Roadway Traffic Noise Assessment

184 Main Street

Ottawa, Ontario

REPORT: GWE16-053 – Traffic Noise

Prepared For:

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EXECUTIVE SUMMARY

This document describes a roadway traffic noise assessment performed for a proposed three-storey mixed-use development. The development is located at 184 Main Street in Ottawa, Ontario. The major source of noise in the area is from roadway traffic along Main Street. The site is surrounded on all sides with mixed-use land, specifically residential, commercial and institutional zones. Figure 1 illustrates a complete site plan with surrounding context.

Upon completion, the development will rise approximately 15 meters (m) above local grade. There are two 4th floor terraces that are considered as outdoor amenity space.

The assessment is based on: (i) theoretical noise prediction methods that conform to the Ministry of the Environment and Climate Change (MOECC) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) architectural drawings received from Rosaline J. Hill Architect & Development Consultant.

The results of the current study indicate that noise levels will range between 50 and 68 dBA during the daytime period (07:00-23:00) and between 43 and 60 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 68 dBA) occurs along the east façade, which is nearest and most exposed to Main Street. Minimum building construction in all areas is required to satisfy the Ontario Building Code (2012). As described in Section 5.2, upgraded building components with higher Sound Transmission Class (STC) ratings will be required for building components on east facing façades (see Figure 3).

In addition to upgraded windows, the installation of central air conditioning (or similar mechanical system) will be required for the development.

Noise levels at the east terrace (Receptor 5) are expected to approach 59 dBA during the daytime period. According to the ENCG, if this area is to be used as an outdoor living area, noise control measures are required. Investigation into the application of a 1.1 and 1.3-meter noise mitigating guardrail surrounding the terrace, proved that noise levels can be reduced to 55 dBA, as illustrated in Figure 4. A Warning Clause in all Agreements of Lease, Purchase and Sale will be required for the development.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by Rosaline J. Hill Architect & Development Consultant to undertake a roadway traffic noise study of the proposed mixed-use development at 184 Main Street in Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to a roadway traffic noise assessment. GWE's scope of work involved assessing exterior and interior noise levels generated by local roadway traffic. The assessment was performed on the basis of theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment and Climate Change[2] guidelines. Noise calculations were based on architectural drawings received from Rosaline J. Hill Architect & Development Consultant, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP).

2. TERMS OF REFERENCE

The focus of this roadway traffic noise assessment is a proposed three-storey mixed-use development. The development is located near the northwest corner of the Main Street & Hazel Street intersection in Ottawa, Ontario.

The major source of noise in the area is from roadway traffic along Main Street. Under the Main Street Renewal project, Main Street will be narrowed from the existing 4-lane roadway to 2-lanes, including a redesigned multi-use pathway. The site is surrounded on all sides with mixed-use land, specifically residential, commercial and institutional zones. Figure 1 illustrates a complete site plan with surrounding context.

Upon completion, the building will rise approximately 15 meters (m) above local grade. There are two 4th floor terraces that are considered as outdoor amenity space.

3. OBJECTIVES

The main goals of this work are to: (i) calculate the future noise levels on the study building produced by local roadway traffic and (ii) ensure that interior noise levels do not exceed the allowable limits specified

[1] City of Ottawa – Environmental Noise Control Guidelines, January 2016
[2] Ministry of the Environment and Climate Change – Environmental Noise Guideline, Publication NPC-300, August 2013

by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Sections 4.2 and 4.3 of this report.

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that particular source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Measurement of noise is based on the decibel unit, dBA, which is a logarithmic ratio referenced to a standard noise level (2×10^{-5} Pascals). The 'A' suffix refers to a weighting scale, which better represents how the noise is perceived by the human ear. With this scale, a doubling of power results in a 3 dBA increase in measured noise levels and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For vehicle traffic, the equivalent sound energy level, L_{EQ}, provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the L_{EQ} is commonly calculated on the basis of a 16-hour (L_{EQ16}) daytime (07:00-23:00) / 8-hour (L_{EQ8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit ranges (that are relevant to this study) are 50 dBA for retail stores, 45 dBA for living and dining areas and 40 dBA for sleeping quarters of residences, as listed in Table 1. Based on GWE's experience, more comfortable indoor noise levels should be targeted toward 42 dBA and 37 dBA (for living rooms and bedrooms, respectively) to control peak noise and deficiencies in building envelope construction.

TABLE 1: INDOOR SOUND LEVEL LIMITS (ROAD & RAIL)[3]

Type of Space	Time Period	L_{EQ} (dBA)	
		Road	Rail
Living/dining/den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living/dining/den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
	23:00 – 07:00	40	35

Predicted noise levels at the plane of window (POW) and outdoor living area (OLA) dictate the action required to achieve the recommended sound levels. When noise levels at these areas exceed the criteria outlined in Table 2, specific outdoor, ventilation and Warning Clause requirements may apply. In addition, when noise levels exceed the criteria outlined in Table 3, upgraded building components must be designed.

[3] Adapted from ENCG 2006 – Table 1.6

TABLE 2: ROAD & RAIL NOISE COMBINED – OUTDOOR NOISE, VENTILATION AND WARNING CLAUSE REQUIREMENTS[4]

Time Period	L_{EQ} (dBA)	Ventilation Requirements	Outdoor Noise Control Measures	Warning Clause
Outdoor Living Area (OLA)				
Daytime (07:00 – 23:00)	$L_{EQ(16hr)} < 55$	N/A	Not required	Not required
	$55 < L_{EQ(16hr)} \leq 60$	N/A	May not be required but should be considered	Generic†
	$L_{EQ(16hr)} > 60$	N/A	Required to reduce the L_{EQ} to below 60 dBA and as close to 55 dBA where feasible	Extensive Mitigation ††
Plane of Window (POW)				
Daytime (07:00 – 23:00)	$L_{EQ(16hr)} < 55$	Not required	N/A	Not required
	$55 < L_{EQ(16hr)} \leq 65$	Forced air heating with provision for central air conditioning	N/A	Generic
	$L_{EQ(16hr)} > 65$	Central air conditioning	N/A	Extensive Mitigation
Nighttime (23:00 – 07:00)	$L_{EQ(8hr)} < 50$	Not required	N/A	Not required
	$50 < L_{EQ(8hr)} \leq 60$	Forced air heating with provision for central air conditioning	N/A	Generic
	$L_{EQ(8hr)} > 60$	Central air conditioning	N/A	Extensive Mitigation

† - Required if resultant L_{EQ} exceeds 55 dBA

†† - Required if resultant L_{EQ} exceeds 55 dBA and if it is administratively, economically and/or technically feasible

[4] Modified from ENCG 2006 – Table 1.10

TABLE 3: ROAD & RAIL NOISE BUILDING COMPONENT REQUIREMENTS[5]

Source	L_{EQ} (dBA)	Building Component Requirements
Road	$L_{EQ(16hr)}$ > 65 (Daytime)	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
	$L_{EQ(8hr)}$ > 60 (Nighttime)	
Rail	$L_{EQ(16hr)}$ > 60 (Daytime)	
	$L_{EQ(8hr)}$ > 55 (Nighttime)	

4.2.2 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan[6] which provides additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. Table 4 (below) summarizes the AADT values used for the roadway included in this assessment.

TABLE 4: ROADWAY TRAFFIC DATA

Roadway	Roadway Class	Speed Limit (km/h)	Official Plan AADT
Main Street	2-UAU	50	**15,000**

4.2.3 Theoretical Roadway Traffic Noise Predictions

Noise predictions were performed with the aid of the Ministry of the Environment and Climate Change (MOECC) computerized noise assessment program, STAMSON 5.04, for road and rail analysis. Appendix A includes the STAMSON 5.04 input and output data.

Roadway traffic noise calculations were performed by treating each roadway segment as separate line sources of noise, and by using existing building locations as noise barriers. In addition to the traffic volumes summarized in Table 4, theoretical noise predictions were based on the following parameters:

[5] Adapted from ENCG 2006 – Table 1.8
[6] City of Ottawa Transportation Master Plan, November 2013

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions
- The day/night split was taken to be 92% / 8% respectively for all streets
- Absorptive and reflective intermediate ground surfaces based on specific source-receiver path ground characteristics
- The study site was treated as having flat topography

Noise receptors were strategically placed at 6 locations around the study area (see Figure 2).

4.3 Indoor Noise Calculations

When calculations reveal that outdoor noise levels are sufficiently high as to require investigation of indoor noise levels, calculations are performed to verify the Sound Transmission Class (STC) requirements for building components. The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in conformance with the Ontario Building Code (2006) typically exceed STC 35, depending on exterior cladding, thickness and interior finish details. For example, brick veneered walls can achieve STC 55. Standard good quality double-glazed non-operable windows can have STC ratings ranging from 25 to 40 depending on the window manufacturer, pane thickness and inter-pane spacing. As previously mentioned, the windows are the known weak point in a partition.

According to the ENCG, when daytime noise levels (from road and rail sources) at the plane of the window (POW) exceed 65 dBA, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure[7] considers:

- Window type and total area as a percentage of total room floor area
- Exterior wall type and total area as a percentage of the total room floor area
- Acoustic absorption characteristics of the room
- Outdoor noise source type and approach geometry
- Indoor sound level criteria, which varies according to the intended use of a space

[7] Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985

Based on published research[8], exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition. Calculations were based on the architectural plans available in Appendix C.

5. RESULTS AND DISCUSSION

Outdoor noise levels are summarized in Section 5.1 and STC requirements to achieve targeted indoor noise level criteria are discussed in Section 5.2. Noise levels and mitigation for outdoor living areas are discussed in Section 5.3.

5.1 Roadway Traffic Noise Levels

Appendix A contains the complete set of input and output data from all STAMSON 5.04 calculations. The results of the roadway traffic noise calculations are summarized in Table 5 below.

TABLE 5: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC

Receptor Number	Receptor Location	Noise Level (dBA)	
		Day	Night
1	POW - 3rd Floor - North Façade	65	58
2	POW - 3rd Floor - East Façade	68	60
3	POW - 3rd Floor - South Façade	65	58
4	POW - 3rd Floor - West Façade	50	43
5	OLA - 4th Floor - East Terrace	59	52
6	OLA - 4th Floor - West Terrace	55	48

The results of the current analysis indicate that noise levels will range between 50 and 68 dBA during the daytime period (07:00-23:00) and between 43 and 60 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 68 dBA) occurs along the east façade, which is nearest and most exposed to Main Street (Receptor 2).

5.2 STC Requirements

The noise levels predicted due to roadway traffic exceed the criteria listed in the ENCG for building components of 65 dBA, along the developments east façade. As discussed in Section 4.3, the anticipated STC requirements for windows have been estimated based on theoretical noise modelling software *INSUL*

[8] CMHC, Road & Rail Noise: Effects on Housing

and National Research Council (NRC)[9] test data. Appendix B contains the complete set of calculations performed to verify the required exterior wall and window STC requirements.

5.2.1 Exterior Wall STC Requirements

The current selected exterior wall assembly for the developments east façade, as described below, has been rated for a particular STC rating based on *INSUL* software and test data. Detailed STC calculations show that this wall construction provides the necessary attenuation to control interior noise levels for retail, living room and kitchen spaces.

Typical Exterior Wall Construction (W12):

- Rainscreen Cladding
- Tyvek Air Barrier
- 7/16" Aspenite Sheathing
- 2×6" Wood Studs @ 16" O.C.
- R-24 Insulation
- Vapour Barrier
- 1/2" Gypsum Board Type X

(STC 34) *INSUL* Calculation

On the 3rd floor, where ENCG indoor sound level criteria is lower for bedrooms, higher STC walls will be required. Detailed STC calculations show that the 3rd floor east façade should be built to an upgraded exterior wall construction to provide the necessary attenuation to control interior noise levels. The upgraded wall construction, as described below, is very similar to the currently selected exterior walls with the addition of resilient channel and one layer of gypsum wall board.

[9] J.S. Bradley and J.A. Birta. Laboratory Measurements of the Sound Insulation of Building Façade Elements, National Research Council October 2000.

Upgraded Exterior Wall Construction (W12):

- Rainscreen Cladding
- Tyvek Air Barrier
- 7/16” Aspenite Sheathing
- 2×6” Wood Studs @ 16” O.C.
- R-24 Insulation
- Vapour Barrier
- **Resilient Channel**
- **Two Layers 1/2” Gypsum Board Type X**

(STC 56) *INSUL* Calculation

5.2.2 Window STC Requirements

The STC requirements for the windows are summarized below for various development façades (see Figure 3):

- **Bedroom Windows**

(i) Bedroom windows facing east will require a minimum STC of 34

(ii) All other bedroom windows will require minimum OBC 2012 construction

- **Living Room Windows**

(i) Living room windows facing east will require a minimum STC of 27

(ii) All other living room windows will require minimum OBC 2012 construction

- **Retail Windows**

(i) Retail windows facing east will require a minimum STC of 24

(ii) All other retail windows will require minimum OBC 2012 construction

A review of window supplier literature indicates that the specified STC ratings can be achieved by a variety of window systems having a combination of glass thickness and inter-pane spacing. We have not specified any particular window configurations, as there are several manufacturers and various combinations of window components that will offer the necessary sound attenuation rating. However, it is the responsibility of the manufacturer to ensure that the specified window achieves the required STC. This can only be assured by using window configurations that have been certified by laboratory testing. The requirements for STC ratings assume that the remaining components of the building are constructed and installed according to the minimum standards of the Ontario Building Code. The specified STC requirements also apply to swinging and/or sliding patio doors.

5.3 Ventilation and Warning Clause Requirements

Results of the calculations also indicate that the development will require central air conditioning (or similar mechanical ventilation systems), which will allow occupants to keep windows closed to maintain a comfortable living environment. In addition to ventilation requirements, a Warning Clause will also be required be placed on all Lease, Purchase and Sale Agreements.

5.4 Noise Barrier Calculation

Noise levels at the east terrace (Receptor 5) are expected to approach 59 dBA during the daytime period. According to the ENCG, if this area is to be used as an outdoor living area, noise control measures are required. Investigation into the application of a 1.1 and 1.3-meter noise mitigating guardrail surrounding the terrace, proved that noise levels can be reduced to 55 dBA, as illustrated in Figure 4. Table 6 summarizes the results of the barrier investigations at the east terrace.

TABLE 6: RESULTS OF BARRIER INVESTIGATION

Location	Reference Receptors	Daytime L_{EQ} Noise Levels (dBA)		
		No Barrier	1.1 M Barrier	1.3 M Barrier
East Terrace	5	59	56	55

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current study indicate that noise levels will range between 50 and 68 dBA during the daytime period (07:00-23:00) and between 43 and 60 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 68 dBA) occurs along the east façade, which is nearest and most exposed to Main Street. Minimum building construction in all areas is required to satisfy the Ontario Building Code (2012). As described in Section 5.2, upgraded building components with higher Sound Transmission Class (STC) ratings will be required for building components on east facing façades (see Figure 3).

In addition to upgraded windows, the installation of central air conditioning (or similar mechanical system) will be required for the development.

Noise levels at the east terrace (Receptor 5) are expected to approach 59 dBA during the daytime period. According to the ENCG, if this area is to be used as an outdoor living area, noise control measures are required. Investigation into the application of a 1.1 and 1.3-meter noise mitigating guard rail surrounding the terrace, proved that noise levels can be reduced to 55 dBA, as illustrated in Figure 4. The following Warning Clause[10] in all Agreements of Lease, Purchase and Sale will be required for all units:

> *"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing roadway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment and Climate Change.*
>
> *To help address the need for sound attenuation, this development includes:*
> - *multi-pane glass;*
> - *high sound transmission class walls*
> - *an acoustic barrier around terrace amenity areas which is owned and maintained by the condominium corporation.*

[10] Ministry of the Environment and Climate Change – Environmental Noise Guideline, Publication NPC-300, August 2013

To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.

This dwelling unit has also been designed with central air conditioning (or similar mechanical system) which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment and Climate Change.

This concludes our assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

Yours truly,

Gradient Wind Engineering Inc.

Michael Lafortune
Environmental Technologist
GWE16-053 - Roadway Traffic Noise

Joshua Foster, P.Eng.
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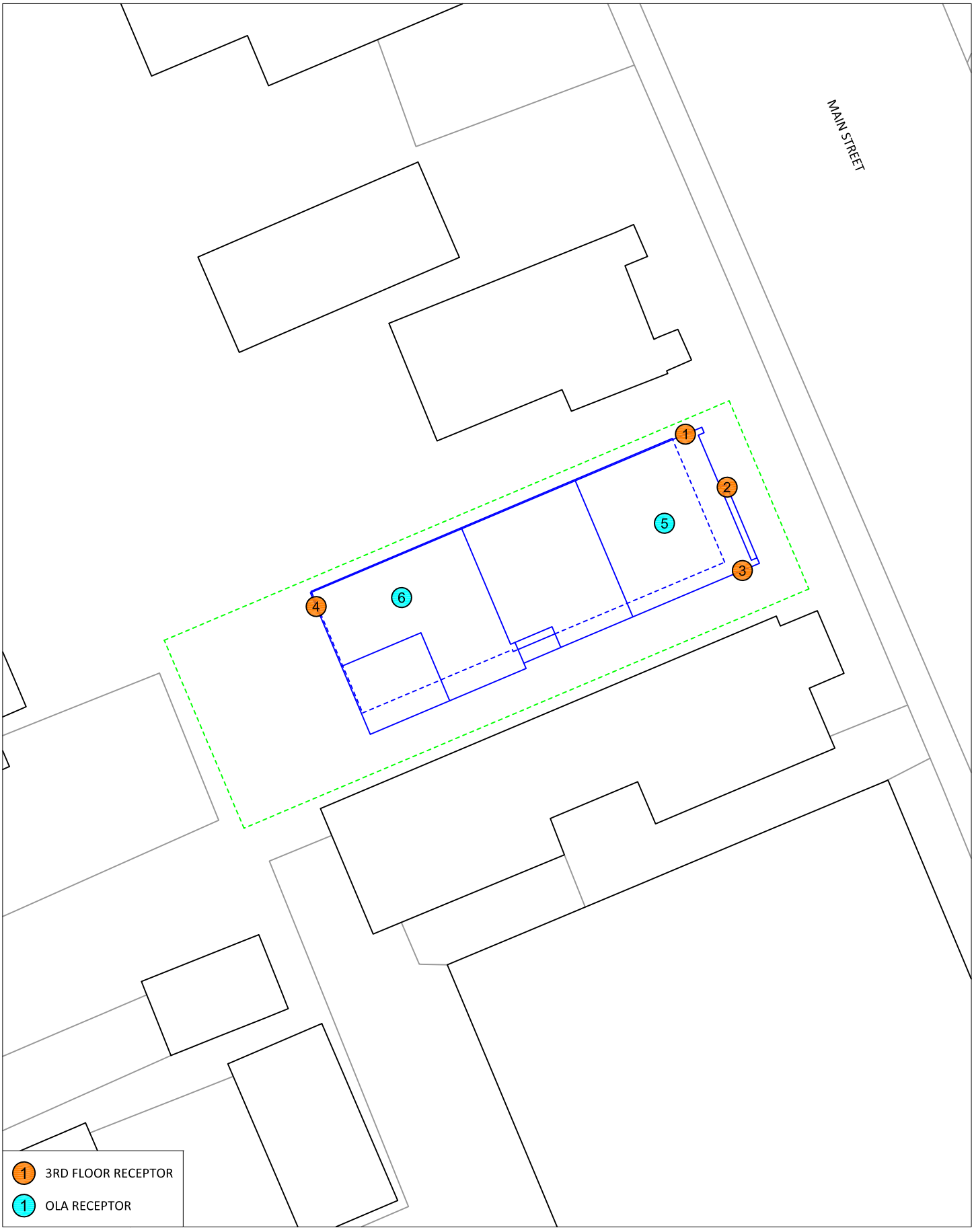
PROJECT	184 MAIN STREET - ROADWAY TRAFFIC NOISE STUDY
SCALE	1:1000 (APPROX.)
DRAWING NO.	GWE16-053-1
DATE	MAY 24, 2016
DRAWN BY	M.L
DESCRIPTION	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT



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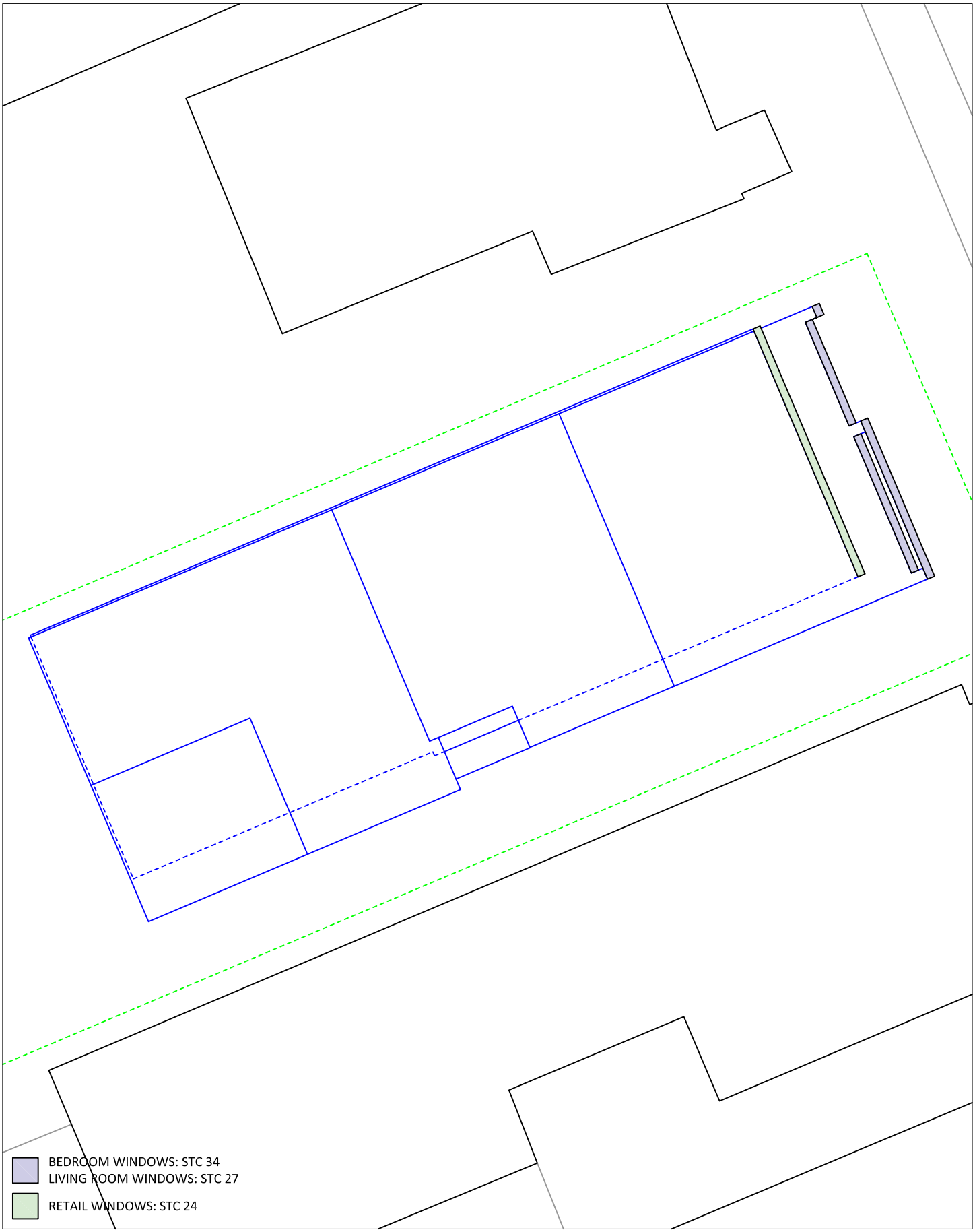
PROJECT: 184 MAIN STREET - ROADWAY TRAFFIC NOISE STUDY		DESCRIPTION: FIGURE 2: RECEPTOR LOCATIONS
SCALE: 1:250 (APPROX.)	DRAWING NO.: GWE16-053-2	
DATE: MAY 24, 2016	DRAWN BY: M.L	



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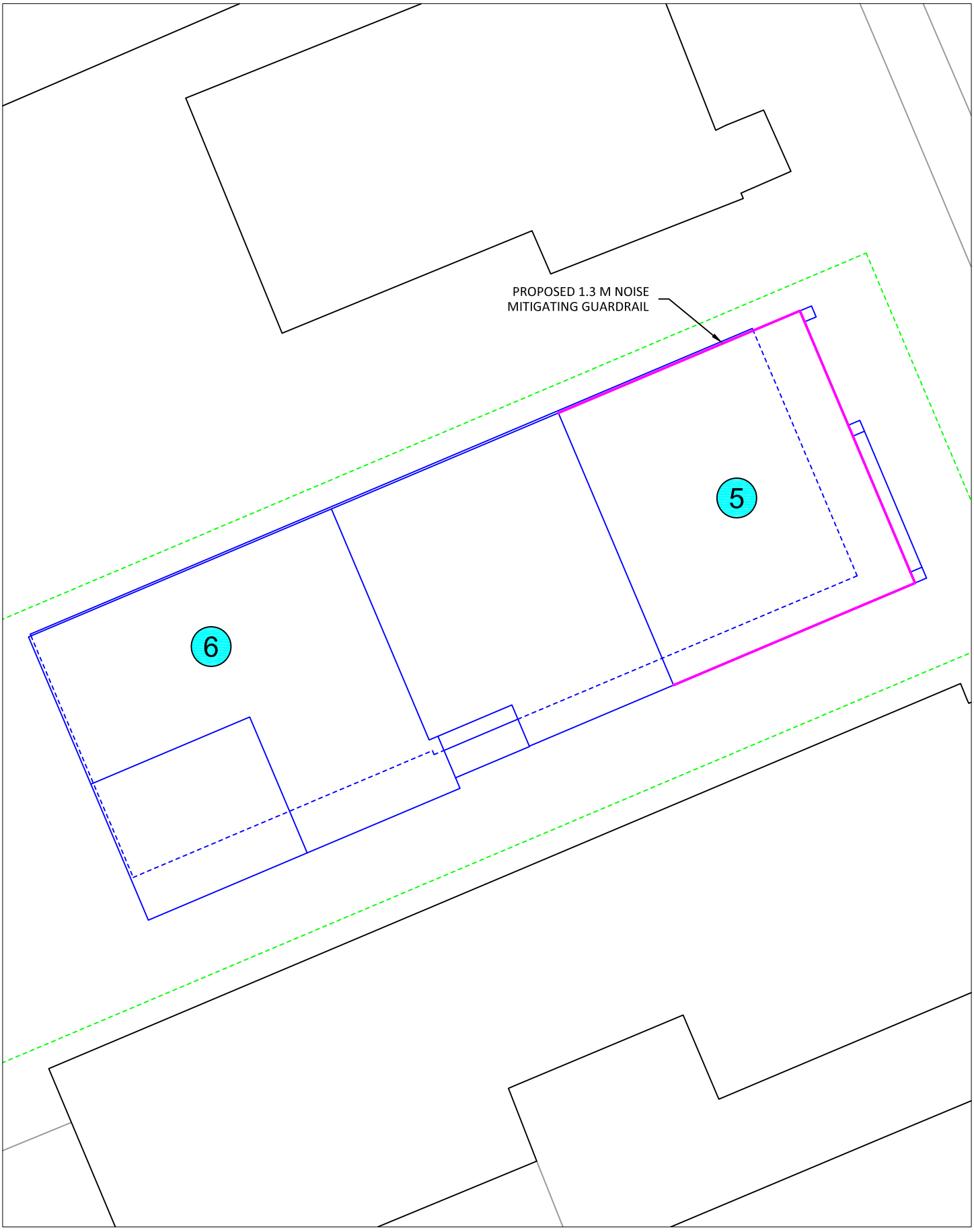
PROJECT: 184 MAIN STREET - ROADWAY TRAFFIC NOISE STUDY		DESCRIPTION: FIGURE 3: WINDOW STC REQUIREMENTS
SCALE: 1:250 (APPROX.)	DRAWING NO.: GWE16-053-3	
DATE: MAY 24, 2016	DRAWN BY: M.L	



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PROJECT	184 MAIN STREET - ROADWAY TRAFFIC NOISE STUDY		DESCRIPTION
SCALE	1:250 (APPROX.)	DRAWING NO.	GWE16-053-4
DATE	MAY 24, 2016	DRAWN BY	M.L

FIGURE 4:
NOISE BARRIER LOCATION

N

APPENDIX A

STAMSON 5.04 - INPUT AND OUTPUT DATA

```
STAMSON 5.0        NORMAL REPORT        Date: 24-05-2016 13:16:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Main (day/night)
----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Main (day/night)
--------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   9.70 / 9.70   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -62.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

Results segment # 1: Main (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	9.70	8.61	8.61

ROAD (0.00 + 60.40 + 63.85) = 65.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-62	0.00	68.48	0.00	0.00	-8.08	0.00	0.00	-0.75	59.65*
-90	-62	0.00	68.48	0.00	0.00	-8.08	0.00	0.00	0.00	60.40
-62	0	0.00	68.48	0.00	0.00	-4.63	0.00	0.00	0.00	63.85

* Bright Zone !

Segment Leq : 65.47 dBA

Total Leq All Segments: 65.47 dBA

```
Results segment # 1: Main (night)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        9.70 !        8.61 !         8.61

ROAD (0.00 + 52.80 + 56.25) = 57.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -62   0.00  60.88   0.00   0.00  -8.08   0.00   0.00  -0.75
52.05*
   -90    -62   0.00  60.88   0.00   0.00  -8.08   0.00   0.00   0.00
52.80
-------------------------------------------------------------------------------
--
   -62      0   0.00  60.88   0.00   0.00  -4.63   0.00   0.00   0.00
56.25
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 57.87 dBA

Total Leq All Segments: 57.87 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 65.47
                           (NIGHT): 57.87
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-05-2016 13:16:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Main (day/night)
----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Main (day/night)
----------------------------------------
Angle1   Angle2           : -83.00 deg   77.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   9.70 / 9.70   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Main (day)
-------------------------------

Source height = 1.50 m

ROAD (0.00 + 67.97 + 0.00) = 67.97 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -83     77   0.00  68.48   0.00   0.00  -0.51   0.00   0.00   0.00
67.97
-------------------------------------------------------------------------
--

Segment Leq : 67.97 dBA

Total Leq All Segments: 67.97 dBA


Results segment # 1: Main (night)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.37 + 0.00) = 60.37 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -83     77   0.00  60.88   0.00   0.00  -0.51   0.00   0.00   0.00
60.37
-------------------------------------------------------------------------
--

Segment Leq : 60.37 dBA

Total Leq All Segments: 60.37 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 67.97
                           (NIGHT): 60.37
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-05-2016 13:17:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Main (day/night)
----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Main (day/night)
----------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :   9.70 / 9.70   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  51.00 deg   Angle2 : 90.00 deg
Barrier height            :   8.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Main (day)
-------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        9.70 !        8.06 !         8.06

ROAD (63.00 + 61.84 + 0.00) = 65.47 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     51   0.00  68.48   0.00   0.00  -5.48   0.00   0.00   0.00
63.00
-------------------------------------------------------------------------------
--
    51     90   0.00  68.48   0.00   0.00  -6.64   0.00   0.00  -4.99
56.85*
    51     90   0.00  68.48   0.00   0.00  -6.64   0.00   0.00   0.00
61.84
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 65.47 dBA

Total Leq All Segments: 65.47 dBA
```

```
Results segment # 1: Main (night)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        9.70 !        8.06 !         8.06

ROAD (55.41 + 54.24 + 0.00) = 57.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     51   0.00  60.88   0.00   0.00  -5.48   0.00   0.00   0.00
55.41
-------------------------------------------------------------------------------
--
    51     90   0.00  60.88   0.00   0.00  -6.64   0.00   0.00  -4.99
49.25*
    51     90   0.00  60.88   0.00   0.00  -6.64   0.00   0.00   0.00
54.24
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 57.87 dBA

Total Leq All Segments: 57.87 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 65.47
                           (NIGHT): 57.87
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-05-2016 13:17:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Main' (day/night)
-----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Main' (day/night)
---------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  33.00 / 33.00  m
Receiver height           :   9.70 / 9.70   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  11.40 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Main' (day)
--------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        9.70 !        9.45 !         9.45

ROAD (0.00 + 50.15 + 0.00) = 50.15 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00  -3.42   0.00   0.00   0.00 -14.91
50.15
-------------------------------------------------------------------------------
--

Segment Leq : 50.15 dBA

Total Leq All Segments: 50.15 dBA
```

```
Results segment # 1: Main' (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        9.70 !        9.45 !         9.45

ROAD (0.00 + 42.55 + 0.00) = 42.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00  -3.42   0.00   0.00   0.00 -14.91
42.55
-------------------------------------------------------------------------------
--

Segment Leq : 42.55 dBA

Total Leq All Segments: 42.55 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 50.15
                           (NIGHT): 42.55
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-05-2016 13:17:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: Main (day/night)
----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Main (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :  12.90 / 12.90  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  11.40 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Main (day)
------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        9.86 !         9.86

ROAD (0.00 + 59.24 + 0.00) = 59.24 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00   0.00   0.00   0.00   0.00  -9.24
59.24
-------------------------------------------------------------------------------
--

Segment Leq : 59.24 dBA

Total Leq All Segments: 59.24 dBA
```

```
Results segment # 1: Main (night)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        9.86 !         9.86

ROAD (0.00 + 51.64 + 0.00) = 51.64 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00   0.00   0.00   0.00   0.00  -9.24
51.64
-------------------------------------------------------------------------------
--

Segment Leq : 51.64 dBA

Total Leq All Segments: 51.64 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 59.24
                           (NIGHT): 51.64
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-05-2016 13:17:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5b.te               Time Period: Day/Night 16/8 hours
Description: 1.1 m barrier


Road data, segment # 1: Main (day/night)
----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Main (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :  12.90 / 12.90  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  12.50 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Main (day)
-------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        9.86 !         9.86

ROAD (0.00 + 55.89 + 0.00) = 55.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00   0.00   0.00   0.00   0.00 -12.59
55.89
-------------------------------------------------------------------------------
--

Segment Leq : 55.89 dBA

Total Leq All Segments: 55.89 dBA
```

```
Results segment # 1: Main (night)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        9.86 !         9.86

ROAD (0.00 + 48.30 + 0.00) = 48.30 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00   0.00   0.00   0.00   0.00 -12.59
48.30
-------------------------------------------------------------------------------
--

Segment Leq : 48.30 dBA

Total Leq All Segments: 48.30 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 55.89
                           (NIGHT): 48.30
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-05-2016 13:17:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5b2.te              Time Period: Day/Night 16/8 hours
Description: 1.3 m barrier


Road data, segment # 1: Main (day/night)
----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Main (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  15.00 / 15.00  m
Receiver height           :  12.90 / 12.90  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :  12.70 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Main (day)
-------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        9.86 !         9.86

ROAD (0.00 + 55.38 + 0.00) = 55.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  68.48   0.00   0.00   0.00   0.00   0.00 -13.10
55.38
-------------------------------------------------------------------------------
--

Segment Leq : 55.38 dBA

Total Leq All Segments: 55.38 dBA
```

```
Results segment # 1: Main (night)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        9.86 !         9.86

ROAD (0.00 + 47.78 + 0.00) = 47.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90     90   0.00  60.88   0.00   0.00   0.00   0.00   0.00 -13.10
47.78
-------------------------------------------------------------------------------
--

Segment Leq : 47.78 dBA

Total Leq All Segments: 47.78 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 55.38
                           (NIGHT): 47.78
```

```
STAMSON 5.0        NORMAL REPORT        Date: 24-05-2016 13:17:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6.te                Time Period: Day/Night 16/8 hours
Description:


Road data, segment # 1: MainL2 (day/night)
-----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: MainL2 (day/night)
----------------------------------------
Angle1   Angle2           : -57.00 deg   -26.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  29.00 / 29.00  m
Receiver height           :  12.90 / 12.90  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -57.00 deg   Angle2 : -26.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: MainC (day/night)
------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: MainC (day/night)
---------------------------------------
Angle1   Angle2           : -26.00 deg   46.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  29.00 / 29.00  m
Receiver height           :  12.90 / 12.90  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -26.00 deg   Angle2 : 46.00 deg
Barrier height            :  15.20 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: MainR (day/night)
-----------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: MainR (day/night)
---------------------------------------
Angle1   Angle2           :  46.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  29.00 / 29.00  m
Receiver height           :  12.90 / 12.90  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  46.00 deg   Angle2 : 90.00 deg
Barrier height            :   8.00 m
Barrier receiver distance :  19.00 / 19.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: MainL1 (day/night)
------------------------------------------
Car traffic volume  : 12144/1056  veh/TimePeriod  *
Medium truck volume :   966/84    veh/TimePeriod  *
Heavy truck volume  :   690/60    veh/TimePeriod  *
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: MainL1 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   -57.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  29.00 / 29.00  m
Receiver height           :  12.90 / 12.90  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -57.00 deg
Barrier height            :   8.00 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: MainL2 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        5.82 !         5.82

ROAD (0.00 + 50.45 + 0.00) = 50.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -57    -26   0.00  68.48   0.00  -2.86  -7.64   0.00   0.00  -7.53
50.45
-------------------------------------------------------------------------------
--

Segment Leq : 50.45 dBA


Results segment # 2: MainC (day)
--------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !       11.33 !        11.33

ROAD (0.00 + 41.76 + 0.00) = 41.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -26     46   0.00  68.48   0.00  -2.86  -3.98   0.00   0.00 -19.88
41.76
-------------------------------------------------------------------------------
--

Segment Leq : 41.76 dBA
```

```
Results segment # 3: MainR (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        5.43 !         5.43

ROAD (0.00 + 50.48 + 0.00) = 50.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    46     90   0.00  68.48   0.00  -2.86  -6.12   0.00   0.00  -9.02
50.48
-------------------------------------------------------------------------------
--

Segment Leq : 50.48 dBA


Results segment # 4: MainL1 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        5.82 !         5.82

ROAD (0.00 + 50.57 + 0.00) = 50.57 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -57   0.00  68.48   0.00  -2.86  -7.37   0.00   0.00  -7.68
50.57
-------------------------------------------------------------------------------
--

Segment Leq : 50.57 dBA

Total Leq All Segments: 55.46 dBA
```

```
Results segment # 1: MainL2 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        5.82 !         5.82

ROAD (0.00 + 42.85 + 0.00) = 42.85 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -57    -26   0.00  60.88   0.00  -2.86  -7.64   0.00   0.00  -7.53
42.85
-------------------------------------------------------------------------------
--

Segment Leq : 42.85 dBA


Results segment # 2: MainC (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !       11.33 !        11.33

ROAD (0.00 + 34.16 + 0.00) = 34.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -26     46   0.00  60.88   0.00  -2.86  -3.98   0.00   0.00 -19.88
34.16
-------------------------------------------------------------------------------
--

Segment Leq : 34.16 dBA
```

```
Results segment # 3: MainR (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        5.43 !         5.43

ROAD (0.00 + 42.88 + 0.00) = 42.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    46     90   0.00  60.88   0.00  -2.86  -6.12   0.00   0.00  -9.02
42.88
-------------------------------------------------------------------------------
--

Segment Leq : 42.88 dBA

Results segment # 4: MainL1 (night)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       12.90 !        5.82 !         5.82

ROAD (0.00 + 42.97 + 0.00) = 42.97 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -57   0.00  60.88   0.00  -2.86  -7.37   0.00   0.00  -7.68
42.97
-------------------------------------------------------------------------------
--

Segment Leq : 42.97 dBA

Total Leq All Segments: 47.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.46
                           (NIGHT): 47.86
```

APPENDIX B

STC Calculations

Sound Insulation Prediction (v8.0.9)

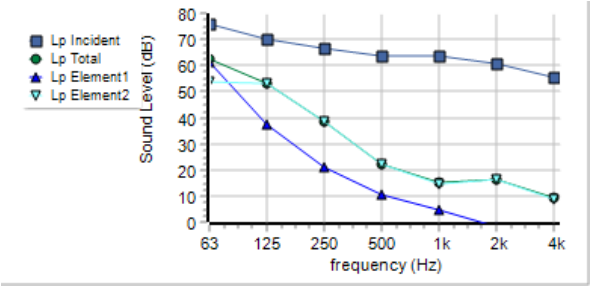
According to EN12354/3

Title :Bedroom 3

Comments :

Upgraded exterior w all:
-Resilient Channel
-1 Layer 1/2" Gypsum Board

STC 34 Window



Date: 25 May 16 Initials:

File Name: Bedroom 3.inz

	Octave Band Centre Frequency (Hz)							Overall dBA
Source	63	125	250	500	1k	2k	4k	
Incident sound level (freefield)	76	70	66	64	64	61	56	68
Path								
Element 1 ,Wall STL	-15	-33	-46	-54	-60	-63	-59	
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [6.1 m2]	8	8	8	8	8	8	8	
Element sound level contribution	62	37	21	11	4.4	-1.8	-2.6	36
Element 2 ,Window STL	-21	-16	-27	-41	-48	-43	-46	
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [4.2 m2]	6	6	6	6	6	6	6	
Element sound level contribution	54	53	38	22	15	17	8.8	38
Receiver								
Room volume (-10Log V) [32 m3]	-15	-15	-15	-15	-15	-15	-15	
Reveberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10Log T)	-3	-3	-3	-3	-3	-3	-3	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	62	53	38	22	15	17	9.1	40

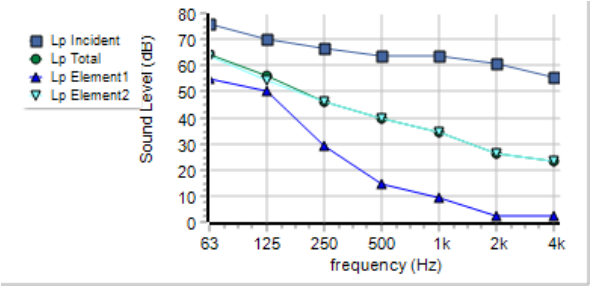
Sound Insulation Prediction (v8.0.9)

According to EN12354/3

Title :Living/Kitchen

Comments :

STC 27 Window



Date: 25 May 16 Initials:Michael Lafortune

File Name: Living and Kitchen.inz

	Octave Band Centre Frequency (Hz)							Overall dBA
Source	63	125	250	500	1k	2k	4k	
Incident sound level (freefield)	76	70	66	64	64	61	56	68
Path								
Element 1 ,Wall STL	-15	-13	-31	-43	-48	-52	-47	
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [5.4 m2]	7	7	7	7	7	7	7	
Element sound level contribution	55	51	29	15	9.4	2.2	2.4	36
Element 2 ,Window STL	-10	-13	-18	-22	-27	-32	-30	
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [13 m2]	11	11	11	11	11	11	11	
Element sound level contribution	63	54	46	39	34	26	23	44
Receiver								
Room volume (-10Log V) [143 m3]	-22	-22	-22	-22	-22	-22	-22	
Reveberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10Log T)	-3	-3	-3	-3	-3	-3	-3	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	64	56	46	39	34	26	23	45

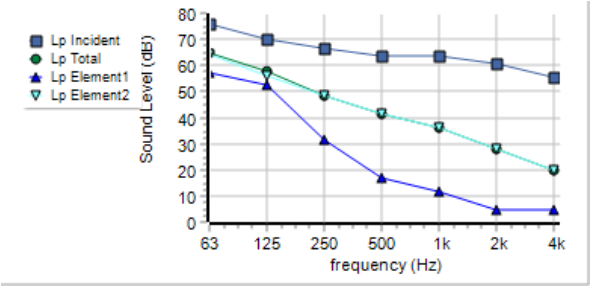
Sound Insulation Prediction (v8.0.9)

According to EN12354/3

Title :Retail

Comments :

STC 24 Window



Date: 25 May 16 Initials:Michael Lafortune

File Name: Retail.inz

	Octave Band Centre Frequency (Hz)							Overall dBA
Source	63	125	250	500	1k	2k	4k	
Incident sound level (freefield)	76	70	66	64	64	61	56	68
Path								
Element 1 ,Wall STL	-15	-13	-31	-43	-48	-52	-47	
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [13 m2]	11	11	11	11	11	11	11	
Element sound level contribution	57	53	31	17	12	4.5	4.7	38
Element 2 ,Window STL	-8	-10	-14	-19	-24	-29	-32	
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [14 m2]	11	11	11	11	11	11	11	
Element sound level contribution	64	56	49	41	36	28	20	46
Receiver								
Room volume (-10Log V) [202 m3]	-23	-23	-23	-23	-23	-23	-23	
Reveberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10Log T)	-3	-3	-3	-3	-3	-3	-3	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	65	58	49	41	36	28	20	46

APPENDIX C

Floor Plan Drawings

CONSTRUCTION ASSEMBLIES:

FOUNDATION WALLS:

W1- PARGING TO 8" BELOW GRADE
PLATON DAMP PROOFING MEMBRANE
8" POURED CONCRETE WALL
BUILDING PAPER
1/2" AIR SPACE
2x6" STUD WALLS @ 16" O.C.
R-24 INSULATION
VAPOUR BARRIER
1/2" GYPSUM BOARD

W2- PARGING 8" BELOW GRADE
DRAINAGE SHEET
8" POUR CONCRETE WALL
DRAINAGE SHEET

EXTERIOR WALLS:

NOTES: SEE DWGS A2.1-4 FOR SPECIFICATION OF FINISH MATERIALS.

EXTERIOR WALLS TO BE W9 UNLESS NOTED OTHERWISE

REFER TO KEY TO MATERIALS ON SHEET 2.1 AND 2.2 FOR STRAPPING DETAILS

STUCCO/ SIDING CLAD:

W9- PROPRIETARY RAINSCREEN CLADDING SYSTEM
MOUNTED AS PER MANUFACTURER'S SPEC
TYVEK AIR BARRIER
7/16" ASPENITE SHEATHING
2x6" WOOD STUDS @ 16" O.C.
R-24 INSULATION
VAPOUR BARRIER
1/2" GYPSUM BOARD

W12 - NON-COMBUSTABLE PROPRIETARY RAINSCREEN CLADDING MOUNTED AS PER MANUFACTURER'S SPEC. - 0.75HR FIRE RATE
TYVEK AIR BARRIER
7/16" ASPENITE SHEATHING F.R.
2x6" WOOD STUDS @ 16" O.C.
R-24 INSULATION
VAPOUR BARRIER
1/2" GYPSUM BOARD TYPE 'X' (USE 5/8" FOR 1HR)

NON-COMBUSTIBLE CONSTRUCTION:

W13 - 1.0 HR FIRE RATING ULC W452
NON-COMBUSTIBLE PROPRIETARY RAINSCREEN CLADDING MOUNTED AS PER MANUFACTURER'S SPEC.
HOT DIPPED GALVANIZED METAL HAT CHANNELS OR Z-BARS TO SUIT CLADDING DIRECTION
TYVEK WEATHER BARRIER
5/8" TYPE 'X' GLASS FACED GYPSUM SHEATHING
4" HOT DIPPED GALVANIZED METAL C-H STUDS AT 16" o.c. (18ga)
1" TYPE 'X' GLASS FACED GYPSUM SHAFT LINER
1/2" AIRSPACE
TYVEK AIR/WEATHER BARRIER
7/16" ASPENITE SHEATHING
2x6" WOOD STUDS @ 16" O.C.
R-24 BATT INSULATION
6 mil POLY VAPOUR BARRIER
5/8" TYPE 'X' GYPSUM BOARD

PARAPET WALL ASSEMBLIES:

P1 - PARAPET LESS THAN 2' IN HEIGHT
CLADDING AS PER EXTERIOR WALL BELOW
TYVEK AIR BARRIER
7/16" ASPENITE SHEATHING
2x6" WOOD STUDS @ 16" O.C.
R-24 INSULATION
7/16" ASPENITE SHEATHING
TYVEK AIR BARRIER
SOPREMA SOPRALENE FLAME STICK BASE SHEET
SOPREMA SOPRALENE 250 GR CAP SHEET
(INSTALLATION, PRIMER & LIQUID MEM. AS PER MAN. SPEC'S)
NOTE: ROOFING MEMBRANE TO LAP UP PARAPET AND UNDER METAL CAP FLASHING.

P2 - PARAPET GREATER THAN 2' IN HEIGHT
CLADDING AS PER EXTERIOR WALL BELOW
TYVEK AIR BARRIER
7/16" ASPENITE SHEATHING
2x6" WOOD STUDS @ 16" O.C.
R-24 INSULATION
7/16" ASPENITE SHEATHING
TYVEK AIR BARRIER
1x3 WOOD STRAPPING
HARDI BOARD PANELS OR SIMILAR, TO 6" ABOVE FINISHED ROOF
NOTE: ROOFING MEMBRANE TO LAP UP PARAPET AND UNDER METAL THROUGH WALL FLASHING.

ROOF ASSEMBLIES:

R1 - FLAT ROOF:
SOPREMA SOPRALENE 250 GR CAP SHEET
SOPREMA SOPRALENE FLAME STICK BASE SHEET
(INSTALLATION, PRIMER & LIQUID MEM. AS PER MAN. SPEC'S)
3/4" EXTERIOR GRADE PLYWOOD
2X6" SLEEPERS @ 16" O.C. SLOPED TO SCUPPERS
MIN. DEPTH 1" STUD CUT TO SLOPE FILL VOID WITH INSULATION
3/4" EXTERIOR GRADE PLYWOOD
STRUCTURE AS NOTED ON DRAWINGS
OPEN CELL S.I.P. POLYURETHANE FOAM INSULATION TO ACHIEVE MINIMUM R31
VAPOUR BARRIER
1x3" WOOD STRAPPING @ 16" O.C.
1/2" GYPSUM BOARD

FLOOR ASSEMBLIES:

F1 - SLAB ON GRADE
35MPa CONCRETE
4" POURED CONCRETE
c/w W.W.M. 6"x6" - 8gax8 ga
VAPOUR BARRIER
2" RIGID INSULATION
8" GRANULAR 'A' ON COMPACTED SUB BASE

F2 - BASEMENT FLOOR
25MPa CONCRETE
4" POURED CONCRETE
VAPOUR BARRIER
2" RIGID INSULATION
8" GRANULAR 'A' ON COMPACTED SUB BASE

F3 - TYPICAL FLOOR
FLOOR FINISH
3/4" T&G OSB OR PLYWOOD SUB-FLOOR
OPEN WEB JOISTS (SEE PLAN)
1x3" WOOD STRAPPING @ 16" O.C.
1/2" GYPSUM BOARD

F4 - STAIR LANDINGS
SAME AS F3 EXCEPT DIMENSIONAL LUMBER JOISTS (SEE PLAN)

F5 - FLOOR ABOVE UNHEATED SPACE
FLOOR FINISH
3/4" T&G OSB OR PLYWOOD SUB-FLOOR
OPEN WEB JOISTS (SEE PLAN)
1x3" WOOD STRAPPING @ 16" O.C.
1/2" OSB OR PLYWOOD SHEATHING
R-31 CLOSED CELL S.I.P. POLYURETHANE FOAM INSULATION (VAPOUR BARRIER APPLICATION)
SOFFIT CONSTRUCTION AS PER SECTIONS AND DETAILS

F6 - CEILING UNDER STAIRS
WOOD STAIRS
1x3" WOOD STRAPPING @ 16" O.C.
1/2" GYPSUM BOARD

F7 - ROOF PATIO
5/4" CEDAR DECK BOARDS
2X4" SLEEPERS @ 16" O.C.
COUNTER SLOPE TO ROOF.
MIN. DEPTH 1" STUD CUT

F8 - 1.0HR FIRE RATED FLOOR (OBC SB-3 F28c)
FLOOR FINISH
3/4" T&G OSB OR PLYWOOD SUB-FLOOR
OPEN WEB JOISTS (SEE PLAN)
MINERAL FIBRE INSULATION
1/2" RESILENT CHANNELS @ 16" O.C.
2-5/8" TYPE 'X' GYPSUM BOARD

INTERIOR WALLS:

NOTE: INTERIOR WALLS TO BE W4 UNLESS DIMENSIONED OR NOTED OTHERWISE.

W4 - TYPICAL INTERIOR WALL
1/2" GYPSUM BOARD
2x4" WOOD STUD AT 16" O.C.
1/2 GYPSUM BOARD

W5 - TYPICAL PLUMBING WALL
1/2" GYPSUM BOARD
2x6" WOOD STUD AT 16" O.C.
1/2" GYPSUM BOARD

W6 - INTERIOR LOAD BEARING WALL
1/2" GYPSUM BOARD
2x6" WOOD STUD AT 16" O.C.
1/2" GYPSUM BOARD

W7 - PARTY WALL - 1 HR. FIRE RATING STC 55+
2-5/8" TYPE 'X' GYPSUM BOARD
2x6 WOOD STUDS @ 16" o.c
6" BATT INSULATION (FIBERGLASS)
1" AIR SPACE
4" BATT INSULATION
1/2" RESILIENT CHANNELS AT 24" o.c.
2-5/8" TYPE 'X' GYPSUM BOARD

WALL, FLOOR & CLG NOTES:

1. ALL T&G FLOOR SHEATHING TO BE GLUED AND SCREWED.
2. TAPE AND FILL ALL GYPSUM BOARD JOINTS.
3. ALL CEILINGS TO BE SMOOTH FINISH UNLESS NOTED OTHERWISE.
4. CERAMIC TILE TO HAVE 5/8" PLYWOOD UNDER.

DOOR NOTES:

1. ALL INTERIOR DOORS TO BE 30x80" UNLESS OTHERWISE NOTED.
2. ALL INTERIOR DOORS TO BE FLAT PANEL UNLESS OTHERWISE NOTED.
3. ALL EXTERIOR DOORS TO BE 36" UNLESS NOTED OTHERWISE, RESISTANT TO FORCED ENTRY AS PER OBC.

WINDOW NOTES:

1. ALL WINDOWS TO HAVE DRYWALL RETURNS.

MISC. NOTES:

1. INSTALL INTERCONNECTED SMOKE AND CARBON MONOXIDE DETECTORS AS PER OBC.
2. INSTALL SMOKE DETECTOR ON EACH FLOOR AND IN EVERY BEDROOM AS PER OBC.
3. EXHAUST DRYER TO EXTERIOR.
4. WINDOWS ARE NUMBERED AND SIZES ARE NOTED ON ELEVATION DRAWINGS.
5. EXTERIOR DOORS ARE NUMBERED AND SIZES ARE NOTED ON ELEVATION DWGS.
6. INSTALL WATER RESISTANT FLOORING IN KITCHEN
7. LAUNDRY ROOMS ABOVE GRADE TO HAVE WATER RESISTANT FLOORING, PAN & DRAIN

BATHROOM NOTES:

1. ALL FIXTURES TO BE CSA APPROVED.
2. INSTALL EXHAUST FAN IN EACH WASHROOM, VENTED TO EXTERIOR. (F)
3. INSTALL WATER RESISTANT DRYWALL AND FLOORING.
4. PROVIDE WATER-PROOF WALL FINISH TO A HEIGHT NOT LESS THAN 6' ABOVE FINISHED FLOOR OF SHOWER, 4' ABOVE RIM OF TUB W/SHOWER, 16" ABOVE RIM OF TUB W/OUT SHOWER.
5. PROVIDE BACKING FOR FUTURE INSTALLATION OF GRAB BARS TO CONFORM TO O.B.C. 9.5.2.3. PLACEMENT MUST CONFORM TO 3.8.3.8.(1)(d) FOR TOILETS AND TO 3.8.3.13.(1)(f) FOR BATHTUBS AND SHOWER STALLS. REFER TO DRAWINGS PROVIDED.

STRUCTURAL NOTES:

-LUMBER TO BE S-P-F #1/#2 OR BETTER
-LVL TO BE 2.0E Fb=3100 PSI OR BETTER
-HSS TO BE ASTM A500, GRADE C OR BETTER
-STEEL TO BE 350W, ASTM A992/AS72
GRADE 50 OR BETTER

POSTS
P1 TELEPOST
P2 2-2x4/6
P3 3-2x4/6
P4 4-2x4/6
P6 4x4 P.T. OR CEDAR
P7 6x6 CEDAR
P8 HSS 3.5" x 3.5" x 0.188"
P9 HSS 4" x 4" x 0.25"

LINTELS
ALL LINTELS IN WOOD FRAME WALLS TO BE 2-2x10" UNLESS NOTED OTHERWISE. WITH 2-2x6" POSTS E/S

JOISTS:
16" OPEN WEB JOISTS @ 16" O.C. MAX. UNLESS OTHERWISE NOTED.
SERIES AND SPACING AS PER SUPPLIERS INSTALLATION AND DETAIL DRAWINGS.

BEAMS:
1. ALL BEAMS TO BE LVL UNLESS OTHERWISE NOTED.
2. ALL BEAMS TO BE FLUSH UNLESS OTHERWISE NOTED.

FOUNDATION NOTES:
1. STRIP FOOTING TO BE 30"x8" CONCRETE .
2. 4" CONCRETE FLOOR SLAB (TYP.) COMP. STRENGTH 25MPa, TROWELED FINISH.
3. GROUND FLOOR SLAB ON GRADE COMP. STRENGTH 25MPa, TROWELED FINISH.
4. MIN. SOIL BEARING CAPACITY: 130kPa.

GENERAL STRUCTURAL NOTES:
1. ALL POSTS TO BE TAKEN TO SOUND BEARING.
2. PROVIDE POINT LOAD BLOCKING IN EACH FLOOR SPACE BELOW POSTS.
3. CONTRACTOR TO SUBMITT PROPOSED TRUSS, JOIST AND LVL BEAM LAYOUT TO ARCH. FOR REVIEW PRIOR TO MANUFACTURING.
4. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR ALL GUARDS, C/W ENGINEERS STAMP.
5. LOAD BEARING WOOD FRAME WALLS TO BE 2x6" STUDS AT 16"O.C. UNLESS NOTED
6. LEDGER BOARD FOR DECK TO BE MIN 2x12" C/W 1/2" DIAM. LAG BOLTS @ 24" O.C, AND WITH HOCKEY PUCK SPACERS..
7. NON LOADBEARING INTERIOR WALLS THAT RUN PARALLEL TO FLOOR JOISTS SHALL BE SUPPORTED BY JOISTS BENEATH OR BLOCKING BETWEEN JOISTS

FLOOR JOIST NOTE:
FJP = AS PER FLOOR JOIST MANUFACTURER'S PLAN

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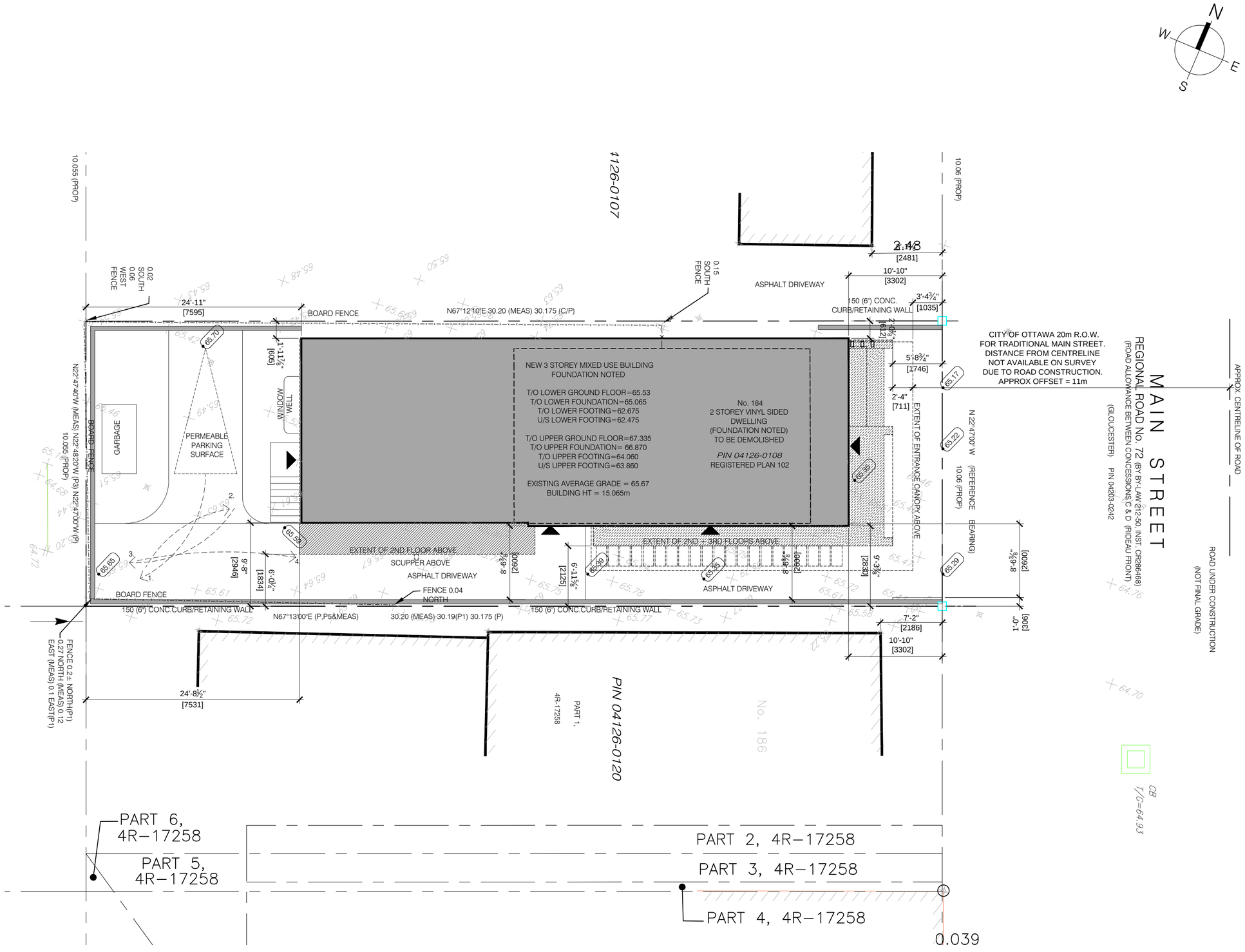
No.	Y / M / D	REVISION
8.	2016/04/29	COORDINATION
7.	2016/02/22	COORDINATION
6.	2016/01/21	CONSULTATION
5.	2016/01/14	CLIENT REVIEW
4.	2015/12/18	FLOOR JOIST COORDINATION
3.	2015/12/17	NEW FOUNDATION COORDINATION
2.	2015/12/11	STRUCTURAL COORDINATION
1.	2015/12/04	PRELIMINARY STRUCTURE

Consultants:

LAY RESIDENCE
184 MAIN STREET OTTAWA ON K1S 1C2

CONSTRUCTION NOTES

Drawn By:	Date:	
AW	NOV. 2015	A0.2
Project No: 1514	Scale: NTS	



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No.	Y / M / D	REVISION
8.	2016/04/29	COORDINATION
7.	2016/02/22	COORDINATION
6.	2016/01/21	CONSULTATION
5.	2016/01/14	CLIENT REVIEW
4.	2015/12/18	FLOOR JOIST COORDINATION
3.	2015/12/17	NEW FOUNDATION COORDINATION
2.	2015/12/11	STRUCTURAL COORDINATION
1.	2015/12/04	PRELIMINARY STRUCTURE

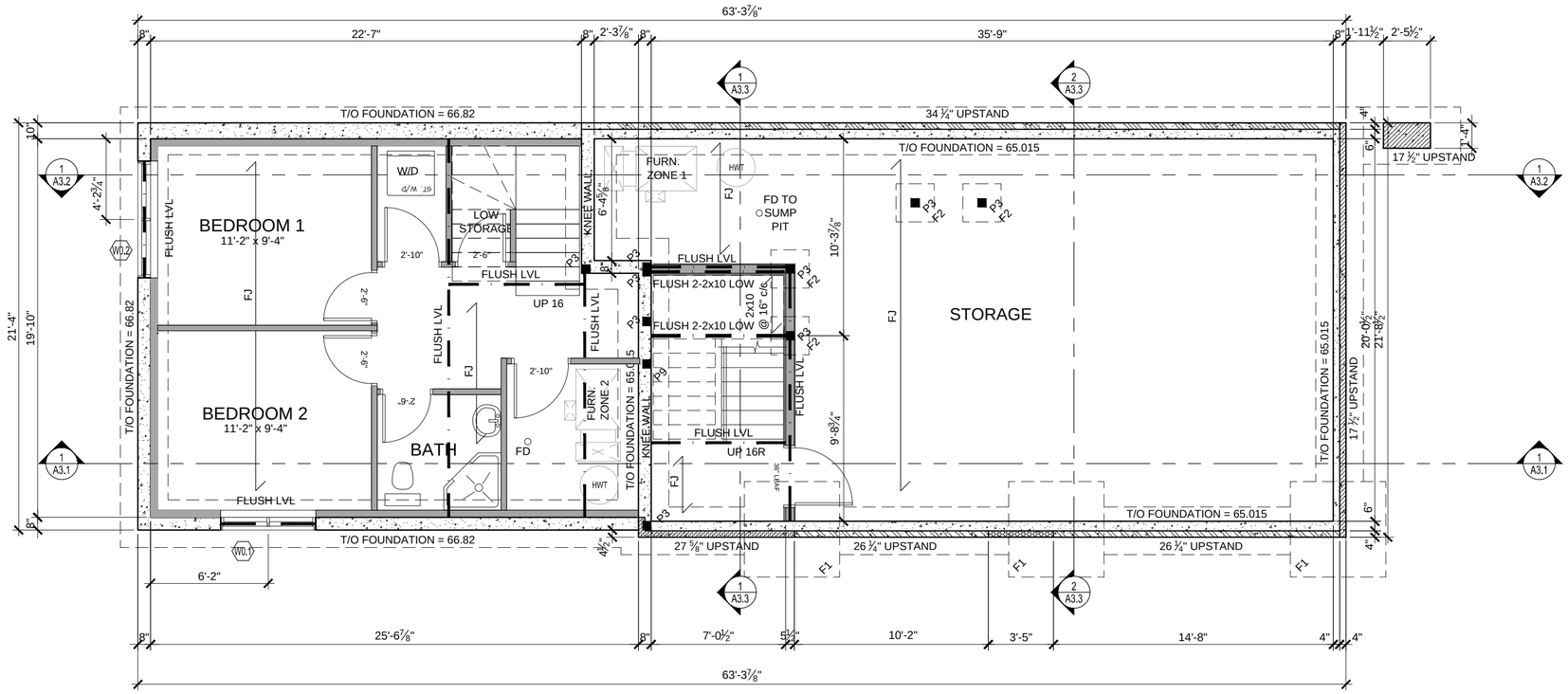
Consultants:

LAY RESIDENCE

184 MAIN STREET OTTAWA ON K1S 1C2

SITE PLAN

Drawn By:	Date:	
AW	NOV. 2015	A0.1
Project No: 1514	Scale: 1/8" = 1'0"	



1 A1.1 BASEMENT FLOOR PLAN

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

FJ = 16" OPEN WEB WOOD

CONC. PAD FOOTINGS
MIN. BEARING CAPACITY 95KPa

F1 = 60" x 60" x 12" PAD
c/w 6-15M(B) E/W

F2 = 24" x 24" x 10" PAD
c/w 3-15M(B) E/W

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3.	2015/12/17	NEW FOUNDATION COORDINATION
2.	2015/12/11	STRUCTURAL COORDINATION
1.	2015/12/04	PRELIMINARY STRUCTURE

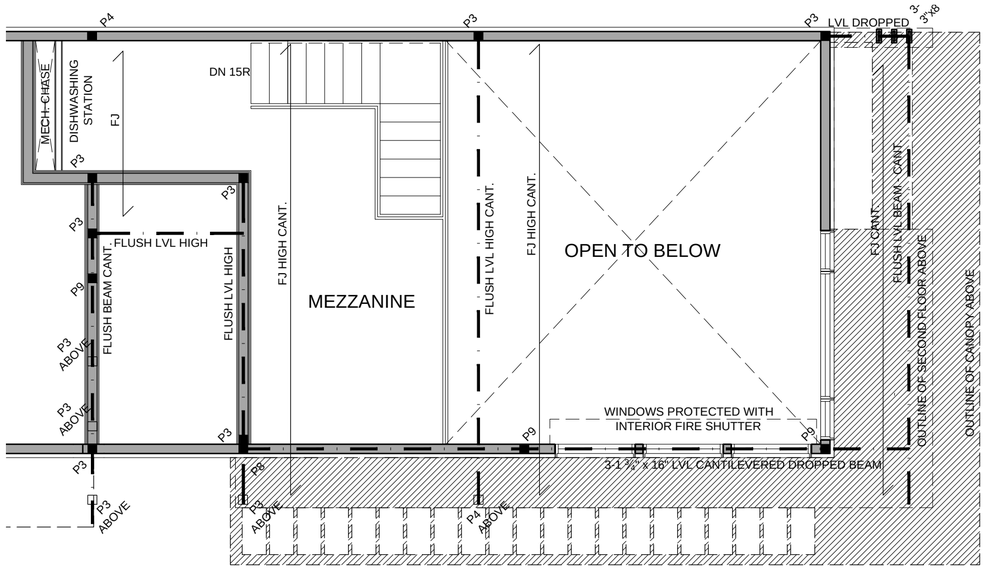
Consultants:

LAY RESIDENCE

184 MAIN STREET OTTAWA ON K1S 1C2

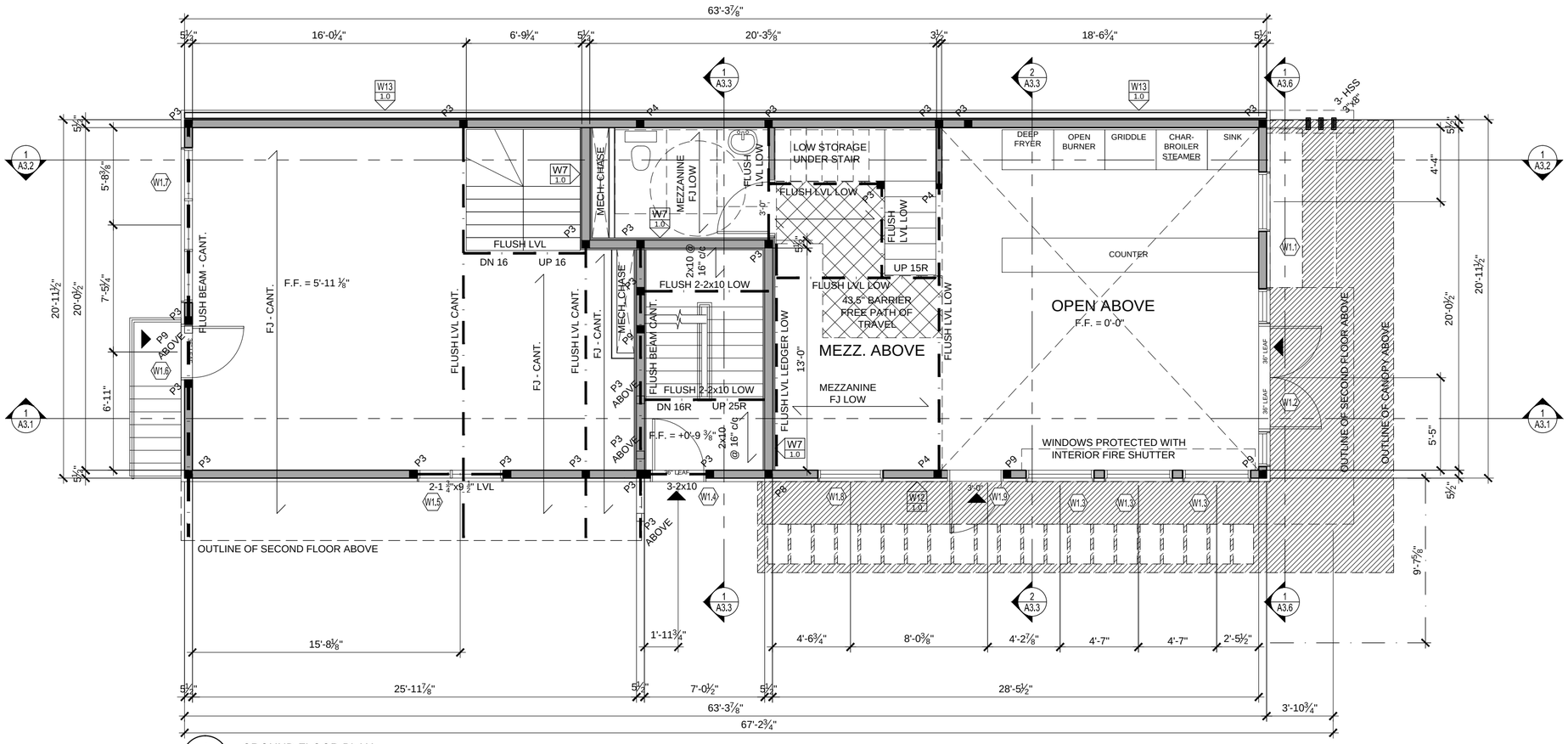
BASEMENT FLOOR PLAN

Drawn By:	Date:	
AW	NOV. 2015	A1.1
Project No: 1514	Scale: 3/16" = 1'0"	



2 / A1.2 MEZZANINE PLAN

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



1 / A1.2 GROUND FLOOR PLAN

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

FJ = 16" OPEN WEB WOOD MEZZANINE FJ = 9.5" TJI

UNLESS NOTED ALL LINTELS TO BE 2-2x10 c/w 2-2x6 EACH END

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1.	2015/12/04	PRELIMINARY STRUCTURE

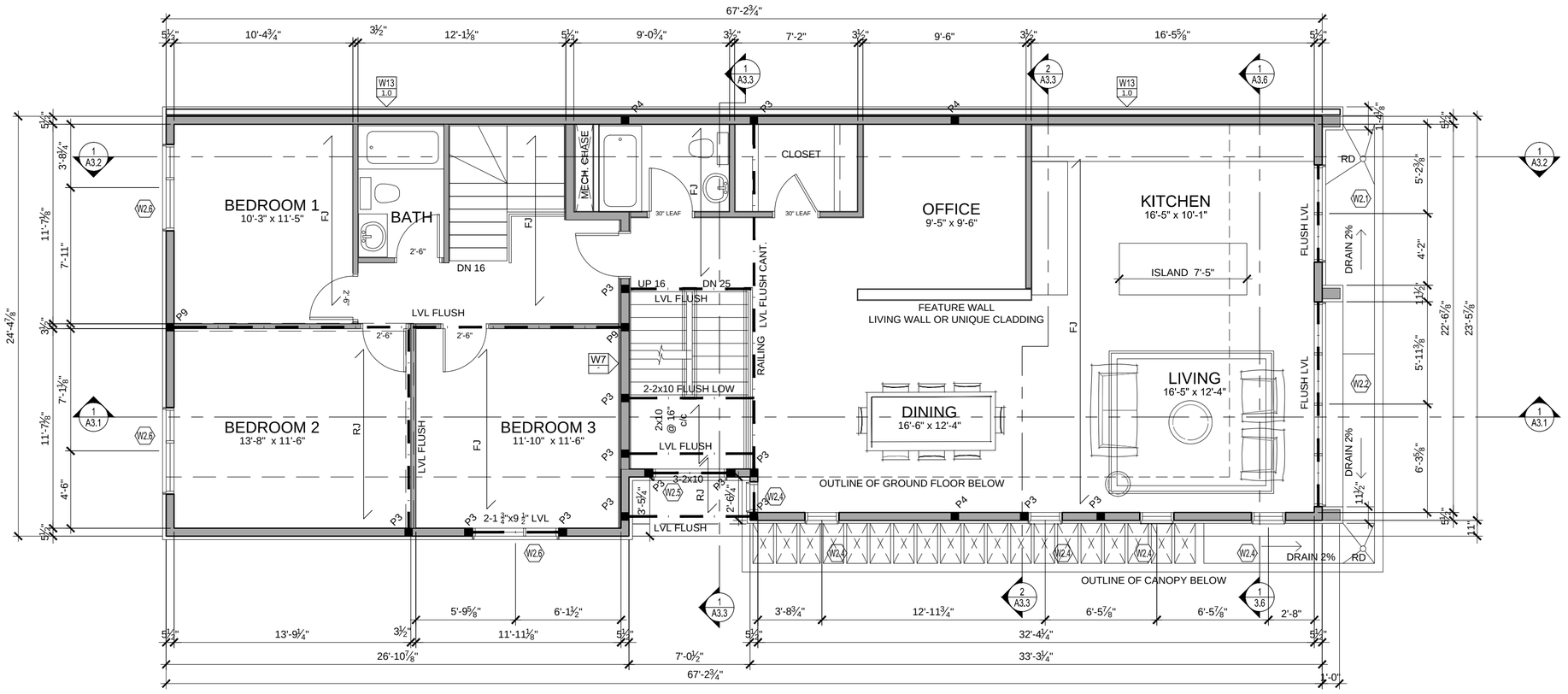
Consultants:

LAY RESIDENCE

184 MAIN STREET OTTAWA ON K1S 1C2

GROUND FLOOR PLAN

Drawn By:	Date:	
AW	NOV. 2015	A1.2
Project No: 1514	Scale: 3/16" = 1'0"	



1 A1.3 SECOND FLOOR PLAN

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

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Consultants:

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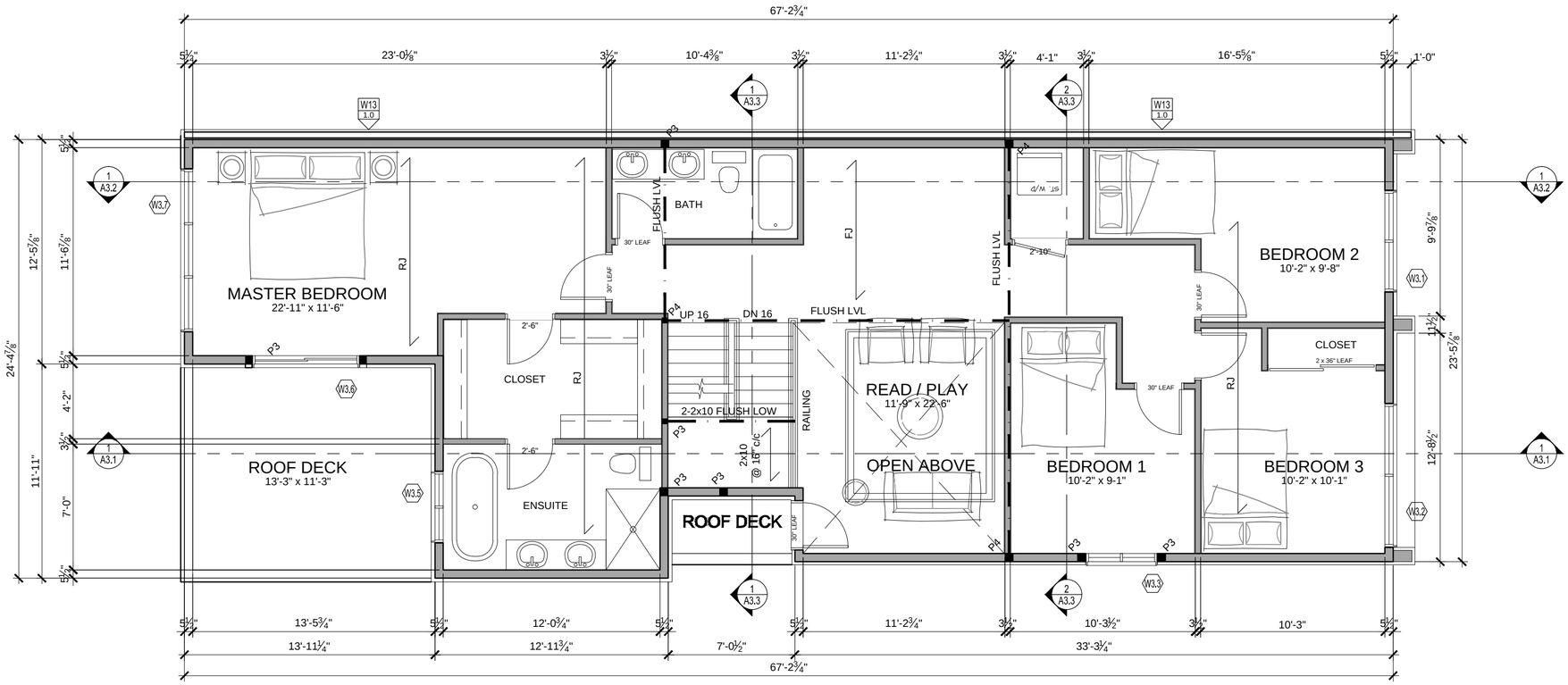
SECOND FLOOR PLAN

Drawn By:	Date:	
AW	NOV. 2015	A1.3
Project No: 1514	Scale: 3/16" = 1'0"	



1 A1.4 THIRD FLOOR PLAN

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

FJ = 16" OPEN WEB WOOD
RJ = 16" OPEN WEB WOOD

UNLESS NOTED ALL
LINTELS TO BE 2-2x10
c/w 2-2x6 EACH END

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1.	2015/12/04	PRELIMINARY STRUCTURE

Consultants:

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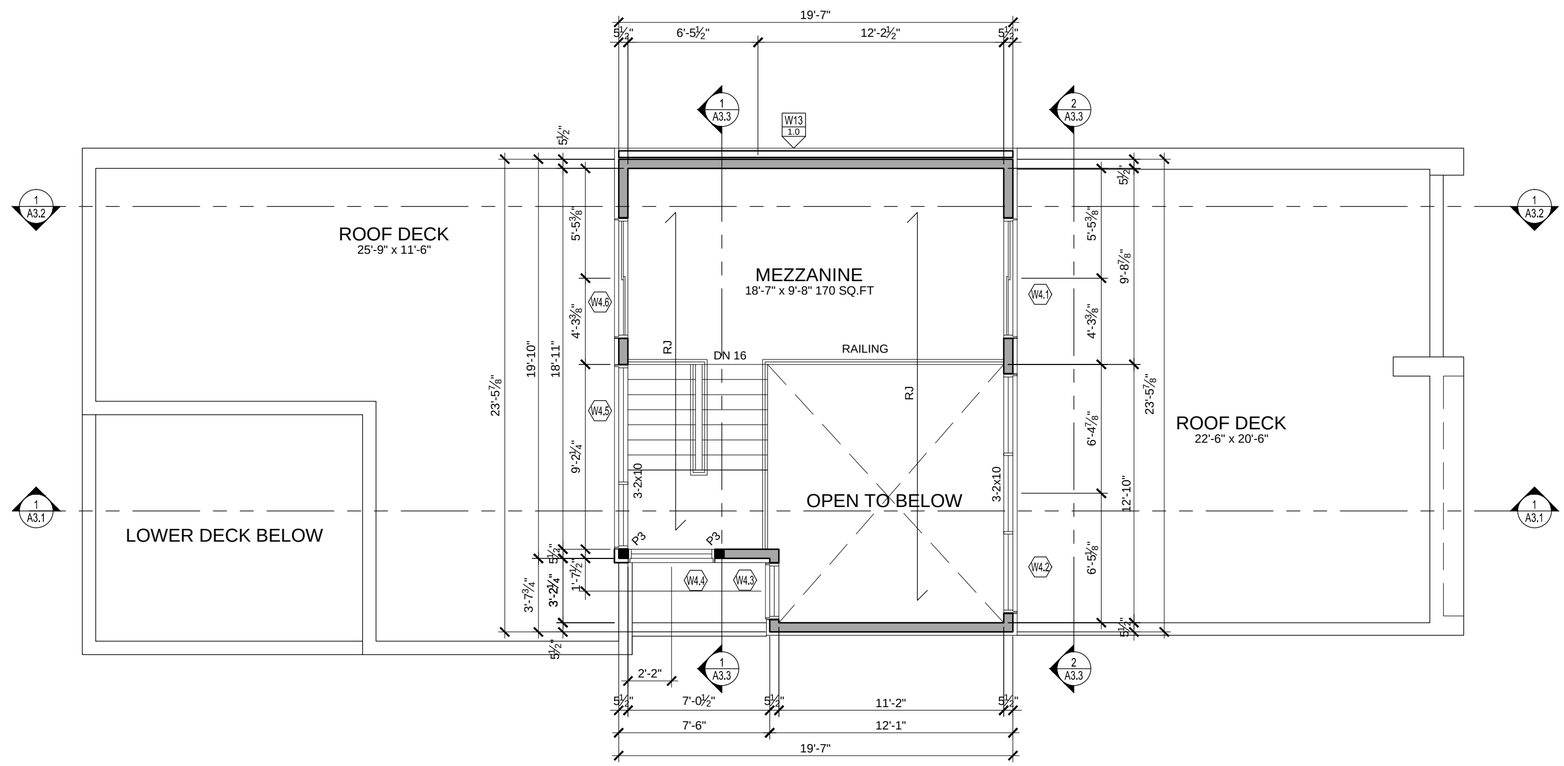
184 MAIN STREET OTTAWA ON K1S 1C2

THIRD FLOOR PLAN

Drawn By:	Date:	
AW	NOV. 2015	A1.4
Project No: 1514	Scale: 3/16" = 1'0"	



1 A1.5 MEZZANINE / ROOF FLOOR PLAN

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

RJ = 16" OPEN WEB WOOD

UNLESS NOTED ALL LINTELS TO BE 2-2x10 c/w 2-2x6 EACH END

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1.	2015/12/04	PRELIMINARY STRUCTURE

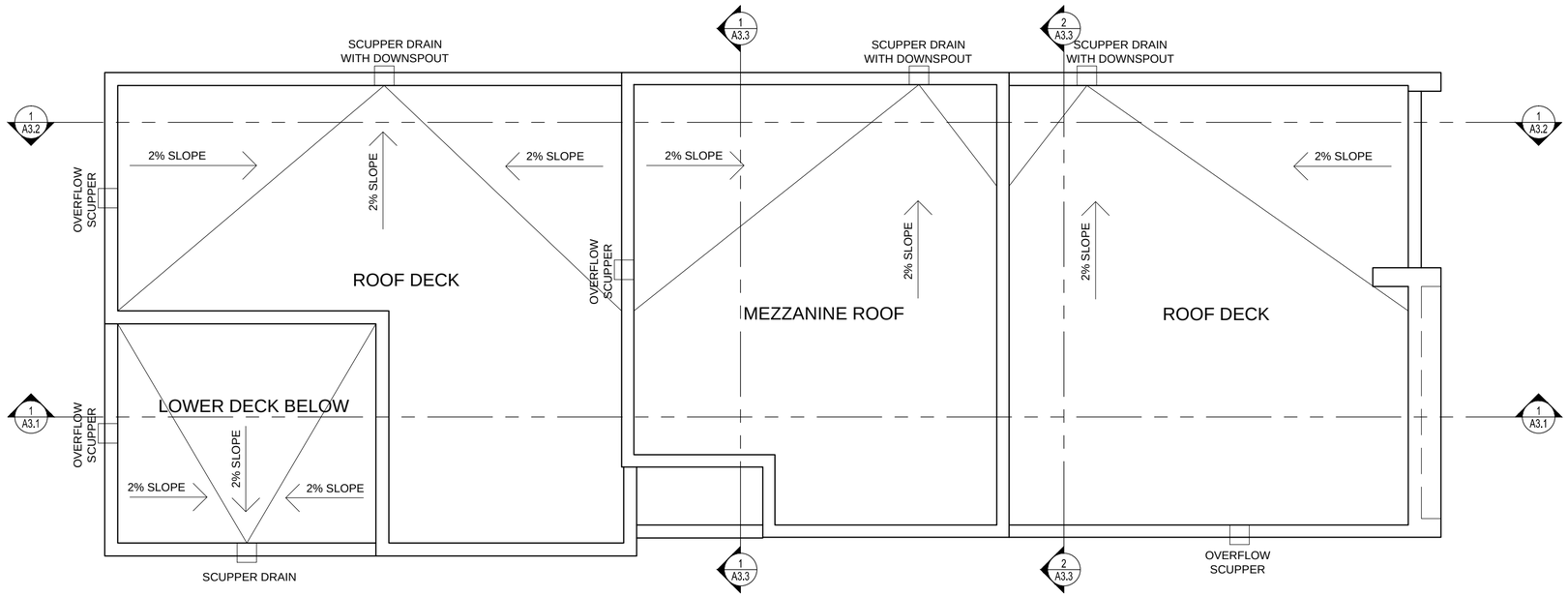
Consultants:

LAY RESIDENCE

184 MAIN STREET OTTAWA ON K1S 1C2

MEZZANINE PLAN

Drawn By:	Date:	
AW	NOV. 2015	A1.5
Project No: 1514	Scale: 3/16" = 1'0"	



1 A1.6 ROOF PLAN
SCALE: 3/16" = 1'-0"

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1.	2015/12/04	PRELIMINARY STRUCTURE

Consultants:

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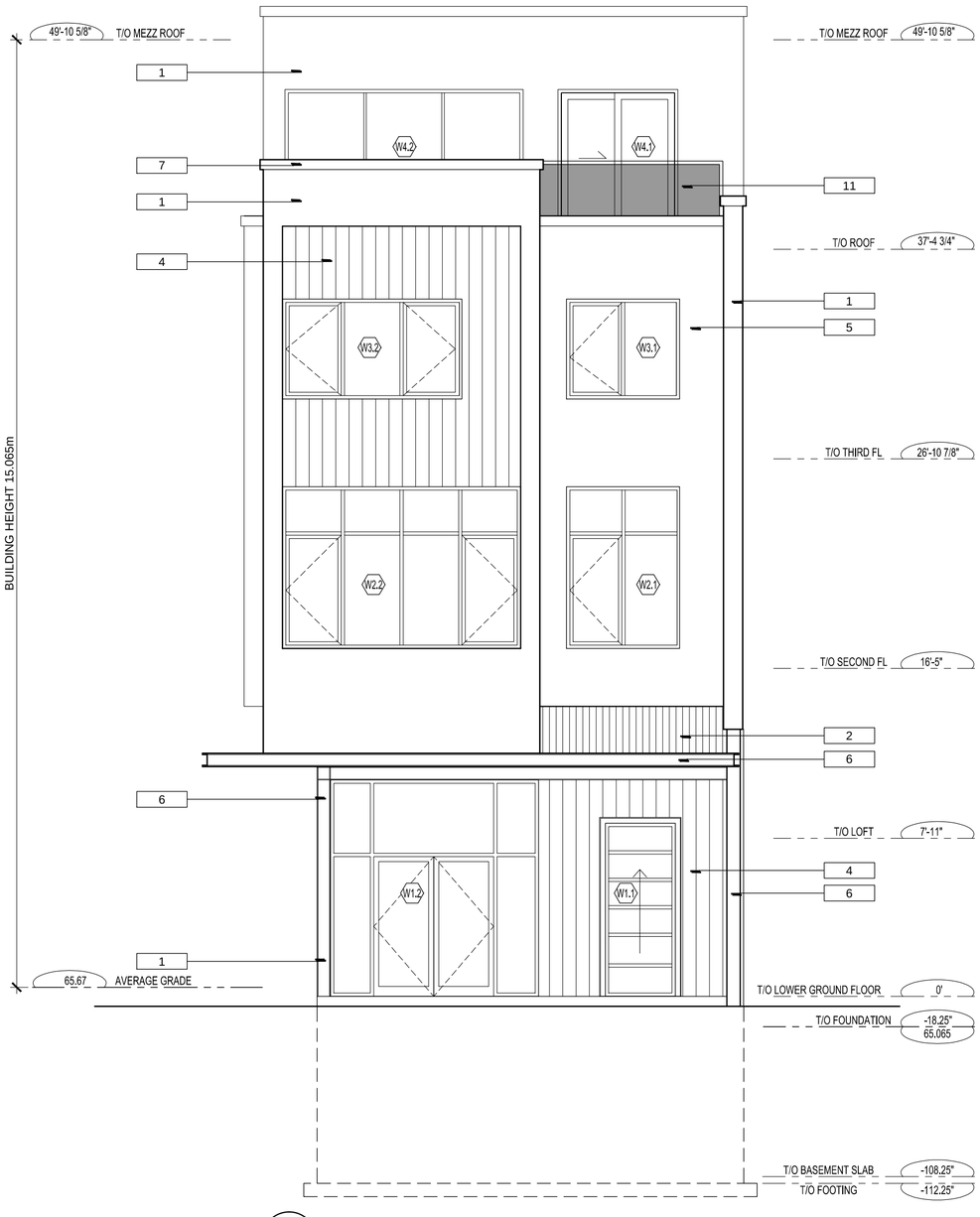
184 MAIN STREET OTTAWA ON K1S 1C2

ROOF PLAN

Drawn By:	Date:	
AW	NOV. 2015	A1.6
Project No: 1514	Scale: 3/16" = 1'0"	

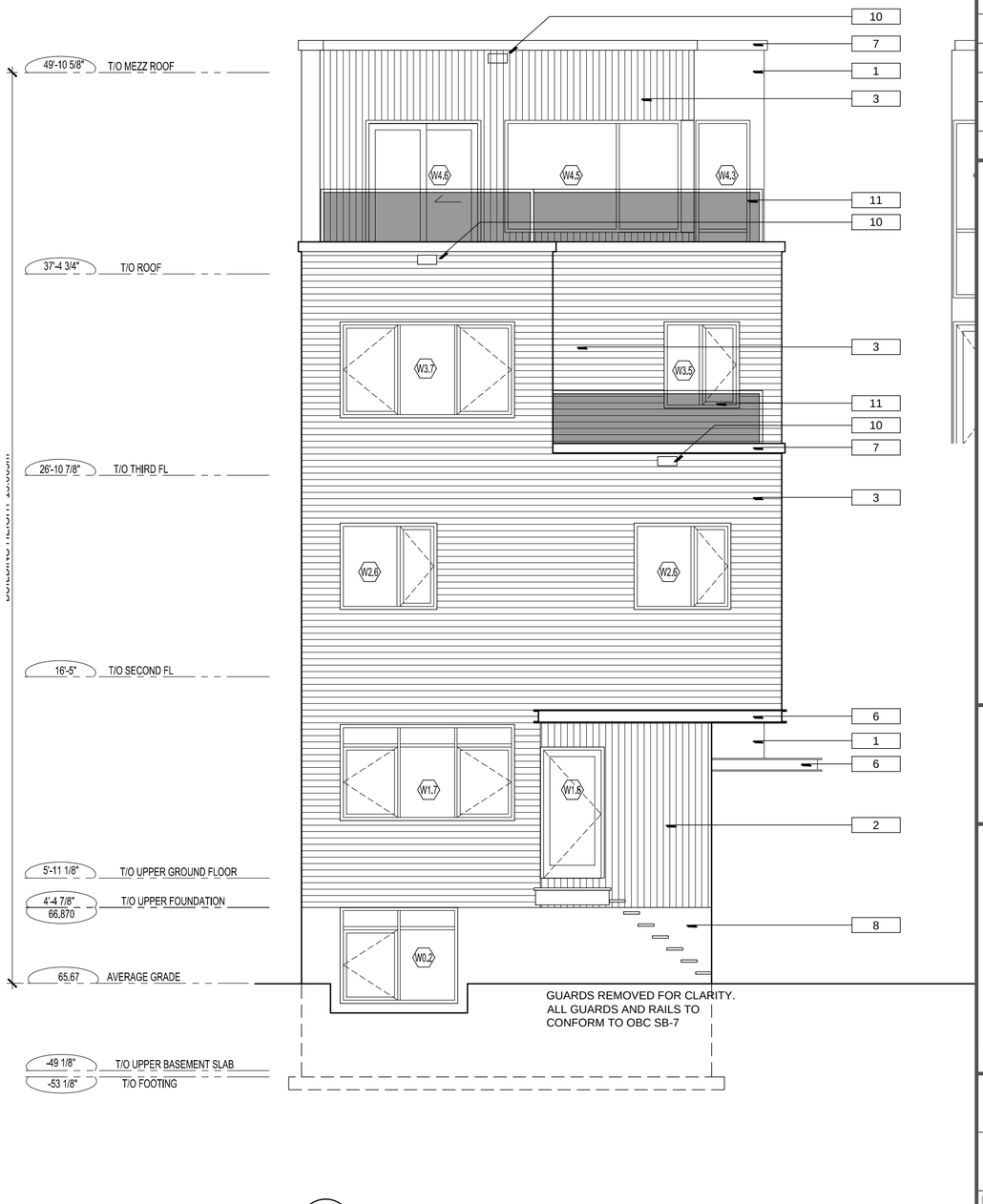
KEY TO MATERIALS

1	CORTEN WEATHERING STEEL ON 2-1X4 WOOD STRAPPING (V+H)
2	VERTICAL ⅞" CORRUGATED METAL SIDING - CHARCOAL ON 1X4 WOOD STRAPPING (H)
3	HORIZONTAL ⅞" CORRUGATED METAL SIDING - GALVALUME ON 1X4 WOOD STRAPPING (V)
4	VERTICAL 1" WEATHERED WOOD PLANKS. VARIOUS WIDTHS. ON 1X4 WOOD STRAPPING (H)
5	STUCCO- CCMC APPROVED 2" EIFS - CHARCOAL
6	PAINTED STRUCTURAL STEEL
7	PREFINISHED METAL
8	CEMENT PARGING
9	SCUPPER AND DOWNSPOUT
10	SCUPPER
11	ALUMINUM AND GLASS GAURD. ENG. DWGS TO BE PROVIDED TO BUILDING INSPECTOR ON SITE



1 A2.1 FRONT ELEVAITON

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



2 A2.1 REAR ELEVAITON

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

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1.	2015/12/04	PRELIMINARY STRUCTURE

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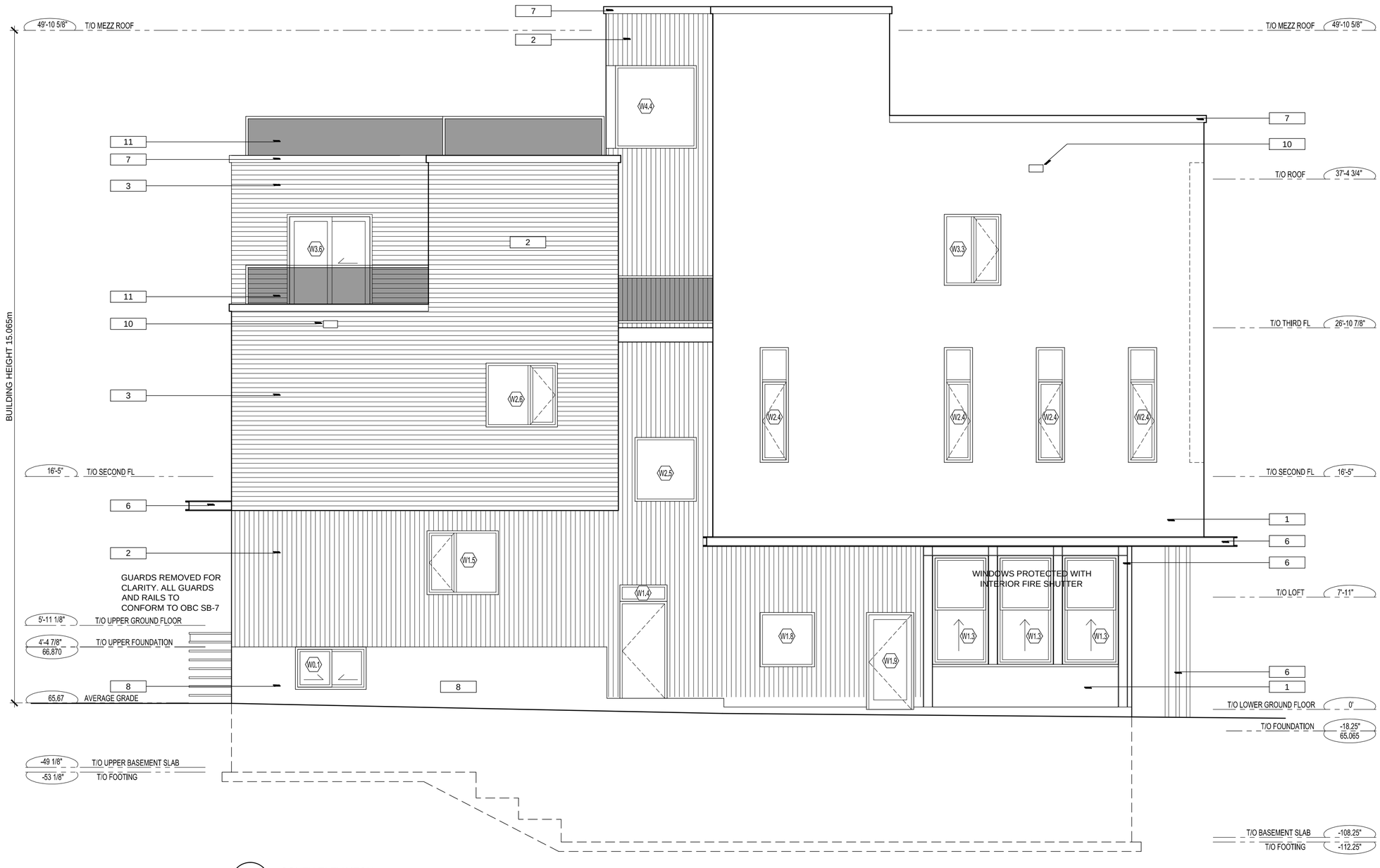
184 MAIN STREET OTTAWA ON K1S 1C2

ELEVATIONS

Drawn By:	Date:	
AW	NOV. 2015	A2.1
Project No: 1514	Scale: 3/16" = 1'-0"	

KEY TO MATERIALS

1	CORTEN WEATHERING STEEL ON 2-1X4 WOOD STRAPPING (V+H)
2	VERTICAL 7/8" CORRUGATED METAL SIDING - CHARCOAL ON 1X4 WOOD STRAPPING (H)
3	HORIZONTAL 7/8" CORRUGATED METAL SIDING - GALVALUME ON 1X4 WOOD STRAPPING (V)
4	VERTICAL 1" WEATHERED WOOD PLANKS. VARIOUS WIDTHS. ON 1X4 WOOD STRAPPING (H)
5	STUCCO- CCMC APPROVED 2" EIFS - CHARCOAL
6	PAINTED STRUCTURAL STEEL
7	PREFINISHED METAL
8	CEMENT PARGING
9	SCUPPER AND DOWNSPOUT
10	SCUPPER
11	ALUMINUM AND GLASS GAURD. ENG. DWGS TO BE PROVIDED TO BUILDING INSPECTOR ON SITE



1 / A2.2 SOUTH ELEVAITON

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

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1.	2015/12/04	PRELIMINARY STRUCTURE

Consultants:

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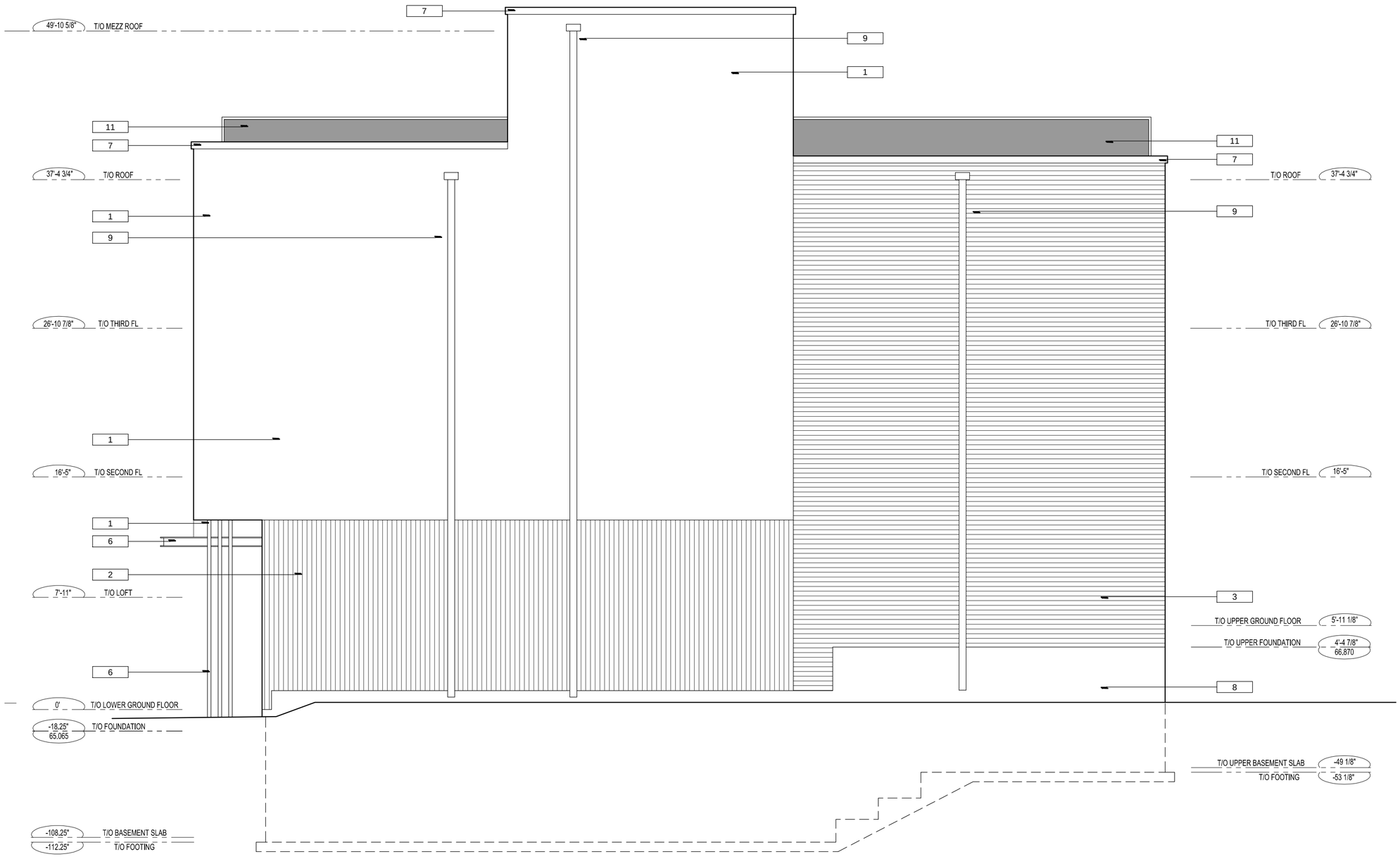
184 MAIN STREET OTTAWA ON K1S 1C2

ELEVATIONS

Drawn By:	Date:	
AW	NOV. 2015	A2.2
Project No: 1514	Scale: 3/16" = 1'-0"	

KEY TO MATERIALS

1	CORTEN WEATHERING STEEL ON 2-1X4 WOOD STRAPPING (V+H)
2	VERTICAL ⅞" CORRUGATED METAL SIDING - CHARCOAL ON 1X4 WOOD STRAPPING (H)
3	HORIZONTAL ⅞" CORRUGATED METAL SIDING - GALVALUME ON 1X4 WOOD STRAPPING (V)
4	VERTICAL 1" WEATHERED WOOD PLANKS. VARIOUS WIDTHS. ON 1X4 WOOD STRAPPING (H)
5	STUCCO- CCMC APPROVED 2" EIFS - CHARCOAL
6	PAINTED STRUCTURAL STEEL
7	PREFINISHED METAL
8	CEMENT PARGING
9	SCUPPER AND DOWNSPOUT
10	SCUPPER
11	ALUMINUM AND GLASS GAURD. ENG. DWGS TO BE PROVIDED TO BUILDING INSPECTOR ON SITE



1 / A2.3 NORTH ELEVAITON

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

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1.	2015/12/04	PRELIMINARY STRUCTURE

Consultants:

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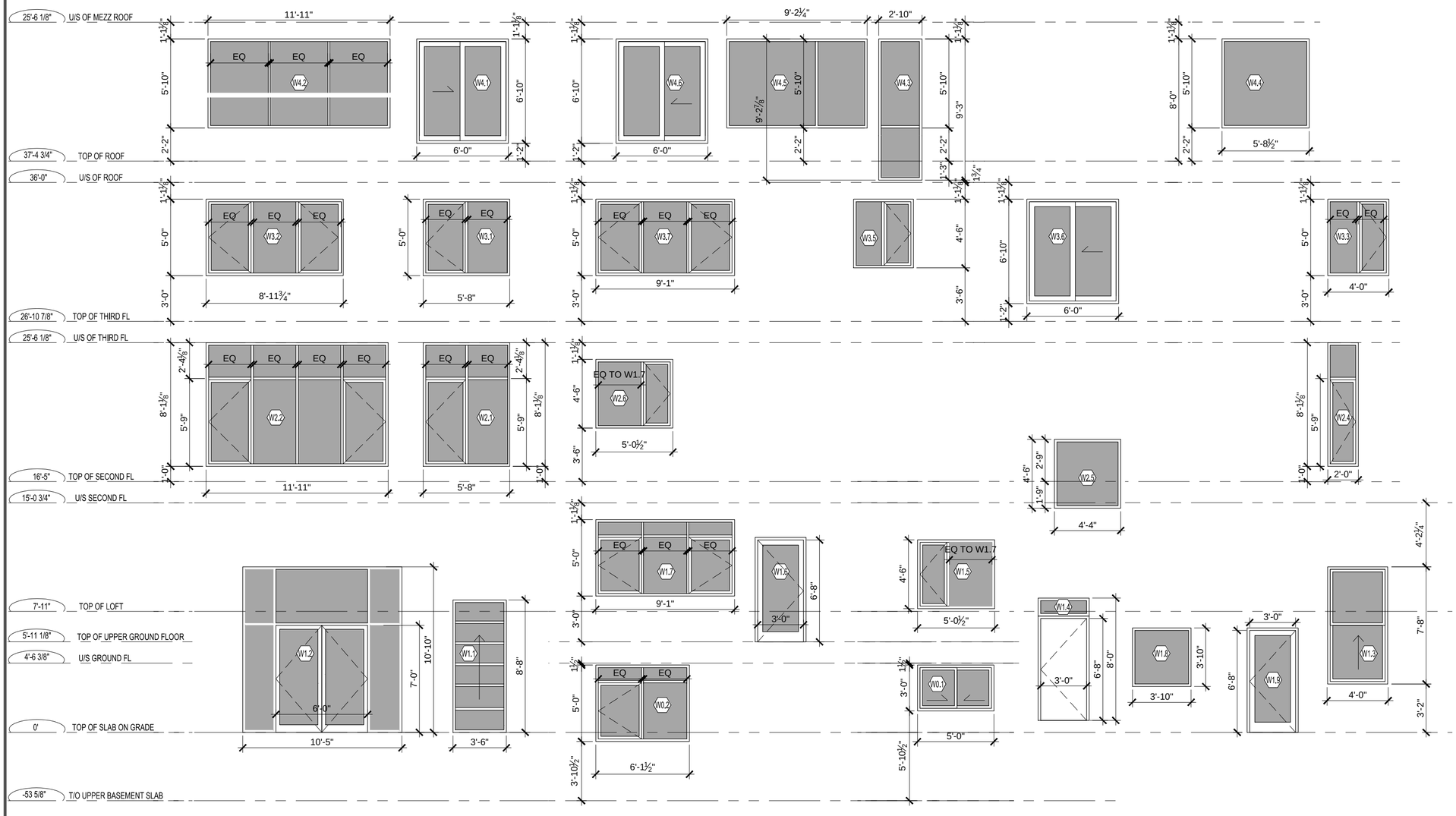
184 MAIN STREET OTTAWA ON K1S 1C2

ELEVATIONS

Drawn By:	Date:	
AW	NOV. 2015	A2.3
Project No: 1514	Scale: 3/16" = 1'-0"	



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Consultants:

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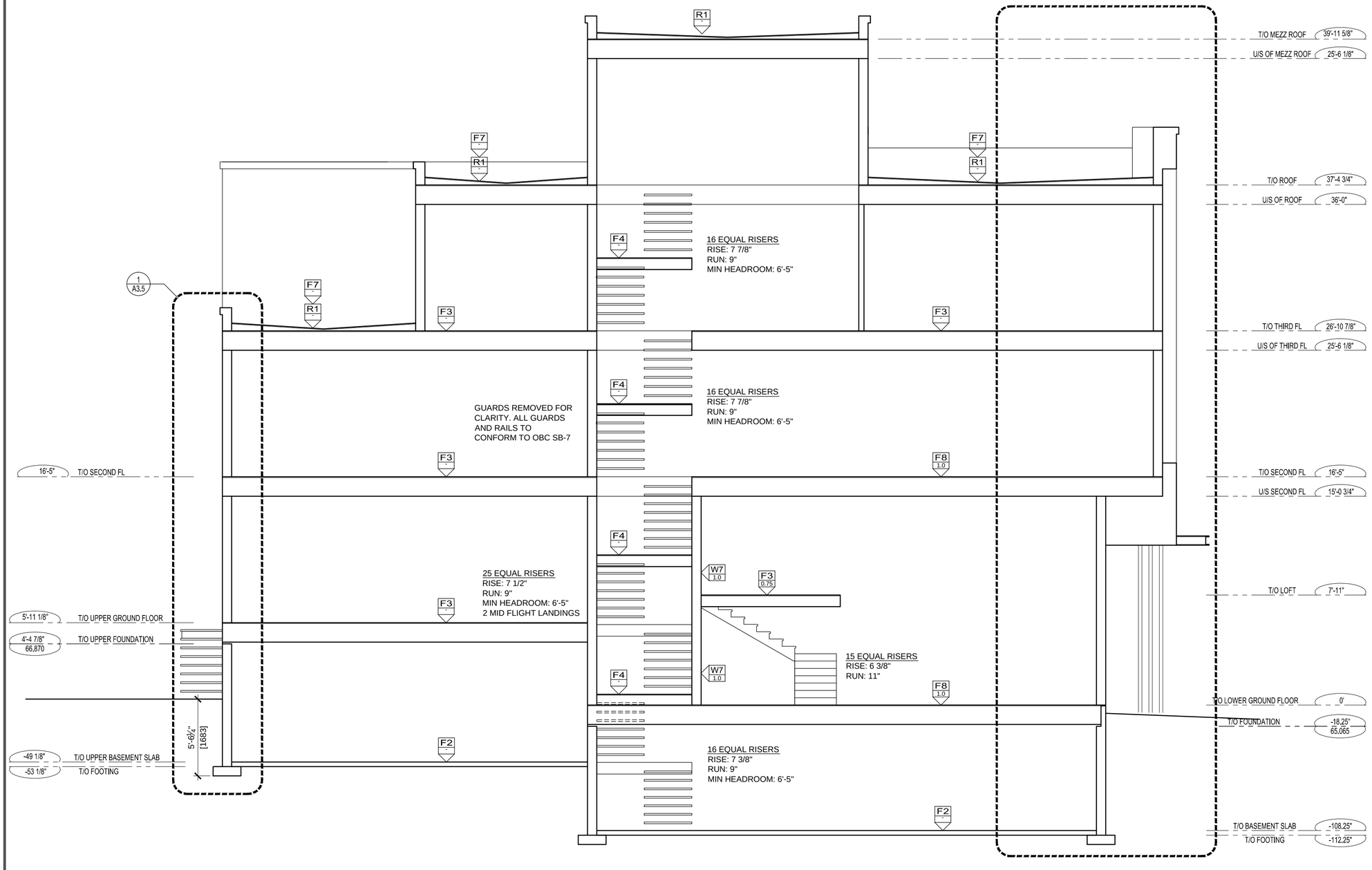
184 MAIN STREET OTTAWA ON K1S 1C2

WINDOW SCHEDULE

Drawn By:	Date:	
AW	NOV. 2015	W1.1
Project No: 1514	Scale: 3/16" = 1'0"	



1 A3.1 BUILDING SECTION

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

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1.	2015/12/04	PRELIMINARY STRUCTURE

Consultants:

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BUILDING SECTION

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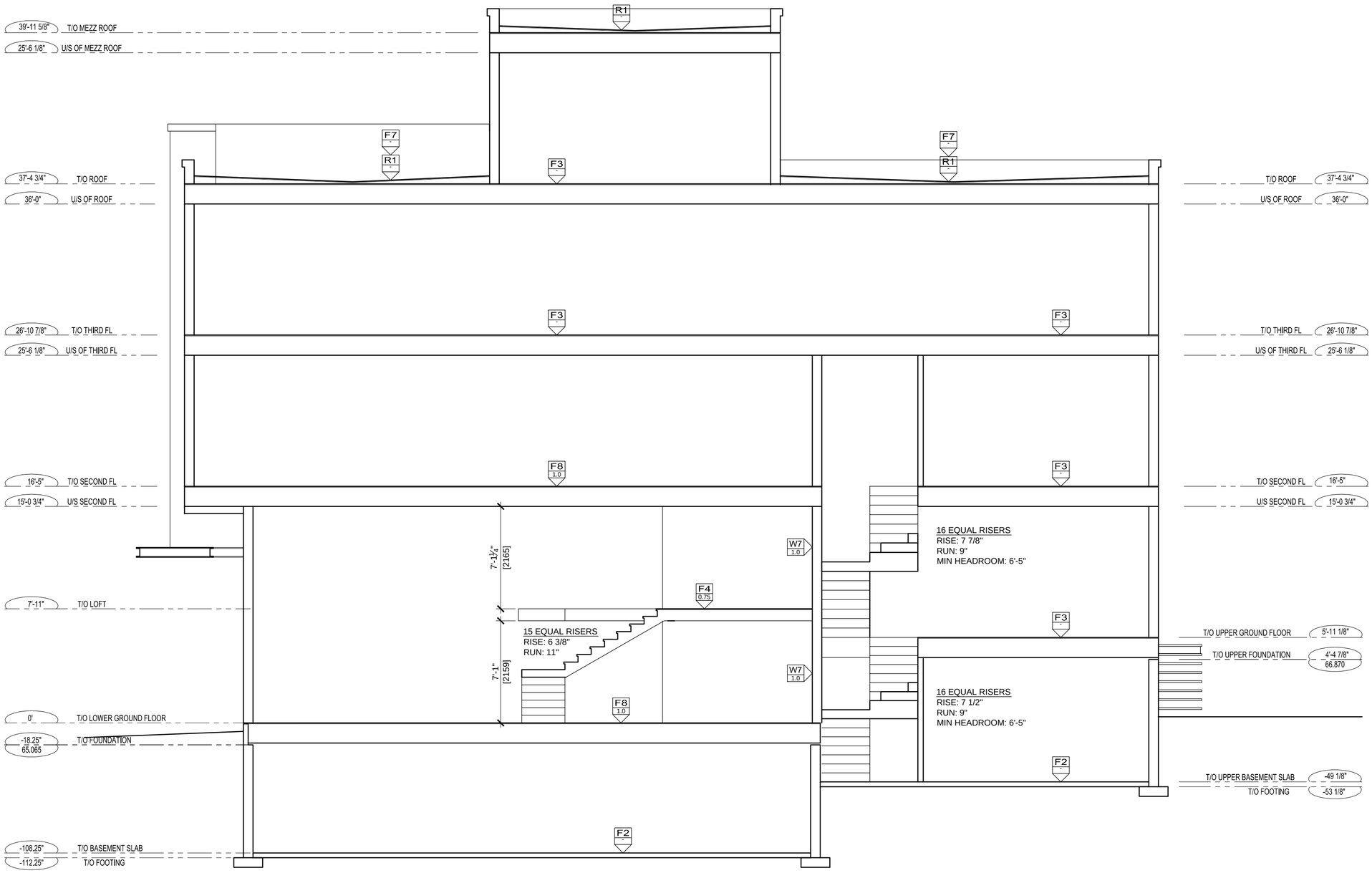
AW	NOV. 2015	A3.1
Project No: 1514	Scale: 3/16" = 1'-0"	



1 / A3.2 BUILDING SECTION

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

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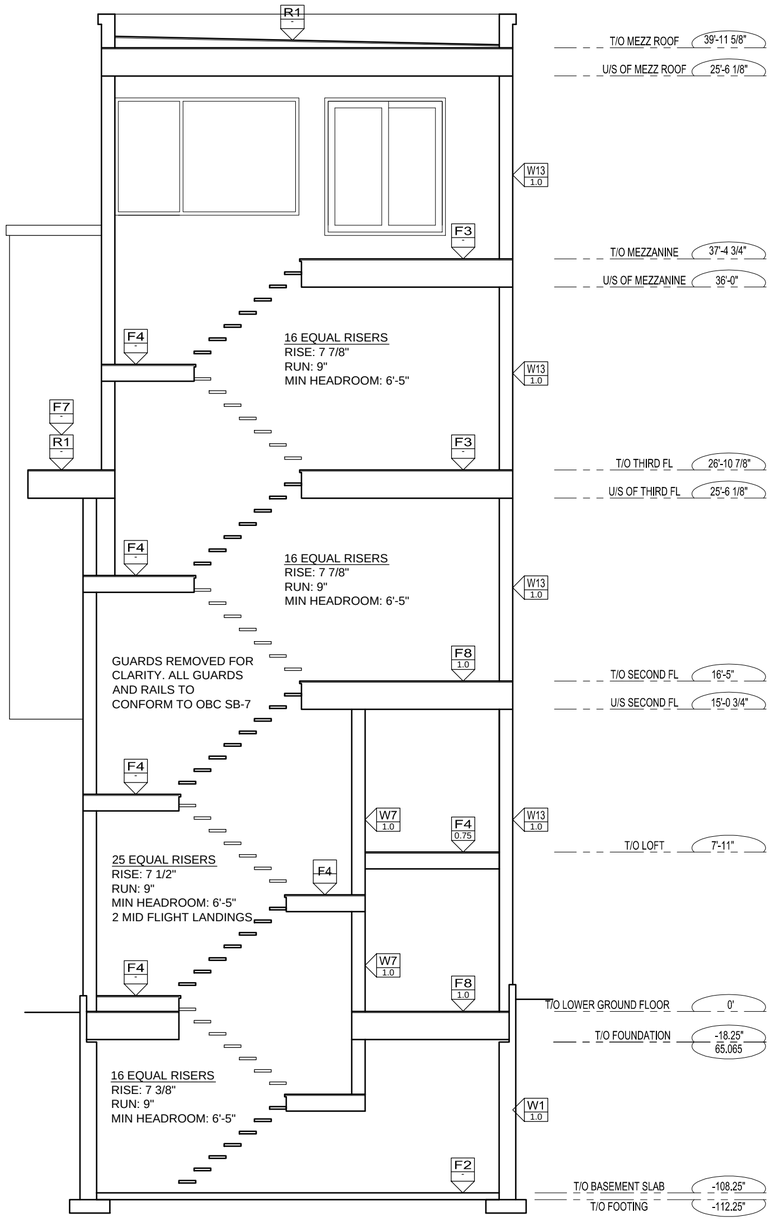
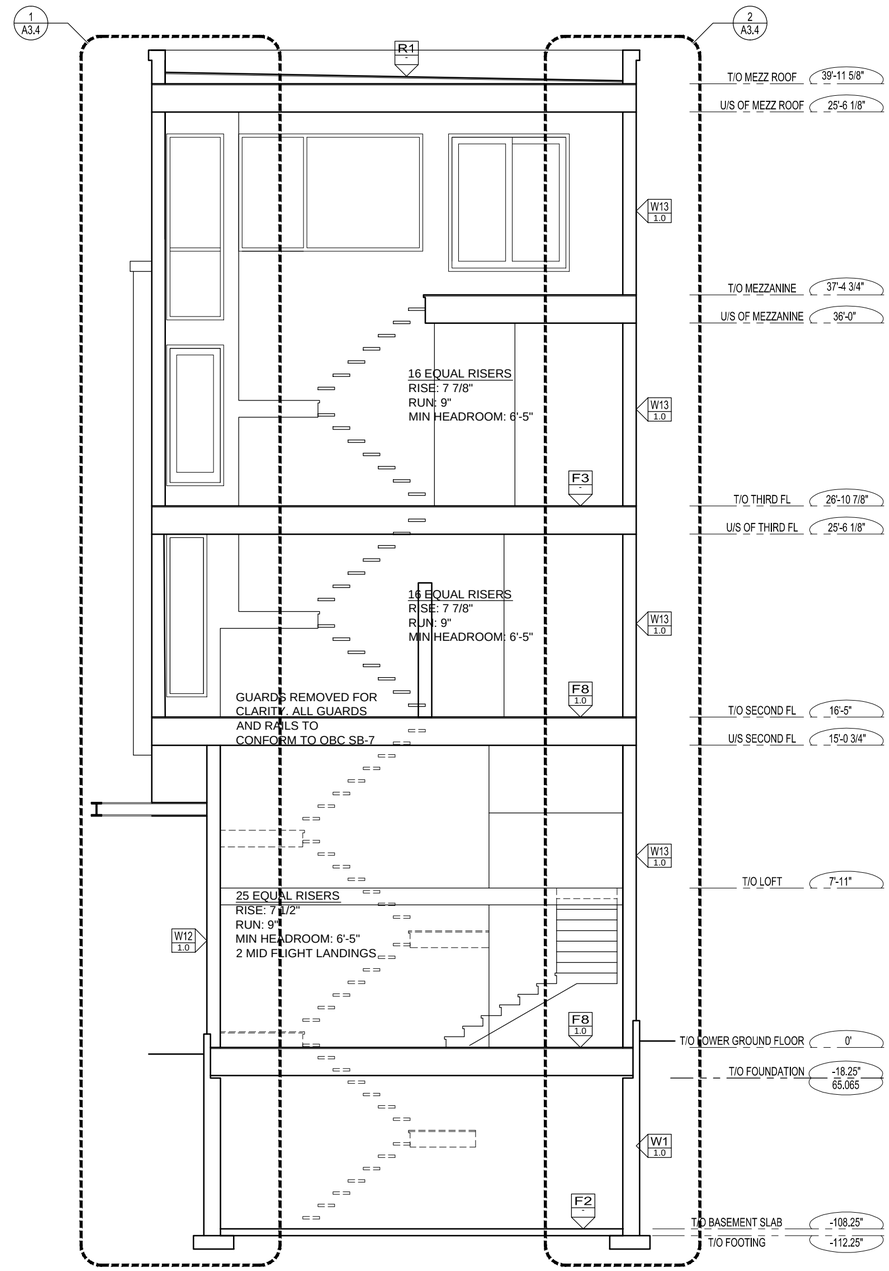
BUILDING SECTION

Drawn By:	Date:	
AW	NOV. 2015	A3.2
Project No: 1514	Scale: 3/16" = 1'-0"	



1 / A3.3 BUILDING SECTION

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



2 / A3.3 BUILDING SECTION

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

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BUILDING SECTION

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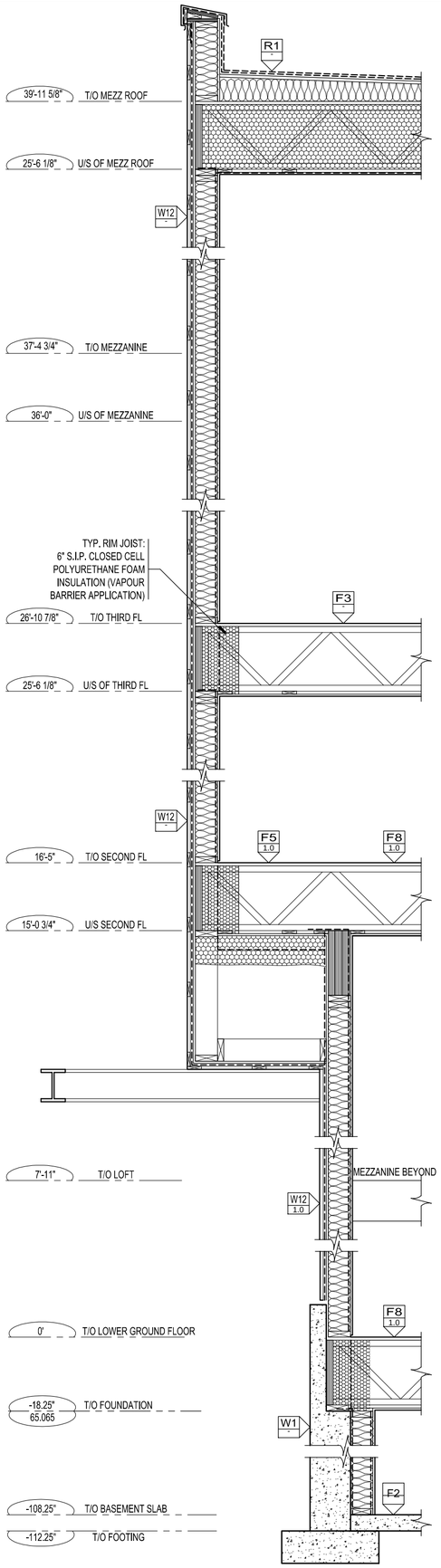
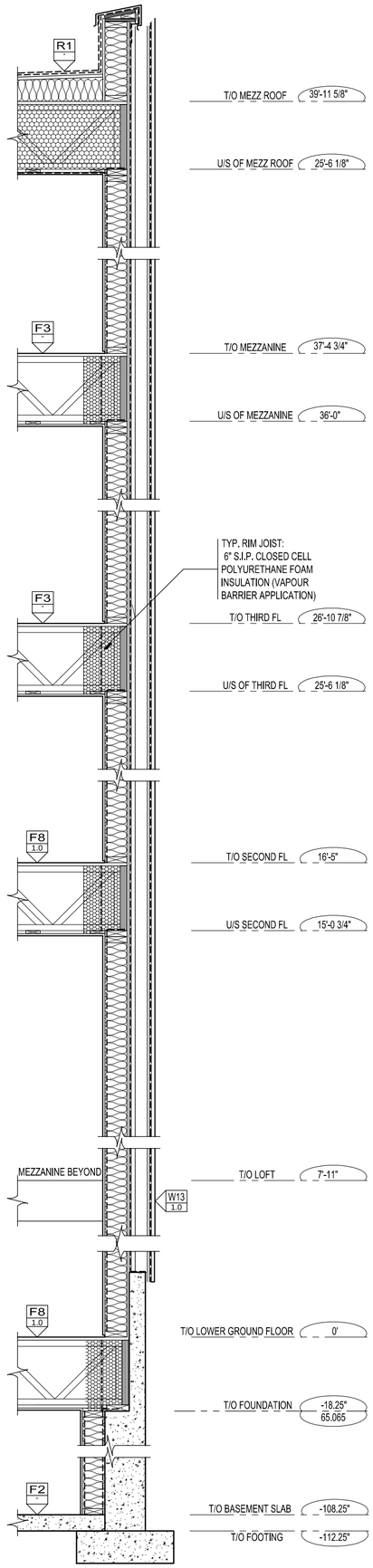


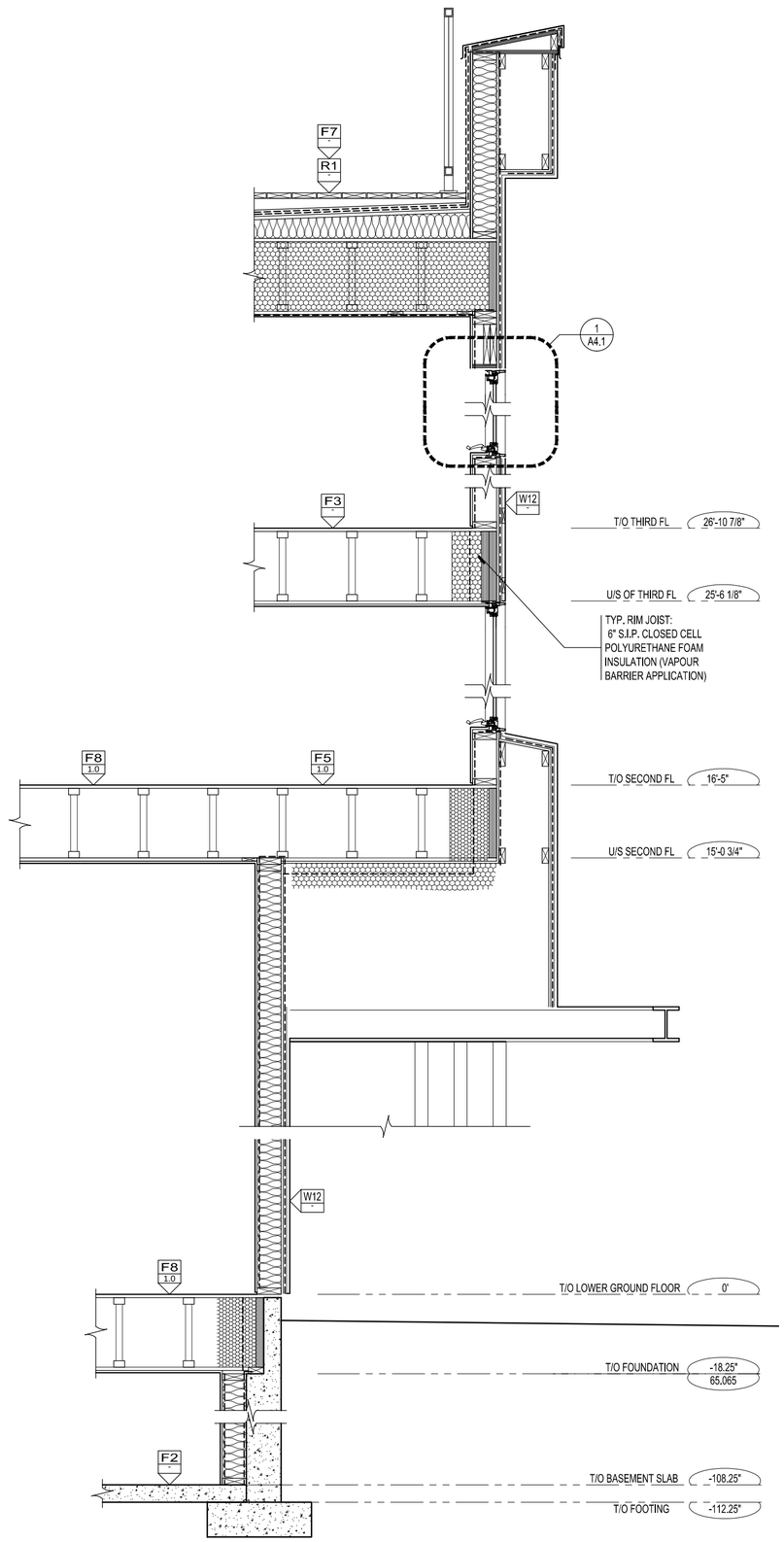
1 A3.4 WALL SECTION AT SOUTH WALL

SCALE: 1/2" = 1'-0"



2 A3.4 WALL SECTION AT NORTH WALL

SCALE: 1/2" = 1'-0"



3 A3.4 WALL SECTION AT EAST WALL

SCALE: 1/2" = 1'-0"

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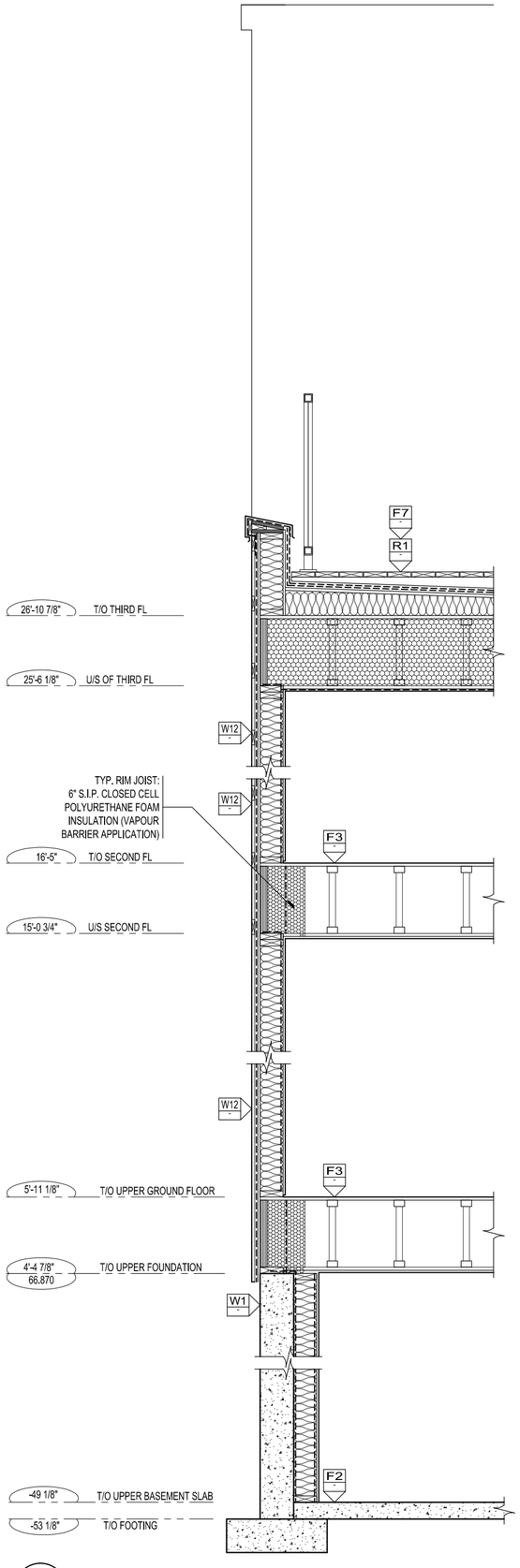
Consultants:

LAY RESIDENCE
184 MAIN STREET OTTAWA ON K1S 1C2

WALL SECTIONS

Drawn By:	Date:	
AW	NOV. 2015	A3.4
Project No: 1514	Scale: 3/4" = 1'-0"	



1 / A3.5 WALL SECTION AT WEST WALL

SCALE: 1/2" = 1'-0"

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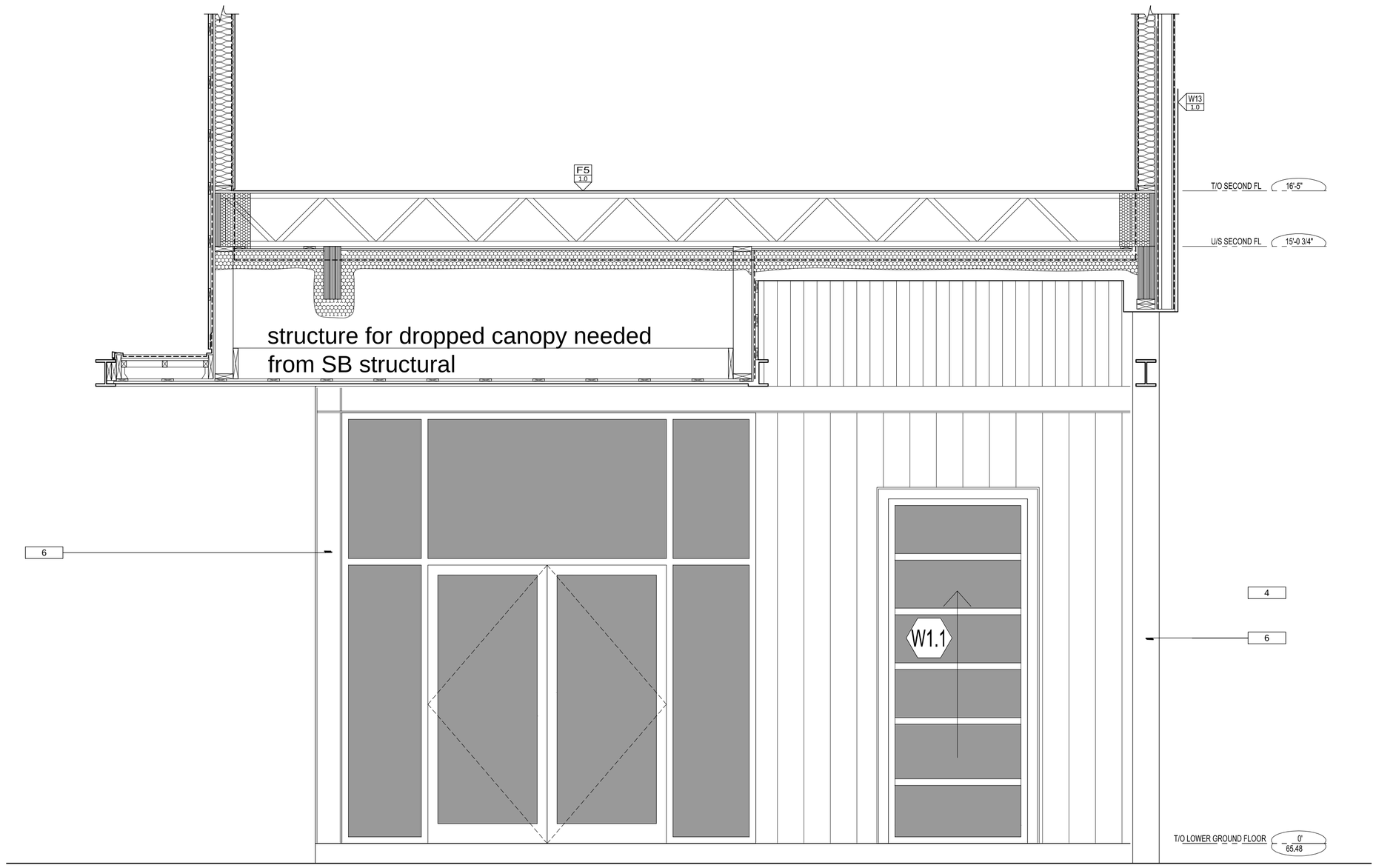
3.	2015/12/17	NEW FOUNDATION COORDINATION
2.	2015/12/11	STRUCTURAL COORDINATION
1.	2015/12/04	PRELIMINARY STRUCTURE

Consultants:

LAY RESIDENCE
184 MAIN STREET OTTAWA ON K1S 1C2

WALL SECTIONS

Drawn By:	Date:	
AW	NOV. 2015	A3.5
Project No: 1514	Scale: 3/4" = 1'-0"	



1 / A3.6 WALL SECTION AT CANOPY

SCALE: 1/2" = 1'-0"

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No.	Y / M / D	REVISION
8.	2016/04/29	COORDINATION
7.	2016/02/22	COORDINATION
6.	2016/01/21	CONSULTATION
5.	2016/01/14	CLIENT REVIEW
4.	2015/12/18	FLOOR JOIST COORDINATION
3.	2015/12/17	NEW FOUNDATION COORDINATION
2.	2015/12/11	STRUCTURAL COORDINATION
1.	2015/12/04	PRELIMINARY STRUCTURE

Consultants:

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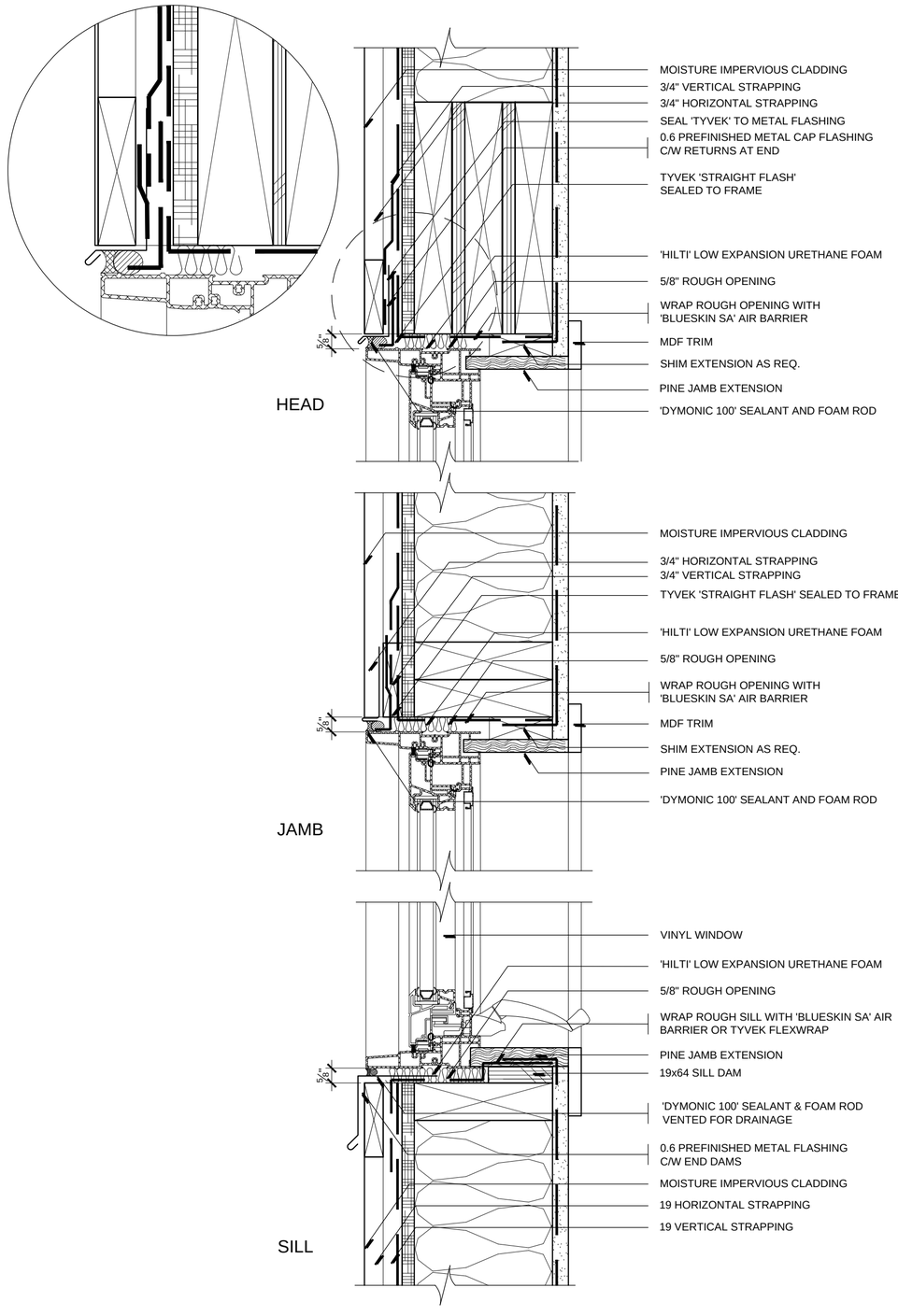
184 MAIN STREET OTTAWA ON K1S 1C2

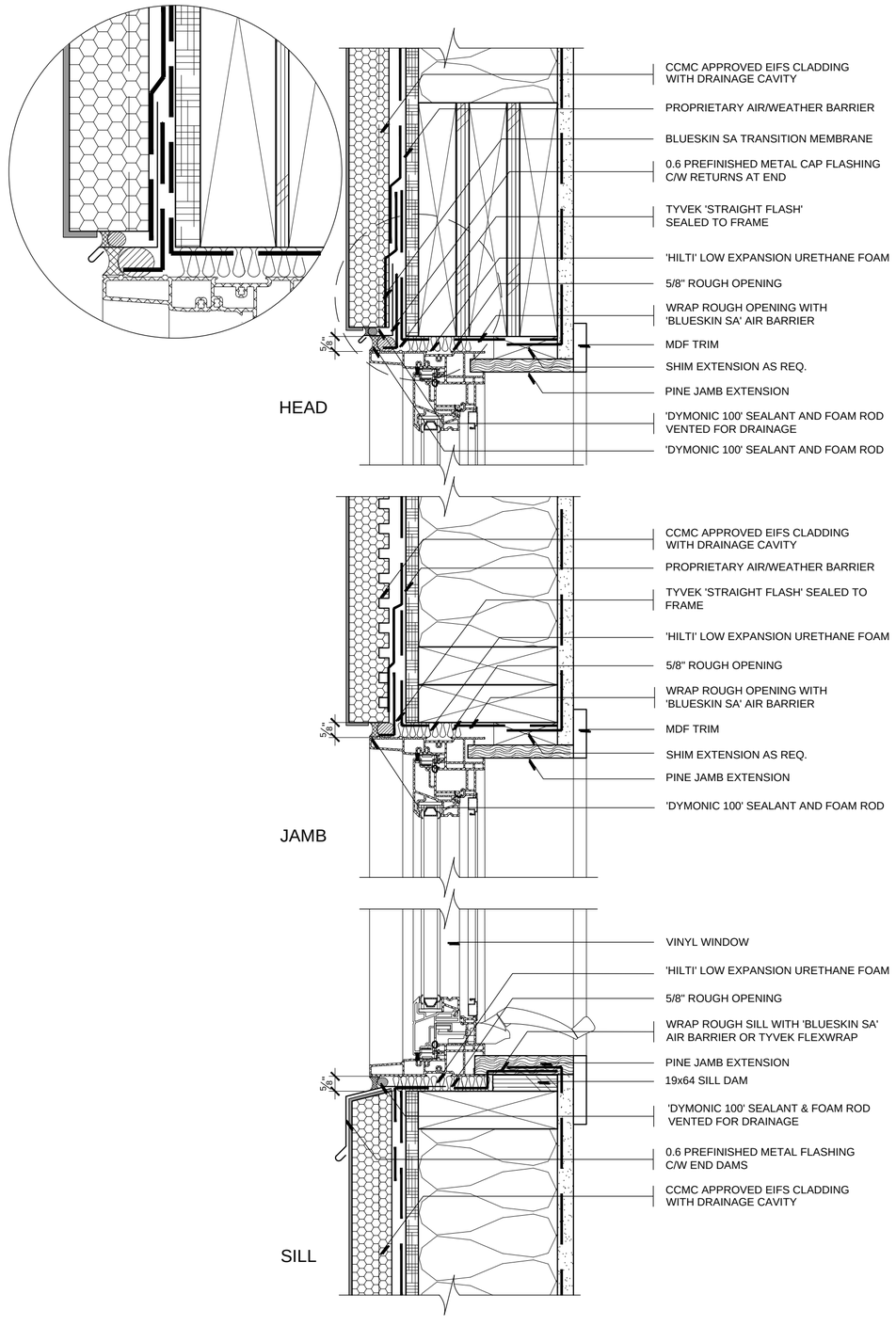
WALL SECTIONS

Drawn By:	Date:	
AW	NOV. 2015	A3.6
Project No: 1514	Scale: 1/2" = 1'-0"	



1 A4.1 WINDOW DETAILS IN METAL SIDING

SCALE: 3" = 1'-0"



2 A4.1 WINDOW DETAILS IN EIFS

SCALE: 3" = 1'-0"

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2.	2015/12/11	STRUCTURAL COORDINATION
1.	2015/12/04	PRELIMINARY STRUCTURE

Consultants:

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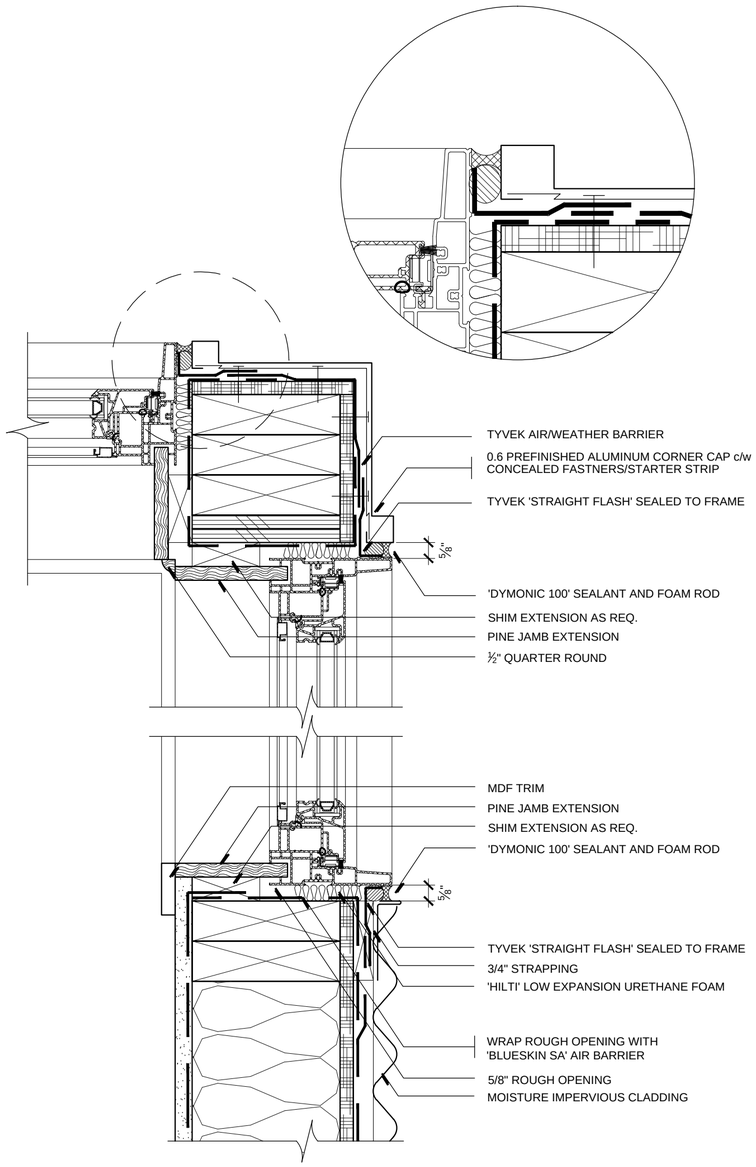
WINDOW DETAILS

Drawn By:	Date:	
AW	NOV. 2015	A4.1
Project No: 1514	Scale: 3" = 1'-0"	



1 / A4.2 CORNER WINDOW PLAN DETAIL

SCALE: 3" = 1'-0"

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4.	2015/12/18	FLOOR JOIST COORDINATION
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2.	2015/12/11	STRUCTURAL COORDINATION
1.	2015/12/04	PRELIMINARY STRUCTURE

Consultants:

LAY RESIDENCE

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WINDOW DETAILS

Drawn By:	Date:	
AW	NOV. 2015	A4.2
Project No: 1514	Scale: 3" = 1'-0"	