# 211 Loretta Avenue

Noise Impact Assessment

# Noise Impact Assessment

## 211 Loretta Avenue

## J&M Investments

**Prepared by:**

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December 21, 2018

Ref: R-2018-170
Novatech File No. 118189

NOVATECH
Engineers, Planners & Landscape Architects

December 21, 2018

**BY COURIER**

City of Ottawa
Planning and Growth Management Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON K1P 1J1

**Attention: Robert Sandercott**

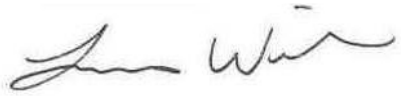
**Reference: 211 Loretta Avenue**
**Noise Impact Assessment**
**Our File No.: 118189**

Please find enclosed three (3) copies of the 'Noise Impact Assessment' for the 211 Loretta Avenue development.

Please contact the undersigned with any questions, or if you require additional information.

Sincerely,

**NOVATECH**



Lucas Wilson, P.Eng.
Project Coordinator

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## 1.0 INTRODUCTION

The subject site is located in the City of Ottawa at 211 Loretta Avenue. A key plan of the area is presented below in **Figure 1-1**.

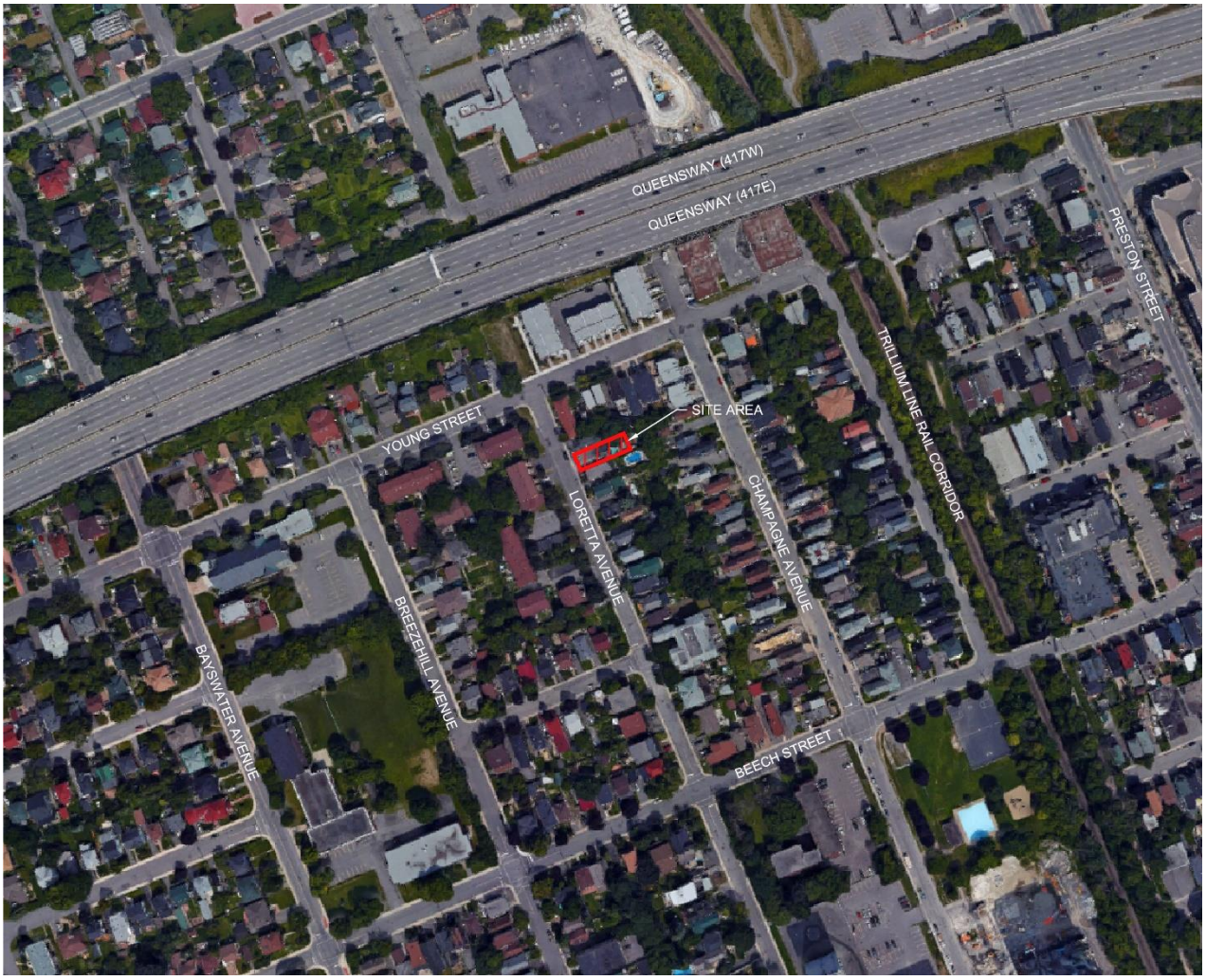



**Figure 1-1 Key Plan**

The proposed development will convert an existing triplex fronting onto Loretta Avenue into a four-unit low-rise apartment building. The proposed site plan is shown in **Figure 1-2**. The subject site is located within 500m of the Queensway. This proximity to the Queensway triggers the requirement for a noise impact assessment.

This report assesses the impacts of sound from vehicular traffic on the proposed development using the Ministry of the Environment (MOE) Stamson 5.0 software and outlines any necessary noise attenuation requirements for compliance with the City of Ottawa Environmental Noise Control Guidelines (ENCG) and the MOE Environmental Noise Guidelines (MOE Publication NPC-300).

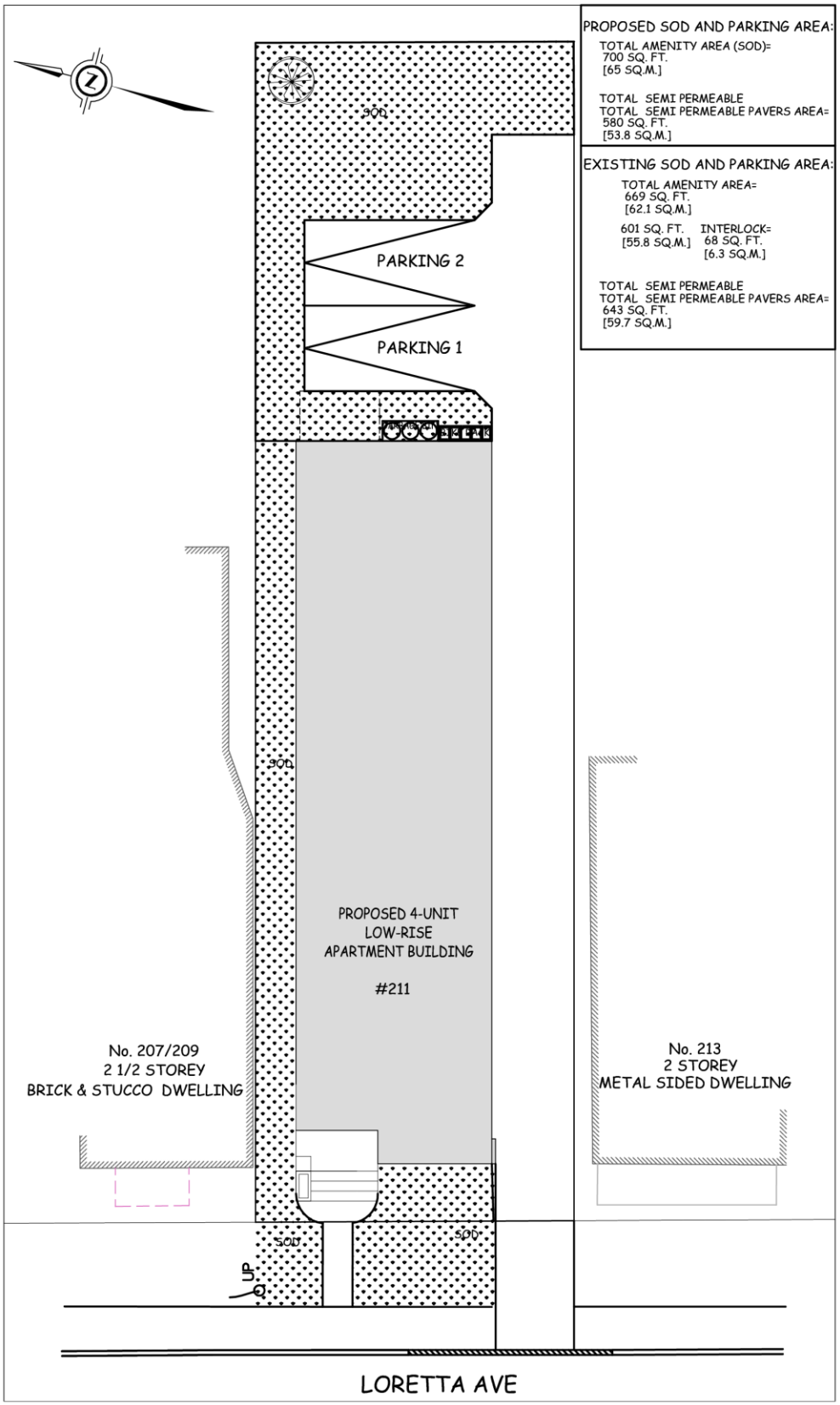



**Figure 1-2 Site Plan**

# 2.0 CITY OF OTTAWA ENVIRONMENTAL NOISE CONTROL GUIDELINES

## 2.1 Sound Level Criteria

The City of Ottawa is concerned with noise from aircraft, roads, railways and transitways as expressed in the City of Ottawa Official Plan (May 2003). These policies are supported by the Environmental Noise Control Guidelines (ENCG) which is a technical document that outlines the specific sound level criteria. The City of Ottawa's *Environmental Noise Control Guidelines (ENCG)*, January, 2016 and the Ministry of Environment's *Environmental Noise Guidelines, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300* have been used for the purpose of this report. As per Section 2.2 of the City of Ottawa Noise Control Guidelines (2016), unless otherwise noted, developments should be consistent with NPC-300 (MOE publication, 2013).

The areas that must be assessed for acoustic protection include the Outdoor Living Area (OLA) and the Outdoor Plane of Window (POW).

These locations are defined as:

- **Outdoor Living Area (OLA):** The Outdoor Living Area is defined as that part of the outdoor amenity area provided for the quiet enjoyment of the outdoor environment during the daytime period. These amenity areas are typically backyards, gardens, terraces, patios and common outdoor living areas. The OLA noise target for traffic noise sources is 55 dBA. This criterion may be exceeded by an amount not greater than 5 dBA, subject to justification and the use of a Warning Clause. OLA noise levels are analysed at 3.0m from the building façade, 1.5m above grade.

- **Plane of Window (POW):** The plane of window is defined as the indoor living space where the sound levels will affect the living room area during daytime hours and bedrooms during night time hours. The residential Plane of Window noise target for traffic noise sources is 55 dBA during the day and 50 dBA at night. If this criterion is exceeded, the property may be subject to building component analysis and warning clauses. The sound criterion is broadly summarized in **Table 2-1.** POW noise levels are analysed 1.5m above grade for the first storey, 4.5m above grade for the second storey and 7.5m above grade for the third storey.

**Table 2-1 City of Ottawa Plane of Window Sound Level Criteria**

| TIME PERIOD | RECEIVER LOCATION | SOUND LEVEL CRITERIA |
|---|---|---|
| Daytime (07:00 - 23:00 hrs) | Plane of Living Room Window | 55 dBA |
| Night time (23:00 - 07:00 hrs) | Plane of Bedroom Window | 50 dBA |

Compliance with the outdoor sound level criteria generally ensures compliance with the indoor sound level criteria which is summarized below in **Table 2-2**.

**Table 2-2 Indoor Sound Level Criteria**

| TIME PERIOD | RECEIVER LOCATION | SOUND LEVEL CRITERIA |
|---|---|---|
| Daytime (07:00 - 23:00 hrs) | **Living/Dining Rooms of residential dwelling units**, hospitals, schools, nursing homes, day-care centres, theatres, places of worship, individual or semiprivate offices, conference rooms etc. | 45 dBA |
| Night Time (23:00 - 07:00 hrs) | **Sleeping quarters of residential units**, hospitals, nursing homes, senior citizen homes, etc. | 40 dBA |

## 2.2 Noise Attenuation Requirements

When sound levels are predicted to be less than the specified criteria for daytime and night time conditions, no attenuation measures are required on the part of the proponent. As the noise criteria are exceeded, a combination of attenuation measures is recommended by the City of Ottawa and the MOE to mitigate noise levels.

These attenuation measures may include any or all of the following:

- Distance setback with soft ground;
- Insertion of noise insensitive land uses between the source and sensitive receptor;
- Orientation of building to provide sheltered zone;
- Construction of a noise barrier wall and/or berm;
- Installation of a forced air ventilation system with provision for central air;
- Installation of central air;
- Acoustically selected building façade components

### 2.2.1 *Noise Barrier*

Noise barriers should only be used when other noise control measures have been considered, and there is no other alternative. For the purpose of this study, when noise levels exceed 60 dBA in the Outdoor Living Area, control measures (barriers) are required to reduce the Leq to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible.

The noise barriers are to be compliant with the City standard for noise barriers and have the following characteristics.

- Minimum height of 2.2m;
- Maximum height of 2.5m (unless approved by the City of Ottawa);
- Situated 0.30m inside the private property;
- A surface mass density not less than 20kg/sq.m; and
- No holes or gaps.

### 2.2.2 *Ventilation Requirements*

A forced air heating system with provision for a central air conditioning system is required if the daytime noise levels are between 55 dBA and 60 dBA and/or night time noise levels are between 50 dBA and 60 dBA.

The installation of a central air conditioning system is required when the daytime noise level exceeds 65 dBA and/or night time noise levels exceed 60 dBA.

### 2.2.3 *Building Component Assessment*

When noise levels exceed 65 dBA (daytime) or 60 dBA (night time) the exterior cladding system of the building envelope must be acoustically assessed to ensure the indoor sound criteria is achieved. This includes analysis of the exterior wall, door, and/or glazing system specifications as appropriate.

The NRC research *Acoustic Insulation Factor: A Rating for the Insulation of Buildings against Noise (*June 1980, JD Quirt) is used to assess the building components and the required acoustic insulation factor (AIF). This method is recognized by the City of Ottawa.

The required AIF is based on the Outside $L_{eq}$, Indoor $L_{eq}$ required, and the number of exterior façade components.

Minimum Required AIF = Outside $L_{eq}$ – Indoor $L_{eq}$ + $\log_{10}$ (Number of Components) + 2dB

Where, N = Number of components (walls, windows and roof);
L = Sound Level expressed on a common decibel scale.

### 2.2.4 *Warning Clauses*

When predicted noise levels exceed the specified criteria, the City of Ottawa and the MOE recommend warning clauses be registered as a notice on title and incorporated into the sales agreements to warn potential purchaser/buyers/tenants of the possible elevated noise levels.

The following typical warning clauses are extracted from Section C8.1 of the MOE NPC-300 document.

*Warning Clause Type A*
“Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City’s and the Ministry of the Environment’s noise criteria.”

*Warning Clause Type B*
“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 road traffic may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the City’s and the Ministry of the Environment’s noise criteria.”

*Warning Clause Type C*
“This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City’s and the Ministry of the Environment’s noise criteria.”

*Warning Clause Type D*
"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria."

### 2.2.5 *Summary of Noise Attenuation Measures*

**Table 2-3** summarizes the noise attenuation measures and warning clauses should sound criteria be exceeded.

**Table 2-3 Outdoor, Ventilation and Warning Clause Requirements (NPC-300)**

| Assessment Location | $L_{eq}$ (dBA) | Outdoor Control Measures | Indoor Control Measures | | Warning Clause |
|---|---|---|---|---|---|
| | | | Ventilation Requirements | Building Components | |
| **Outdoor Living Area (OLA)** | Less than 55 | None required | N/A | N/A | None required |
| | Between 55 and 60 | Control measures (barriers) may not be required but should be considered | N/A | N/A | Required if resultant $L_{eq}$ exceeds 55 dBA Type A |
| | More than 60 | Barriers required | N/A | N/A | Required if resultant $L_{eq}$ exceeds 55 dBA Type B |
| **Plane of Living Room Window (POW)** | Less than 55 | N/A | None Required | None Required | None Required |
| | Between 55 and 65 | N/A | Forced air heating with provision for central air conditioning | None Required | Required Type C |
| | More Than 65 | N/A | Central Air Conditioning | Acoustical performance of the windows and walls should be specified | Required Type D |
| **Plane of Bedroom Window (POW)** | Less than 50 | N/A | None Required | None Required | None Required |
| | Between 50 and 60 | N/A | Forced air heating with provision for central air conditioning | None Required | Required Type C |
| | More than 60 | N/A | Central Air Conditioning | Acoustical performance of the windows and walls should be specified | Required Type D |

## 3.0 NOISE SOURCE

The City of Ottawa Official Plan and Environmental Noise Control Guidelines (ENCG) stipulate that a noise impact assessment is required when a noise sensitive development is within proximity to a surface transportation (road or rail), stationary and aircraft noise sources.

Due to the site location, only roadway noise will be considered. The following distances to roadway noise sources are applicable to the subject site:

- Within 500m from the right-of-way of a 400-series provincial highway

**Figure 3-1** identifies the noise source that triggers the requirement for this noise impact assessment. The subject site is located within 500m of the Queensway (400-series provincial highway).

### 3.1 Queensway (400-series Provincial Highway)

The Queensway currently has 4-Lanes travelling westbound (417W) and 4-Lanes travelling eastbound (417E) within proximity to the site. With an AADT of 18,333 per lane, both 417W and 417E have a total AADT value of 73,332.

As per Table B1 of Appendix B of the ENCG, **Table 3-2** outlines the traffic parameters used to calculate the sound levels for the development.

**Table 3-1 Queensway Noise Parameters**

| **Roadway Classification** | HWY 417W | HWY 417E |
|---|---|---|
| **Annual Average Daily Traffic (AADT)** | 73,332 veh/day | 73,332 veh/day |
| **Day/Night Split (%)** | 92/8 | 92/8 |
| **Heavy Trucks (%)** | 5 | 5 |
| **Medium Trucks (%)** | 7 | 7 |
| **Posted Speed Limit** | 100 km/hr | 100 km/hr |
| **Road Gradient** | 1.0 % | 1.0% |

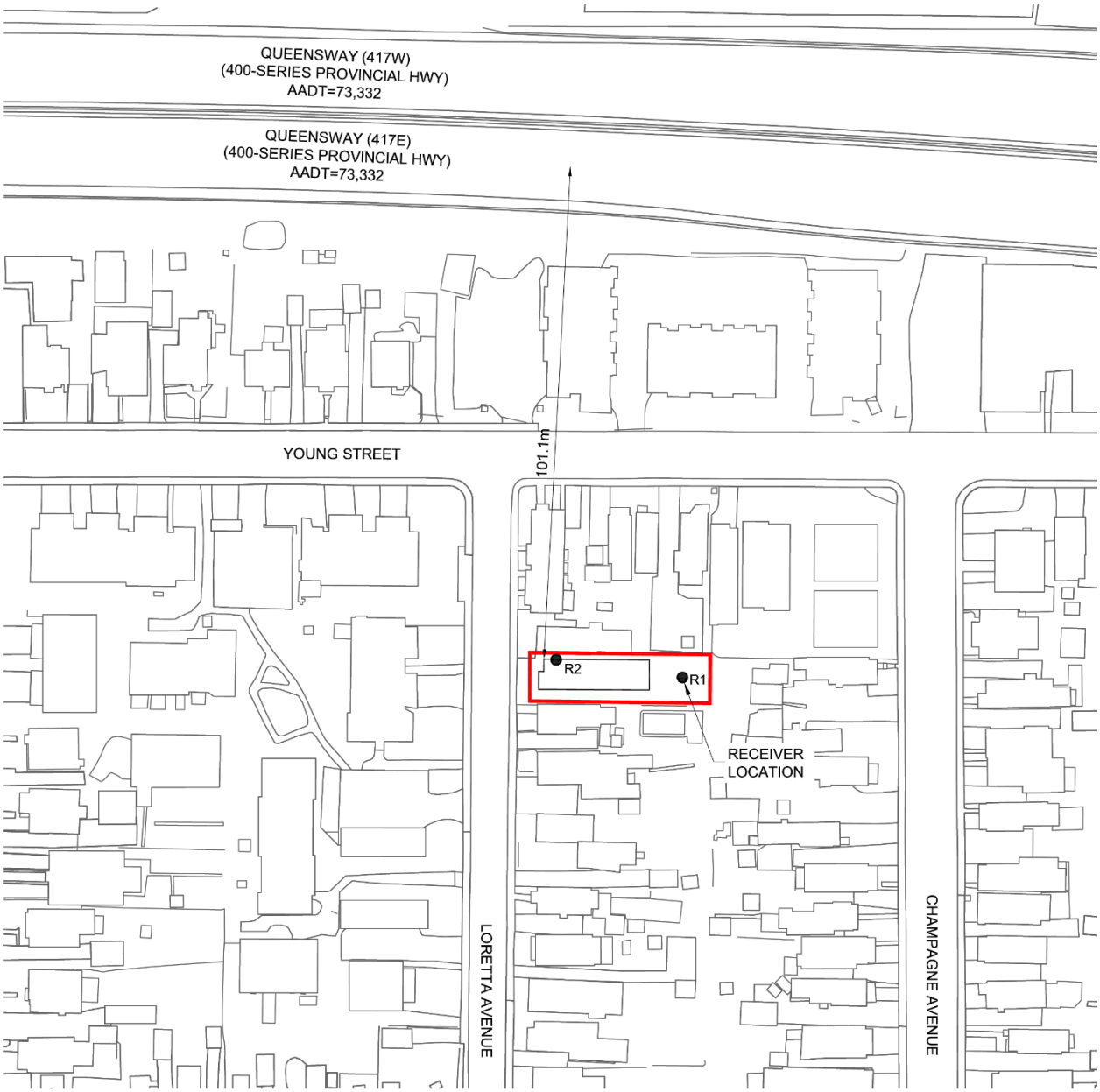



**Figure 3-1 Noise Source**

# 4.0 NOISE LEVEL PREDICTIONS

## 4.1 Modeling

Noise levels are calculated using the STAMSON computer program, version 5.03. Road data is input into the program as applicable, whereupon the program calculates an A-weighted 16 hour $L_{eq}$ noise level for the daytime and an 8 hour $L_{eq}$ noise level for the night time. The results of these computer calculations are presented in **Appendix B** and summarized in **Table 4-1** and **Table 4-2**.

**Table 4-1 OLA Noise Level Summary**

| LOCATION | OUTDOOR LIVING AREA NOISE LEVEL – Leq - (dBA) |
|---|---|
| | Unattenuated |
| R1 | 59.45 |

**Table 4-2 POW Noise Level Summary**

| LOCATION | PLANE OF WINDOW (POW) NOISE LEVEL – $L_{eq}$ - (dBA) | |
|---|---|---|
| | DAYTIME | NIGHT TIME |
| R2 (Ground Floor) | 65.51 | 57.92 |
| R2 (3rd Floor) | 65.51 | 57.92 |

## 4.2 Outdoor Control Measures

The low-rise apartment building will have a shared amenity area located behind the building. The OLA noise level at R1 is above 55 dBA (59.45 dBA), though, below 60 dBA. Existing noise barriers are in place along the Queensway providing noise attenuation for the adjacent dwellings. Due to the Queensway being elevated above the site, no effective outdoor noise control measures exist to reduce noise levels below 55 dBA. We recommend placing a warning clause (Type A) on title without adding a physical noise barrier.

Typical wording for Type A warning clause: “Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City’s and the Ministry of the Environment’s noise criteria.”

## 4.3 Indoor Control Measures

All units require forced air heating with provision for central air conditioning and a warning clause Type C as daytime plane of window noise levels are above 55 dBA.

Typical wording for Type C warning clause: “This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby

ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria."

### 4.4 Building Component Assessment

When noise levels exceed 65 dBA (day-time) the exterior cladding system of the building envelope must be acoustically assessed to ensure the indoor noise criteria is achieved.

The sound level at R1 is slightly above the 65 dBA daytime allowance at 65.51 dBA. Since the building is existing and the increase above the 65 dBA daytime allowance is minimal, no assessment of the exterior cladding system is warranted. As long as the building was built to the minimum requirements of the Ontario Building Code, the indoor noise criteria will be achieved.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

To meet the requirements for compliance with the City of Ottawa Environmental Noise Control Guidelines and the MOE Environmental Noise Guideline the following measures are required.

**Outdoor Control Measures**

All units require a warning clause Type A due to sound levels exceeding 55 dBA in the shared amenity space.

**Indoor Control Measures**

All units require a warning clause Type C.

**Building Component Assessment**

The building is existing and if built to the minimum requirements of the Ontario Building Code the indoor noise criteria will be met.

**Warning Clauses**

Warning clauses are to be placed on title and in the purchase and sale agreements as indicated above and in **Figure 5-1**. The following typical warning clauses are extracted from Section C8.1 of the MOE NPC-300 document.

Warning Clause Type 'A'
"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

Warning Clause Type 'C'
"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria."

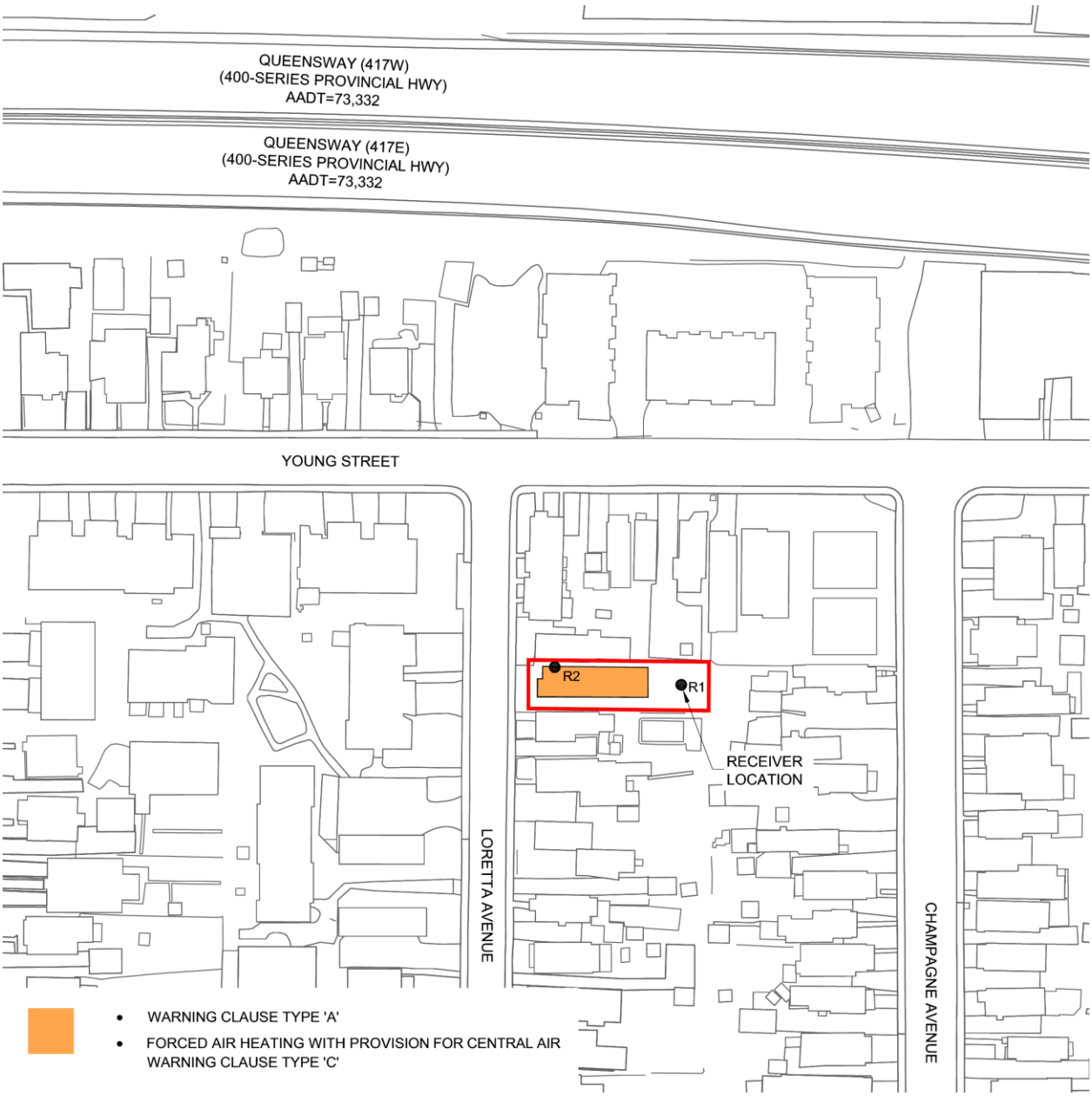



**Figure 5-1 Construction Requirements and Warning Clauses**

If you have any questions or comments with regards to this report, please do not hesitate to contact the undersigned.

Respectfully issued,

**NOVATECH**

Prepared By:


Lucas Wilson, P.Eng.
Project Coordinator

# APPENDIX A

## Stamson Model Output

STAMSON 5.0 NORMAL REPORT Date: 17-12-2018 08:26:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.te Time Period: Day/Night 16/8 hours
Description: R1 (OLA)

Road data, segment # 1: HWY 417E (day/night)
---
Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 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): 73332
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: HWY 417E (day/night)
---
Angle1 Angle2 : -74.00 deg 74.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 103.00 / 103.00 m
Receiver height : 1.50 / 4.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -74.00 deg Angle2 : 74.00 deg
Barrier height : 6.00 m
Elevation : 4.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 74.00 m
Receiver elevation : 70.00 m
Barrier elevation : 70.00 m
Reference angle : 0.00

Road data, segment # 2: HWY 417W (day/night)
---
Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 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): 73332
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: HWY 417W (day/night)
---
Angle1 Angle2 : -74.00 deg 74.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 122.00 / 122.00 m
Receiver height : 1.50 / 4.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -74.00 deg Angle2 : 74.00 deg
Barrier height : 6.00 m
Elevation : 4.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 74.00 m
Receiver elevation : 70.00 m
Barrier elevation : 70.00 m
Reference angle : 0.00

Results segment # 1: HWY 417E (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 | 1.50 | 1.89 | 71.89 |

ROAD (0.00 + 56.82 + 0.00) = 56.82 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -74 | 74 | 0.00 | 81.40 | 0.00 | -8.37 | -0.85 | 0.00 | -5.68 | 0.00 | 66.49 |
| -74 | 74 | 0.00 | 81.40 | 0.00 | -8.37 | -0.85 | 0.00 | 0.00 | -15.36 | 56.82 |

Segment Leq : 56.82 dBA

Results segment # 2: HWY 417W (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 | 1.50 | 1.83 | 71.83 |

ROAD (0.00 + 56.03 + 0.00) = 56.03 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -74 | 74 | 0.00 | 81.40 | 0.00 | -9.10 | -0.85 | 0.00 | -5.59 | 0.00 | 65.85 |
| -74 | 74 | 0.00 | 81.40 | 0.00 | -9.10 | -0.85 | 0.00 | 0.00 | -15.42 | 56.03 |

Segment Leq : 56.03 dBA

Total Leq All Segments: 59.45 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.45

STAMSON 5.0 NORMAL REPORT Date: 17-12-2018 08:27:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2.te Time Period: Day/Night 16/8 hours
Description: R2 1st Floor (POW)

Road data, segment # 1: HWY 417E (day/night)
---
Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 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): 73332
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: HWY 417E (day/night)
---
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 95 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 101.60 / 101.60 m
Receiver height : 1.50 / 1.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 2.00 m
Elevation : 4.00 m
Barrier receiver distance : 93.60 / 93.60 m
Source elevation : 74.00 m
Receiver elevation : 70.00 m
Barrier elevation : 74.00 m
Reference angle : 0.00

Road data, segment # 2: HWY 417W (day/night)
---
Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 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): 73332
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: HWY 417W (day/night)
---

| | | |
|---|---|---|
| Angle1 Angle2 | : -90.00 deg | 90.00 deg |
| Wood depth | : 0 | (No woods.) |
| No of house rows | : 2 / 2 | |
| House density | : 95 % | |
| Surface | : 2 | (Reflective ground surface) |
| Receiver source distance | : 120.60 / 120.60 m | |
| Receiver height | : 1.50 / 1.50 m | |
| Topography | : 4 | (Elevated; with barrier) |
| Barrier angle1 | : -90.00 deg | Angle2 : 90.00 deg |
| Barrier height | : 2.00 m | |
| Elevation | : 4.00 m | |
| Barrier receiver distance | : 93.60 / 93.60 m | |
| Source elevation | : 74.00 m | |
| Receiver elevation | : 70.00 m | |
| Barrier elevation | : 74.00 m | |
| Reference angle | : 0.00 | |

Results segment # 1: HWY 417E (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 | 1.50 | 1.18 | 75.18 |

ROAD (0.00 + 62.74 + 0.00) = 62.74 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -90 | 90 | 0.00 | 81.40 | 0.00 | -8.31 | 0.00 | 0.00 | -10.35 | 0.00 | 62.74 |
| -90 | 90 | 0.00 | 81.40 | 0.00 | -8.31 | 0.00 | 0.00 | 0.00 | -6.30 | 66.79 |

Segment Leq : 62.74 dBA

Results segment # 2: HWY 417W (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 | 1.50 | 0.60 | 74.60 |

ROAD (0.00 + 62.25 + 0.00) = 62.25 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -90 | 90 | 0.00 | 81.40 | 0.00 | -9.05 | 0.00 | 0.00 | -10.10 | 0.00 | 62.25 |
| -90 | 90 | 0.00 | 81.40 | 0.00 | -9.05 | 0.00 | 0.00 | 0.00 | -6.32 | 66.02 |

Segment Leq : 62.25 dBA

Total Leq All Segments: 65.51 dBA

Results segment # 1: HWY 417E (night)
---

Source height = 1.49 m

Barrier height for grazing incidence
---

| Source Height (m) | Receiver Height (m) | Barrier Height (m) | Elevation of Barrier Top (m) |
|---|---|---|---|
| 1.49 | 1.50 | 1.18 | 75.18 |

ROAD (0.00 + 55.15 + 0.00) = 55.15 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -90 | 90 | 0.00 | 73.80 | 0.00 | -8.31 | 0.00 | 0.00 | -10.35 | 0.00 | 55.15 |
| -90 | 90 | 0.00 | 73.80 | 0.00 | -8.31 | 0.00 | 0.00 | 0.00 | -6.30 | 59.19 |

Segment Leq : 55.15 dBA

Results segment # 2: HWY 417W (night)
---

Source height = 1.49 m

Barrier height for grazing incidence
---

| Source Height (m) | Receiver Height (m) | Barrier Height (m) | Elevation of Barrier Top (m) |
|---|---|---|---|
| 1.49 | 1.50 | 0.60 | 74.60 |

ROAD (0.00 + 54.65 + 0.00) = 54.65 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -90 | 90 | 0.00 | 73.80 | 0.00 | -9.05 | 0.00 | 0.00 | -10.10 | 0.00 | 54.65 |
| -90 | 90 | 0.00 | 73.80 | 0.00 | -9.05 | 0.00 | 0.00 | 0.00 | -6.32 | 58.42 |

Segment Leq : 54.65 dBA

Total Leq All Segments: 57.92 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.51
(NIGHT): 57.92

STAMSON 5.0 NORMAL REPORT Date: 17-12-2018 08:27:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r213.te Time Period: Day/Night 16/8 hours
Description: R2 3rd Floor (POW)

Road data, segment # 1: HWY 417E (day/night)
---
Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 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): 73332
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: HWY 417E (day/night)
---
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 95 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 101.60 / 101.60 m
Receiver height : 7.50 / 7.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 2.00 m
Elevation : 4.00 m
Barrier receiver distance : 93.60 / 93.60 m
Source elevation : 74.00 m
Receiver elevation : 70.00 m
Barrier elevation : 74.00 m
Reference angle : 0.00

Road data, segment # 2: HWY 417W (day/night)
---
Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 veh/TimePeriod *
Posted speed limit : 100 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): 73332
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: HWY 417W (day/night)

```
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      2 / 2
House density             :     95 %
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 120.60 / 120.60 m
Receiver height           :   7.50 / 7.50   m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   2.00 m
Elevation                 :   4.00 m
Barrier receiver distance :  93.60 / 93.60  m
Source elevation          :  74.00 m
Receiver elevation        :  70.00 m
Barrier elevation         :  74.00 m
Reference angle           :   0.00
```

Results segment # 1: HWY 417E (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 | 7.50 | 1.65 | 75.65 |

ROAD (0.00 + 62.74 + 0.00) = 62.74 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -90 | 90 | 0.00 | 81.40 | 0.00 | -8.31 | 0.00 | 0.00 | -10.35 | 0.00 | 62.74 |
| -90 | 90 | 0.00 | 81.40 | 0.00 | -8.31 | 0.00 | 0.00 | 0.00 | -5.27 | 67.82 |

Segment Leq : 62.74 dBA

Results segment # 2: HWY 417W (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 | 7.50 | 1.94 | 75.94 |

ROAD (0.00 + 62.25 + 0.00) = 62.25 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -90 | 90 | 0.00 | 81.40 | 0.00 | -9.05 | 0.00 | 0.00 | -10.10 | 0.00 | 62.25 |
| -90 | 90 | 0.00 | 81.40 | 0.00 | -9.05 | 0.00 | 0.00 | 0.00 | -5.00 | 67.34 |

Segment Leq : 62.25 dBA

Total Leq All Segments: 65.51 dBA

Results segment # 1: HWY 417E (night)
---

Source height = 1.49 m

Barrier height for grazing incidence
---

| Source Height (m) | Receiver Height (m) | Barrier Height (m) | Elevation of Barrier Top (m) |
|---|---|---|---|
| 1.49 | 7.50 | 1.65 | 75.65 |

ROAD (0.00 + 55.15 + 0.00) = 55.15 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -90 | 90 | 0.00 | 73.80 | 0.00 | -8.31 | 0.00 | 0.00 | -10.35 | 0.00 | 55.15 |
| -90 | 90 | 0.00 | 73.80 | 0.00 | -8.31 | 0.00 | 0.00 | 0.00 | -5.27 | 60.22 |

Segment Leq : 55.15 dBA

Results segment # 2: HWY 417W (night)
---

Source height = 1.49 m

Barrier height for grazing incidence
---

| Source Height (m) | Receiver Height (m) | Barrier Height (m) | Elevation of Barrier Top (m) |
|---|---|---|---|
| 1.49 | 7.50 | 1.94 | 75.94 |

ROAD (0.00 + 54.65 + 0.00) = 54.65 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|---|---|---|---|---|---|---|---|---|---|---|
| -90 | 90 | 0.00 | 73.80 | 0.00 | -9.05 | 0.00 | 0.00 | -10.10 | 0.00 | 54.65 |
| -90 | 90 | 0.00 | 73.80 | 0.00 | -9.05 | 0.00 | 0.00 | 0.00 | -5.00 | 59.74 |

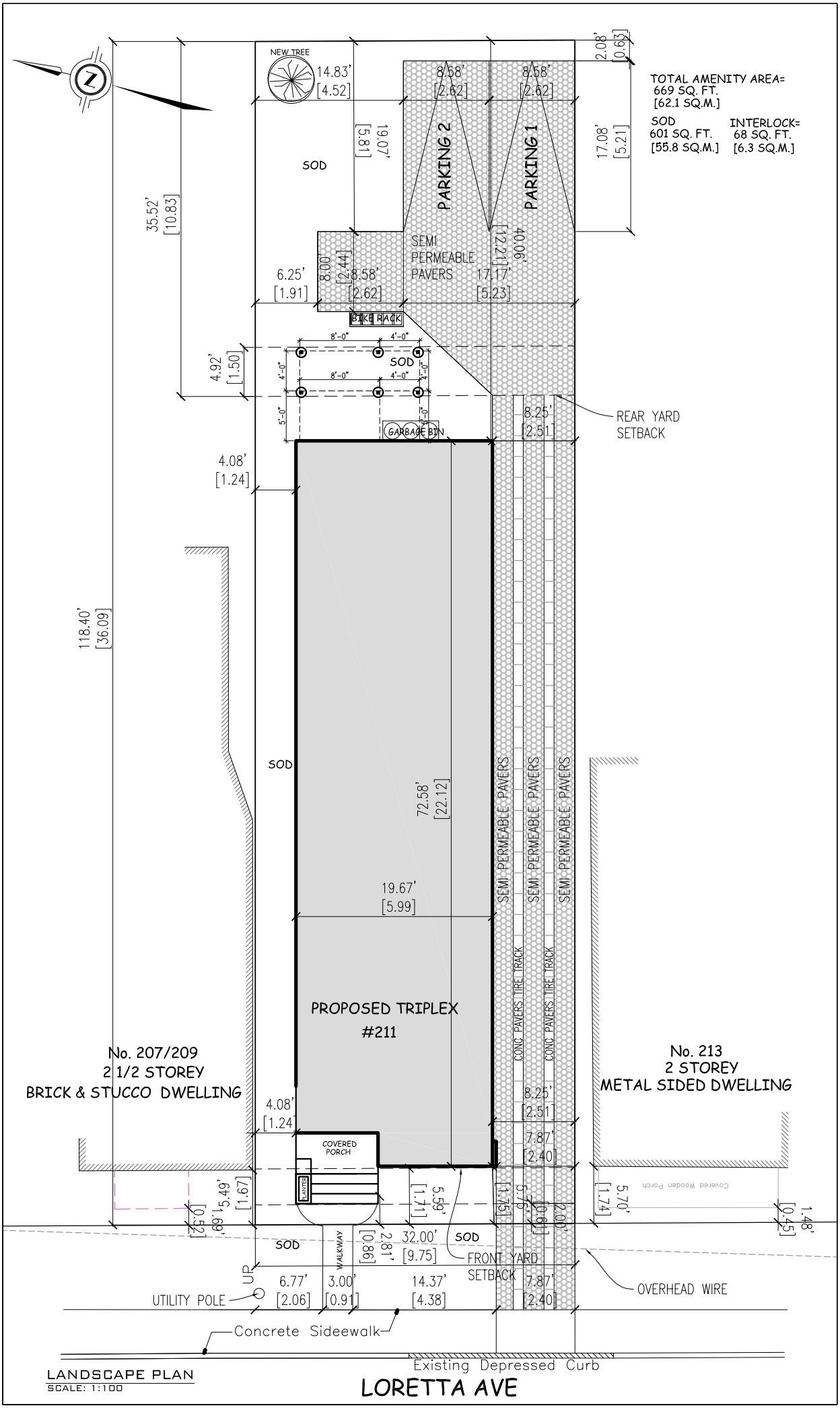
Segment Leq : 54.65 dBA

Total Leq All Segments: 57.92 dBA

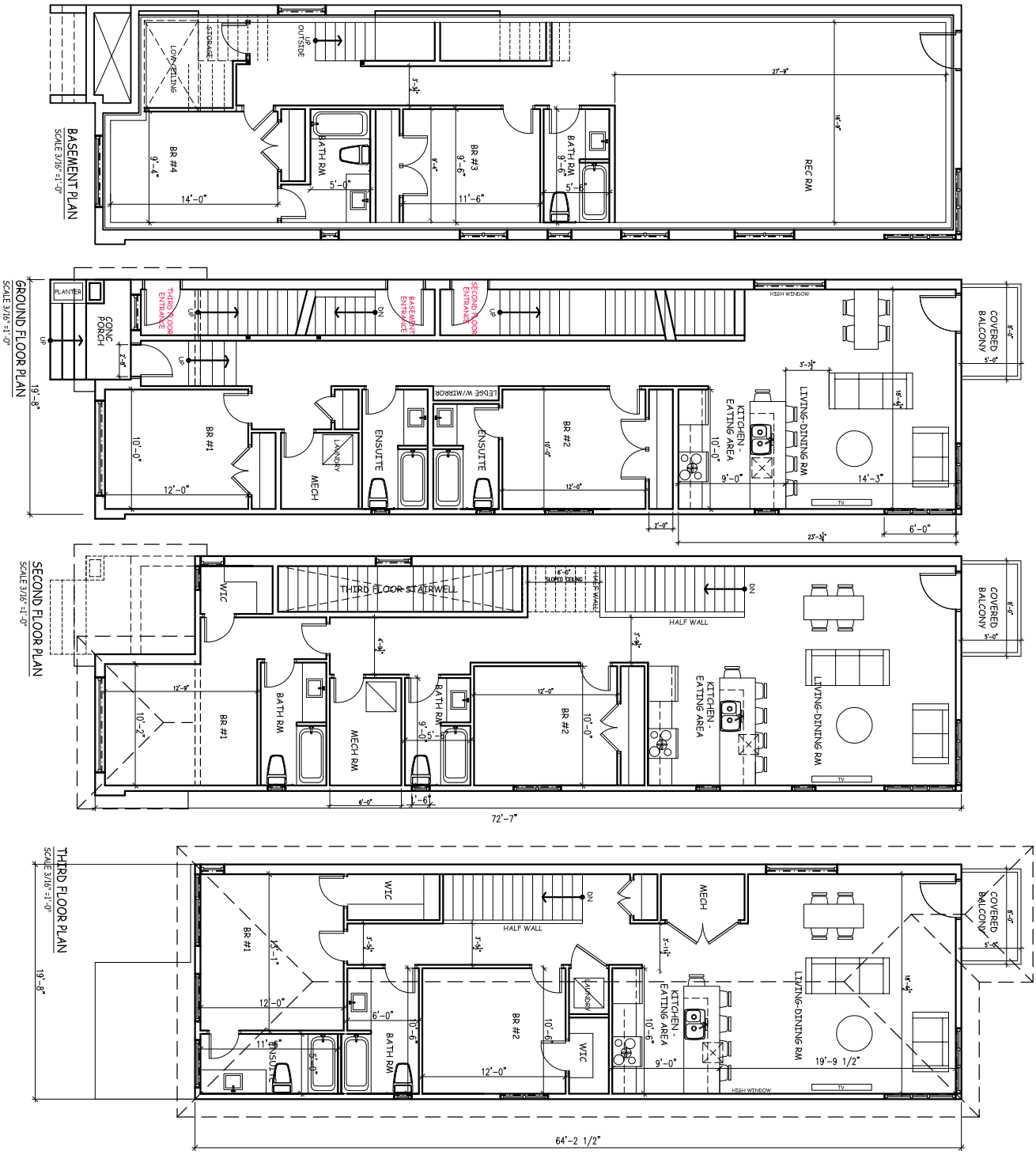
TOTAL Leq FROM ALL SOURCES (DAY): 65.51
(NIGHT): 57.92

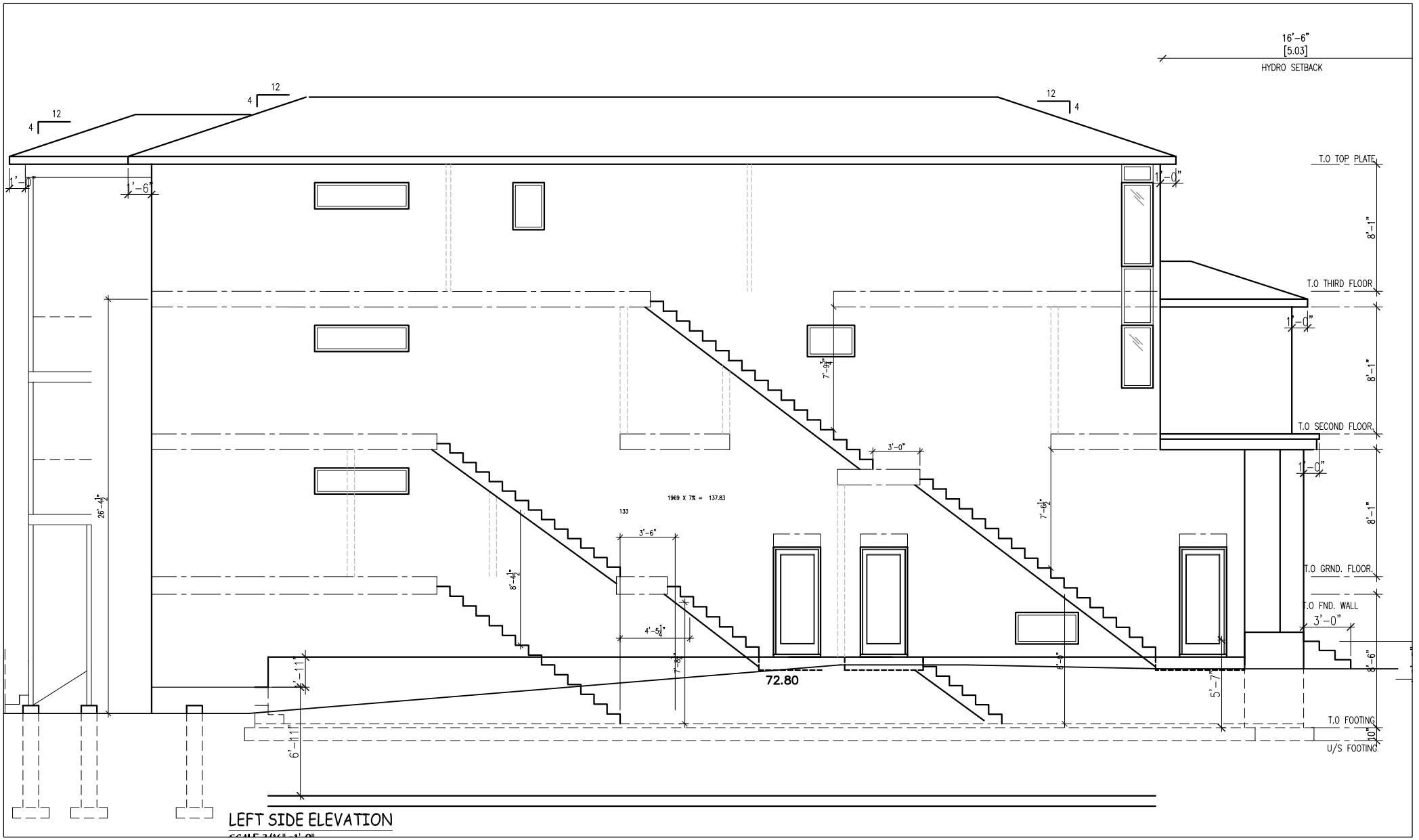
# APPENDIX B

## Site Plan
## Elevation Plans




LANDSCAPE PLAN
SCALE: 1:100


BASEMENT PLAN
SCALE 3/16" =1'-0"
GROUND FLOOR PLAN
SCALE 3/16" =1'-0"
SECOND FLOOR PLAN
SCALE 3/16" =1'-0"
THIRD FLOOR PLAN
SCALE 3/16" =1'-0"
BR #4
BATH RM
BR #3
BATH RM
REC RM
LOWER CEILING
STORAGE
UP
OUTSIDE
PLANTER
CONC PORCH
THIRD FLOOR ENTRANCE
BASEMENT ENTRANCE
SECOND FLOOR ENTRANCE
BR #1
LAUNDRY
MECH
ENSUITE
ENSUITE
LEDGE W/MIRROR
BR #2
KITCHEN - EATING AREA
LIVING-DINING RM
HIGH WINDOW
COVERED BALCONY
TV
THIRD FLOOR STAIRWELL
SLOPED CEILING
HALF WALL
DN
WIC
BATH RM
MECH RM
72'-7"
MECH
64'-2 1/2"
19'-8"




LEFT SIDE ELEVATION