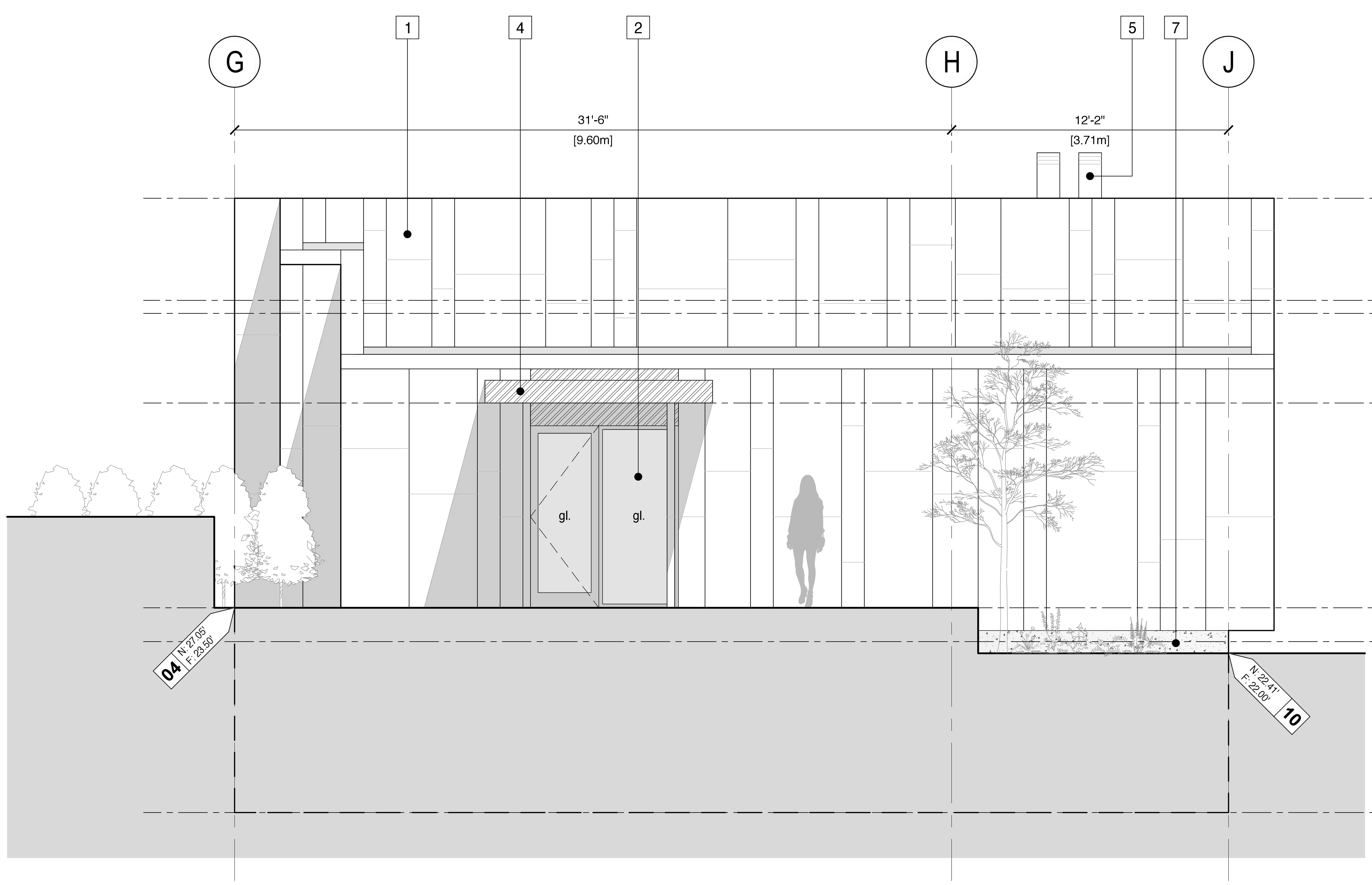
WEST ELEVATION
(PRINCIPAL DWELLING)



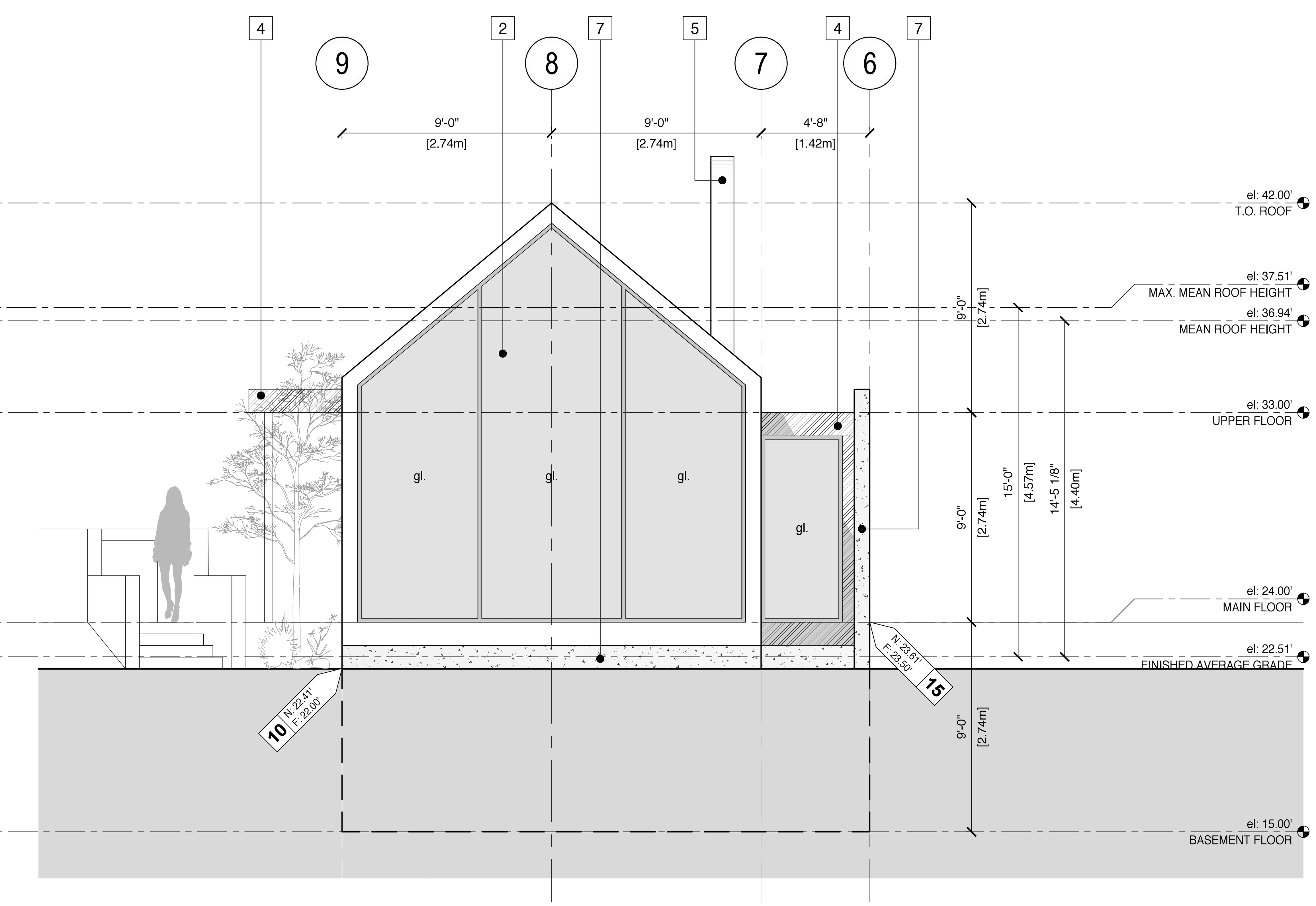
1 NORTH ELEVATION



2 WEST ELEVATION



3 SOUTH ELEVATION



4 EAST ELEVATION

MATERIALS

1. SWISS PEARL CLADDING
2. GLAZING
3. STRUCTURAL GLASS GUARD RAIL
4. METAL FLASHING
5. METAL CHIMNEY
6. ALUMINUM FIN
7. CONCRETE

DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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ARCHITECTURE INC.
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WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
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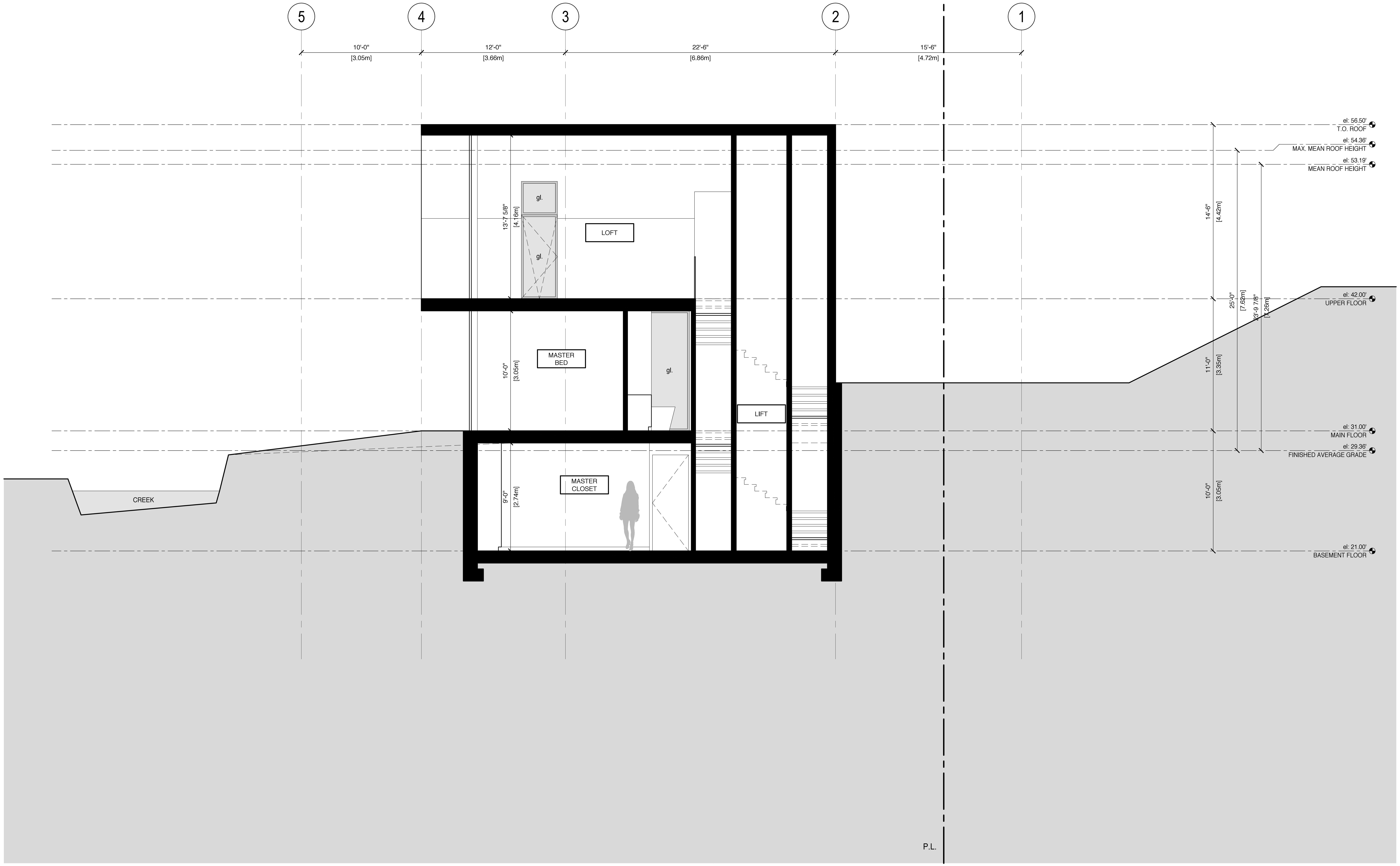
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A305
ELEVATIONS
(COACH HOUSE)



DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

bai

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2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
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EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE

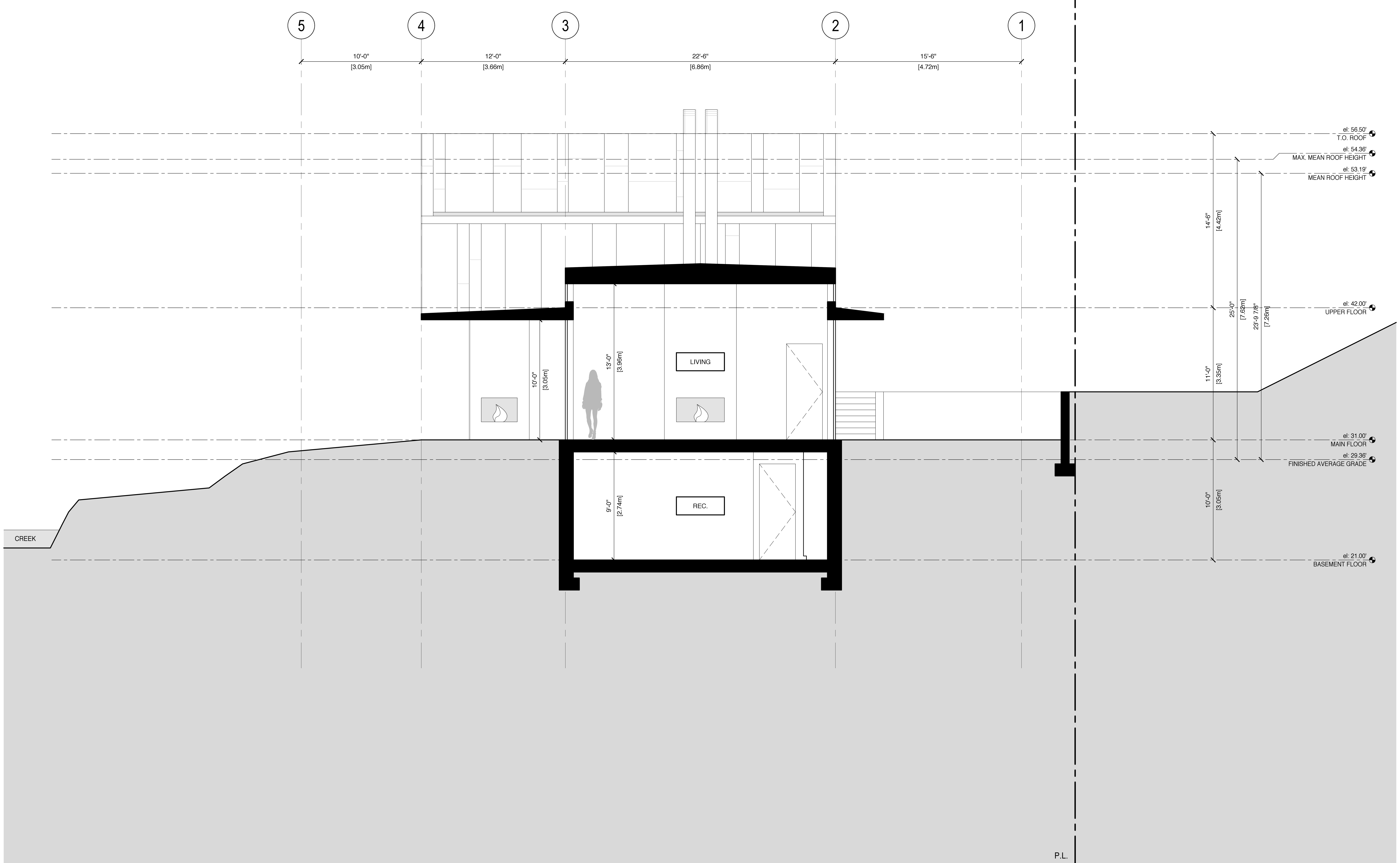
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"

1' 3 6 10

A401

BUILDING SECTION A
(PRINCIPAL DWELLING)



DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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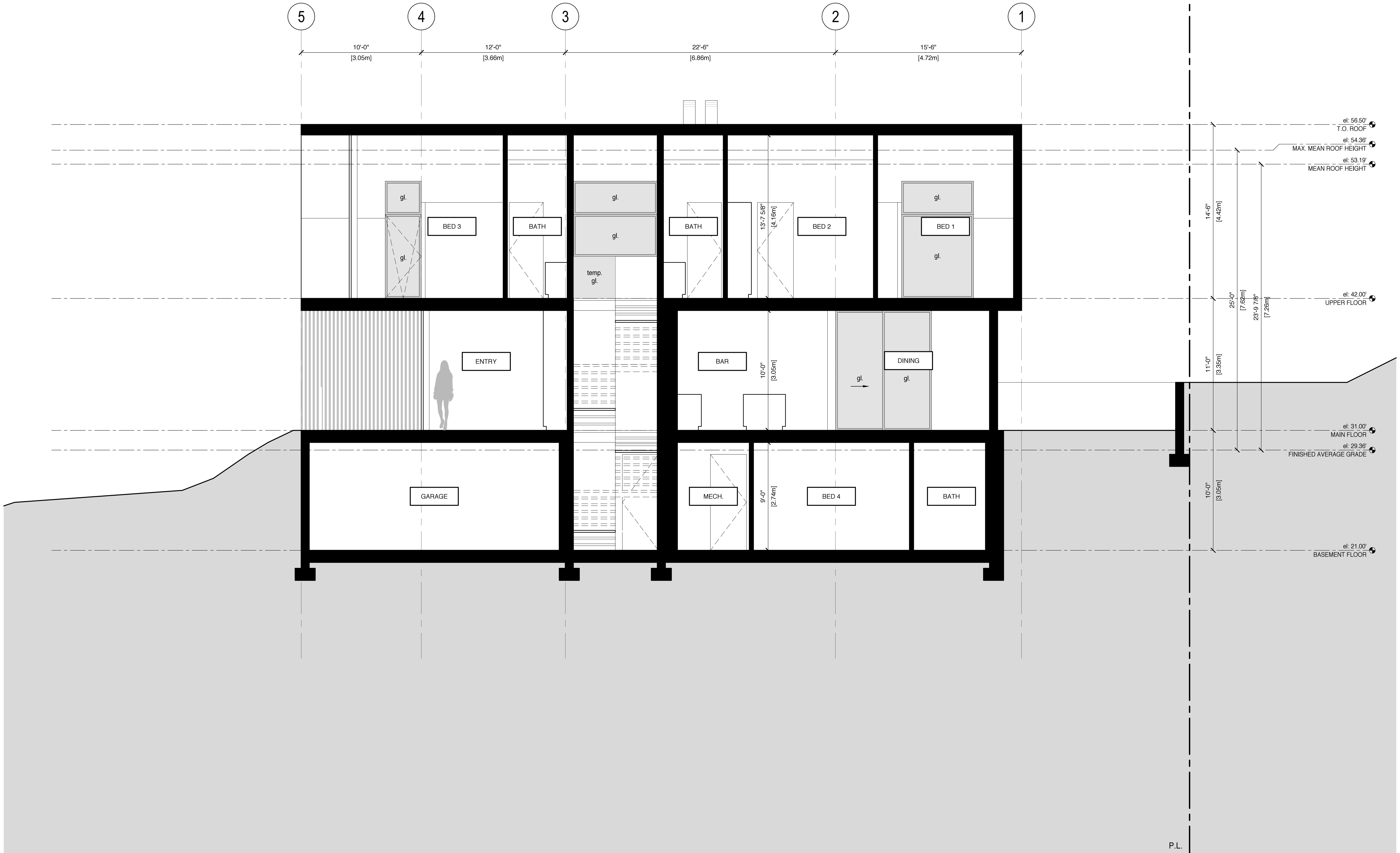
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A402
BUILDING SECTION B
(PRINCIPAL DWELLING)



DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

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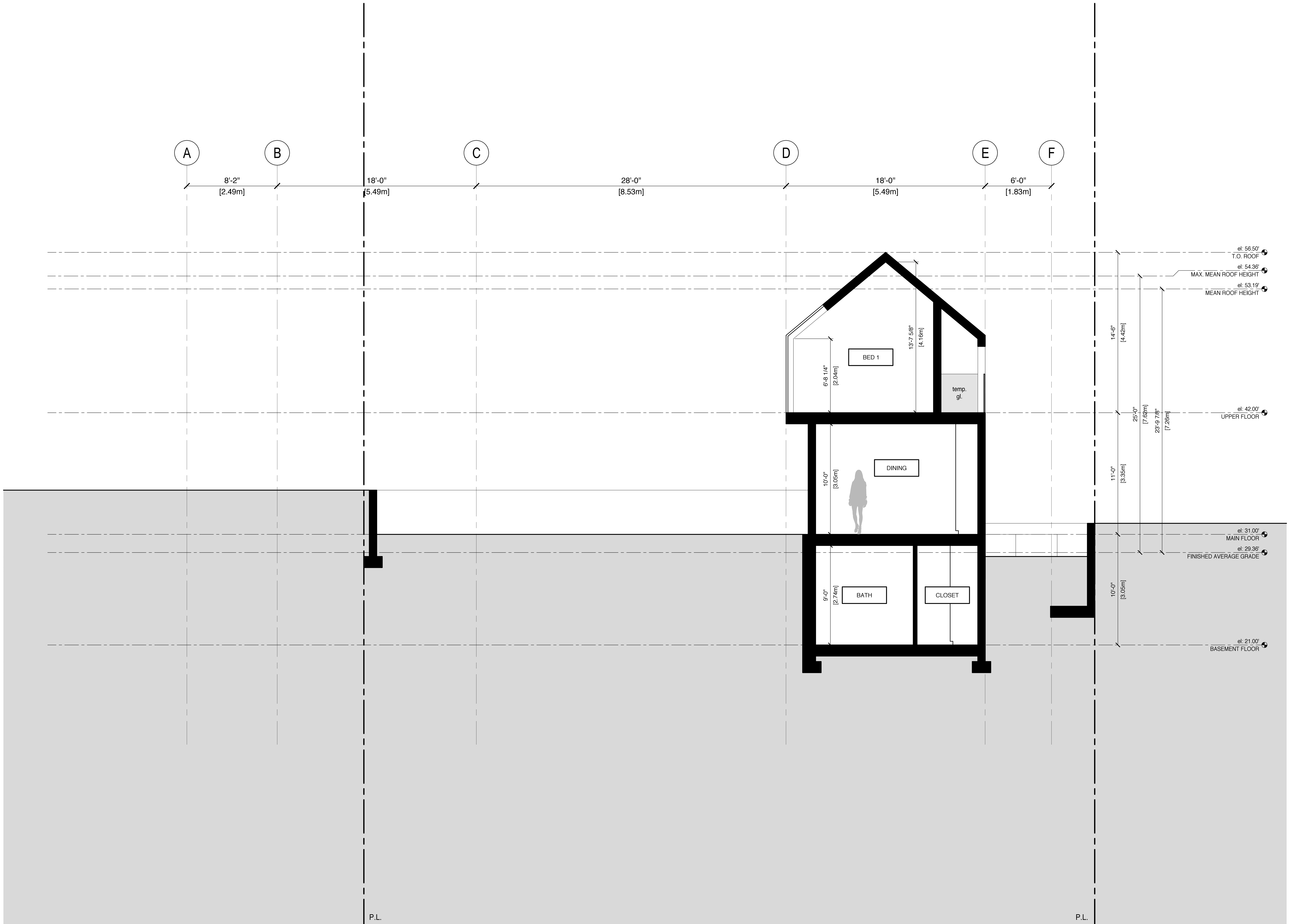
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A403
BUILDING SECTION C
(PRINCIPAL DWELLING)



DATE	NO.	DESCRIPTION	BY
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2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

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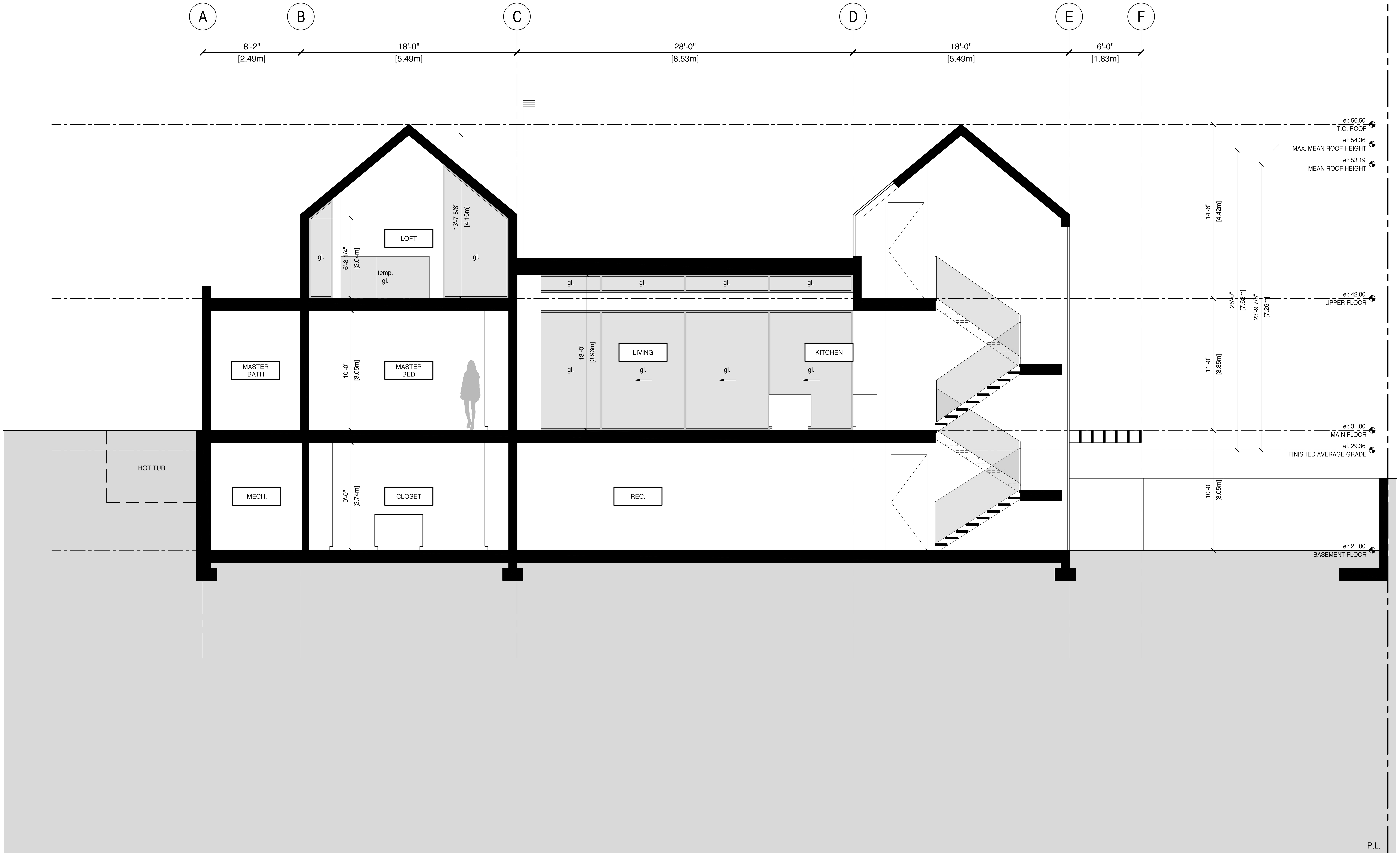
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A404
BUILDING SECTION D
(PRINCIPAL DWELLING)



DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

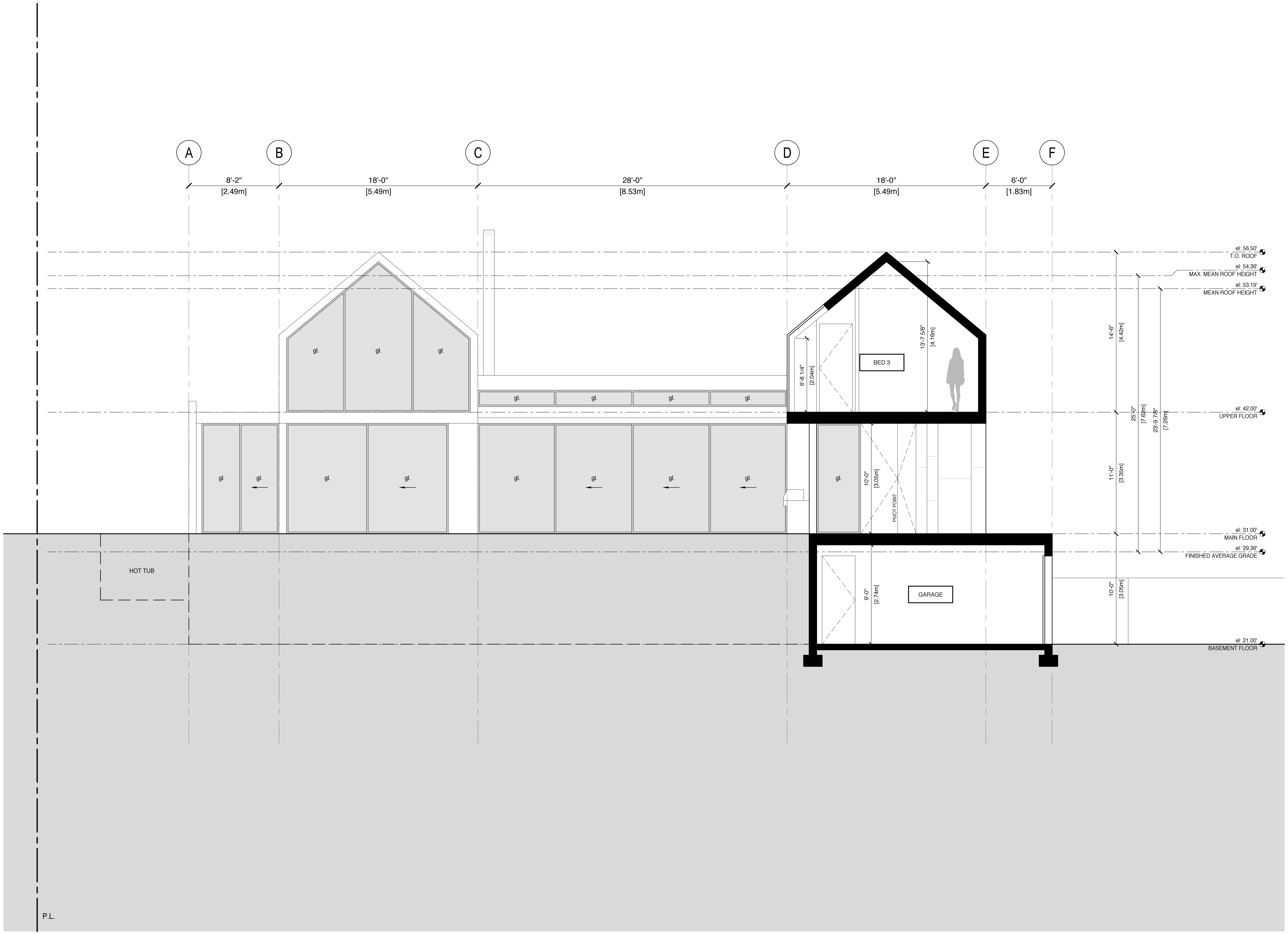
bai
BURGERS ARCHITECTURE INC.
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A405
BUILDING SECTION E
(PRINCIPAL DWELLING)



2018.12.21 ISSUED FOR DEVELOPMENT PERMIT RB

DATE NO. DESCRIPTION BY

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2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE

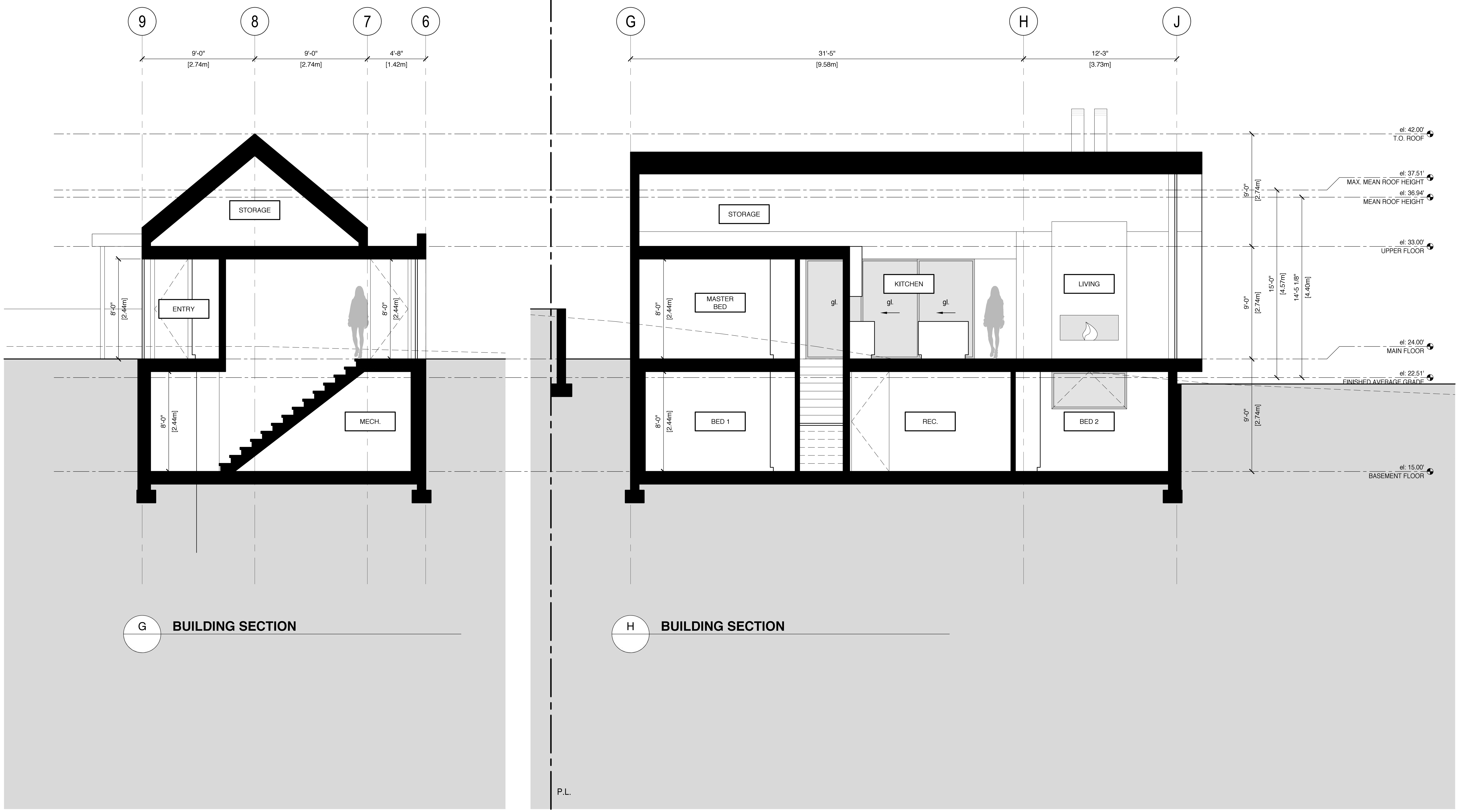
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"

1' 3 6 10

A406

BUILDING SECTION F
(PRINCIPAL DWELLING)



DATE	NO.	DESCRIPTION	BY
2018.12.21		ISSUED FOR DEVELOPMENT PERMIT	RB

bai
BURGERS ARCHITECTURE INC.
2488 HAYWOOD AVENUE
WEST VANCOUVER, BC
V7V 1Y1

PH 604 926 6058
FAX 604 926 9141
EMAIL cedric@baiarchitects.com

MEN / PEEVER RESIDENCE
2859 BELLEVUE AVENUE
WEST VANCOUVER, BC

SCALE: 1/4" = 1'-0"
1' 3 6 10

A407

BUILDING SECTIONS G & H
(COACH HOUSE)