REPORT
Project: 121753-6.2.1

ENVIRONMENTAL NOISE IMPACT ASSESSMENT
COWAN'S GROVE MID-DENSITY RESIDENTIAL BLOCK
4791 BANK STREET
LEITRIM DEVELOPMENT AREA

Prepared for Urbandale Corporation
by IBI GROUP

JANUARY 2021 UPDATE

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1 INTRODUCTION

This report has been prepared to determine transportation-related noise impacts for the Cowan's Grove Mid-Density Residential Block, located at 4791 Bank Street in the Leitrim Development Area of Ottawa, Ontario. The report analyses the expected noise levels within the development and recommends any warning clauses and associated noise abatement measures required in the Agreement of Purchase and Sale of each dwelling unit.

The proposed development consists of 102 stacked townhomes and is bound by Bank Street to the west, the future 'Lilythorne' subdivision to the north (Claridge), Cowan's Grove subdivision to the east (Urbandale) and the Cowan's Grove Commercial Plaza to the south (Urbandale).

2 BACKGROUND

2.1 Noise Sources

The proposed development will be primarily subjected to roadway noise from Bank Street.

The subject site is not located within Airport Vicinity Development Zone (AVDZ), as shown on Annex 10 and Schedule K of the 2013 Official Plan. Aircraft noise from the Ottawa International Airport is, therefore, not included in the analysis for this study.

There are no rail lines within 500 metres of the site. As such, no consideration has been given to the noise impacts from rail traffic in accordance with the City of *Ottawa Environmental Noise Control Guidelines (January 2016)*, hereafter referred to as the ENC Guidelines.

2.2 Sound Level Limits for Road Traffic

Sound level criteria for road traffic are taken from the ENC Guidelines and the *Ministry of the Environment Publication NPC-300 (August 2013)*. Noise levels are expressed in the form Leq (T), which refers to a weighted level of a steady sound carrying the same total energy in the time period T (in hours) as the observed fluctuation sound.

2.2.1 Indoor Sound Level Criterion

The recommended indoor sound level criteria from Table 2.2b of the ENC Guidelines are as follows:

- Bedrooms – 23:00 to 07:00 – 40 dBA Leq (8 hours)
- Other areas – 07:00 to 23:00 – 45 dBA Leq (16 hours)

The sound levels are based on the windows and doors to an indoor space being closed.

The proposed development consists of two-and-a-half storey stacked townhome units. For the purpose of assessing the critical indoor noise in this study, the outdoor noise levels are observed at 6.5 metres above the ground for the plane of the living room and bedroom windows to assess daytime and nighttime noise, respectively. This height was determined by reviewing the living room and bedroom window locations on the architectural drawings and shall be used to determine noise impacts from Bank Street on the critical, top-floor units. For Section 4.2 – Building Components, additional analysis was conducted at the First Floor and Basement level units, approximated as 3.1m and 0.6m above the plane of living room/ windows, to reflect the potential change in the configuration of the windows at each floor level in Blocks 1 and 2.

As per NPC-300 C7.1.3, if the daytime outdoor sound levels exceed 65 dBA at the living room window or if the nighttime sound levels exceed 60 dBA at the bedroom window, then the building must be compliant with the Ontario Building Code. Should the outdoor sound levels exceed this criteria, then the building component (walls, windows, etc.) must be designed to achieve indoor sound level criteria.

As per NPC-300 C7.1.2.1 and C7.1.2.2, when the outdoor noise levels are greater than 55 dBA and less than or equal to 65 dBA at the living room window and/or greater than 50 dBA and less than or equal to 60 dBA at the bedroom window, then a warning clause is compulsory. This warning clause specifies that forced air heating with a provision for central air conditioning is required. Should the outdoor sound levels exceed the criteria, central air conditioning is mandatory and a warning clause is required.

2.2.2 Outdoor Sound Level Criterion

Not Applicable – There are no outdoor living areas (OLAs) for the proposed development, as described in the ENC Guidelines. As such, outdoor noise analysis is not required for this study.

2.2.3 Indoor Sound Level Criterion – Building Components

As per NPC-300 C7.1.3, when the outdoor sound levels are less than or equal to 65 dBA at the living room window and/or less than or equal to 60 dBA at the bedroom level, then the building must be compliant with the Ontario Building Code. Should the outdoor sound levels exceed this criteria then the building component (walls, windows etc.) must be designed to achieve indoor sound level criteria.

3 ROADWAY NOISE

3.1 Traffic Volume Data

The major sources of road noise impacting the site are expected to originate from the traffic flows along Bank Street.

Bank Street

Bank Street is currently a two-lane, undivided rural roadway with a posted speed limit of 70 km/h within the vicinity of the subject site. Ultimately, this section of Bank Street will be reconstructed as a four-lane urban arterial divided (4-UAD) roadway. The noise analysis conducted for this study has been conservatively based on the Bank Street with its ultimate, four-lane configuration and a posted speed limit of 70 km/h.

Table 3.1 summarizes the traffic and road parameters used in this report.

TABLE 3.1: TRAFFIC AND ROAD DATA SUMMARY

	BANK STREET
Annual Average Daily Traffic (AADT)	35,000
Posted Speed Limit (km/h)	70
% Medium Trucks	7%
% Heavy Trucks	5%
% Daytime Traffic	92%

The remaining roads within the transportation network adjacent to the site are classified as local roads and are therefore expected to contribute minimal noise impacts to the proposed development.

3.2 Calculation Methods

Roadway noise is calculated using the STAMSON 5.04 computer program from the Ontario Ministry of the Environment (MOE).

As stated in Section 2.2.2, there are no outdoor living areas (OLAs) associated with the proposed development, therefore these noise calculations are not included for this study.

Unattenuated daytime and nighttime noise levels at the building face calculated to determine indoor sound levels are shown on **Table 3.2** below. Parameters used for calculating the noise levels, including the perpendicular distance from source to receiver and the roadway segment angles are also indicated. Since Bank Street is modelled with its ultimate configuration as an arterial, four-lane divided road, the noise levels are calculated separately for the northbound and southbound lanes and then combined.

The noise parameters input into the STAMSON program, including source-receiver distances, noise angles, as well as source/ receiver locations are presented in **Drawing No. 121753-N1**, while the STAMSON noise calculations completed for this study are included in **Appendix A**.

TABLE 3.2: UNATTENUATED NOISE LEVELS AT BUILDING FACE

LOCATION		ROADWAY	SOURCE - RECEIVER DISTANCE (m)	SEGMENT ANGLES		INDOOR NOISE LEVELS (dBA)	
Lot / Block	UNITS		NB/ SB LANES	LEFT	RIGHT	DAYTIME	NIGHTTIME
Blocks 1 & 2	2nd Floor Units	Bank Street	19.5/ 31.2	-90	90	70.81	63.21
Blocks 1 & 2	1st Floor Units	Bank Street	19.5/ 31.2	-90	90		
Blocks 1 & 2	Basement	Bank Street	19.5/ 31.2	-90	90		
Block 3	1, 2, 3	Bank Street	44.9/ 56.6	0	35	59.86	52.26
Block 4	1, 2, 3	Bank Street	81.8/ 93.5	10	20	50.69	43.10
Block 4	10, 11, 12	Bank Street	88.6/ 100.3	-25	-10	52.05	44.46
Block 6	1, 2, 3	Bank Street	73.3/ 85.0	35	80	56.60	49.00
Block 6	4, 5, 6	Bank Street	82.8/ 94.5	-15	-5	50.79	43.19
Block 7	1, 2, 3	Bank Street	70.6/ 82.3	10	90	59.47	51.87
Block 7	16, 17, 18	Bank Street	107.5/ 119.2	5	90	57.55	49.95

As indicated in **Table 3.2** above, there are several locations which exceed the noise criteria at the building face.

Since the dwelling units in Blocks 1 & 2 are consistently above the 65 dBA threshold, a review of building components for critical facades with respect to Bank Street will be reviewed in Section 4.2 – Building Components.

The Cowan's Grove Commercial Plaza is nearing completion and, as such, allowance for these buildings to screen noise from the development were considered in the noise analysis. The results of the analysis shown above indicate that the noise levels experienced by dwelling units in Blocks 4 and 5 are expected to be well below 55 dBA as a result of this commercial development.

The timeline for the construction of the 'Lilythorne' subdivision to the north is currently unknown, therefore no allowance has been made for these buildings in this study. It is expected that once this development is complete, then the noise levels for the dwelling units in Block 7 will drop significantly.

4 ABATEMENT MEASURES

4.1 Indoor Sound Levels

For dwelling units fronting onto Bank Street, the daytime noise levels at the building face are shown to exceed 65 dBA, requiring mandatory central air conditioning, a review of the building components and a Type 'D' warning clause.

As discussed previously, all units within Block 7 will be temporarily subjected to noise levels above the 55 dBA threshold during the daytime. Once the 'Lilythorne' subdivision is fully built out, it is anticipated that sound levels at the building face are expected to drop to below 55 dBA. Select units in Block 3 and Block 6 will also experience noise levels in excess of 55 dBA. For all of the above dwelling units, an alternative means of ventilation is required as well as a Type 'C' warning clause in the Agreement of Purchase and Sale. Alternative means of ventilation usually consist of a forced air heating system with ducts sized for future installation of central air conditioning.

4.2 Building Components

Based on the results of the indoor noise assessment in **Table 3.2**, an analysis of the required building components for dwelling units expected to experience noise levels at the building face exceeding 65 dBA has been conducted following the Sound Transmission Class (STC) Method. This method was developed by the National Research Council (NRC), and involves a review of architectural plans to determine appropriate design assumptions (i.e. window/floor area ratios) in order to calculate the STC rating for windows and glazed doors. In this particular circumstance, since architectural plans specific to the development were not available at the time of this study, a sample block townhouse end unit was used. The kitchen floor area dining room/ den was included in the 'living room' calculation during the daytime, as the architectural plans indicate that any interior partitioning between these living spaces may be optional. 'Bedroom #2' was used to calculate the STC rating during the nighttime, as this bedroom has the highest potential exposure from outdoor noise on Bank Street, with one exterior wall. The STC ratings for both the living room and bedroom were calculated at each floor level to account for the various window and glazed door configurations associated with the front and side facades, as per the sample architectural drawings reviewed in this study.

The STC calculations were carried out to determine the required STC rating for exterior windows for both the side and front-facing walls of Blocks 1 & 2. Exterior walls were assumed to have an STC rating of 40, which is a conservative value for an insulated wood frame construction wall designed to accommodate Ottawa winters. With the exterior walls in place, the amount of sound energy absorbed by the windows is calculated and the STC rating required to meet the sound criteria was determined. All rooms were assumed to have an intermediate absorptive interior rather than a hard or very absorptive interior, as would be expected for a residential unit. The required STC ratings for the windows and glazed doors are summarized in **Table 4.1** below. The highest required STC rating for front-facing windows and glazed doors was calculated to be 29, while the highest required STC rating for these components on the side wall was determined to be 24.

Additional STAMSON calculations conducted for Blocks 1 and 2 at the receptor heights of the first floor (3.1m) and basement level (0.6m) window planes with respect to the average ground level indicated in the sample architectural drawings, and is provided in **Appendix A**.

STC calculations and sample architectural plans for Blocks 1 or 2 are included in **Appendix B** and **Appendix C**, respectively.

TABLE 3.1: TRAFFIC AND ROAD DATA SUMMARY

DWELLING UNIT	LEVEL	ROOM TYPE	REQUIRED STC RATING
			WINDOWS & GLAZED DOORS
Blocks 1 & 2 - End Unit (Side Wall)	Basement	Living Room	24
		Bedroom	22
Block 1 & 2 – End Unit (Front Wall)		Living Room	25
		Bedroom	N/A[1]
Blocks 1 & 2 - End Unit (Side Wall)	1st Floor	Living Room	N/A[2]
		Bedroom	22
Block 1 & 2 – End Unit (Front Wall)		Living Room	29
		Bedroom	N/A[1]
Blocks 1 & 2 - End Unit (Side Wall)	2nd Floor	Living Room	N/A[2]
		Bedroom	24
Block 1 & 2 – End Unit		Living Room	29

(Front Wall)		Bedroom	N/A[1]

Notes: [1] Front-facing walls do not include any bedroom windows
[2] STC rating falls outside the range of values considered to be critical

5 SUMMARY OF ATTENUATION MEASURES

5.1 Warning Clauses

A clause regarding noise must appear on the Agreement of Purchase and Sale on the title of the lots and townhouse units indicated on **Drawing No. 121753-N2**, as listed below:

Type 'C' Block 3 – Units 1, 2 & 3

Block 6 – Units 1, 2 & 3

Block 7 – All Units

Type 'D' Blocks 1 & 2 – All Units

The following warning clauses are taken from Section C8.1 of NPC 300:

Type C	"This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. 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. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property."
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."

5.2 Ventilation Requirements and Building Components

All dwelling units requiring a Type 'C' warning clause listed in Section 5.1 shall have a forced air heating system sized to accommodate a central air conditioning system.

All dwelling units requiring a Type 'D' warning clause shall have mandatory central air conditioning and acoustical review of building components.

6 CONCLUSION

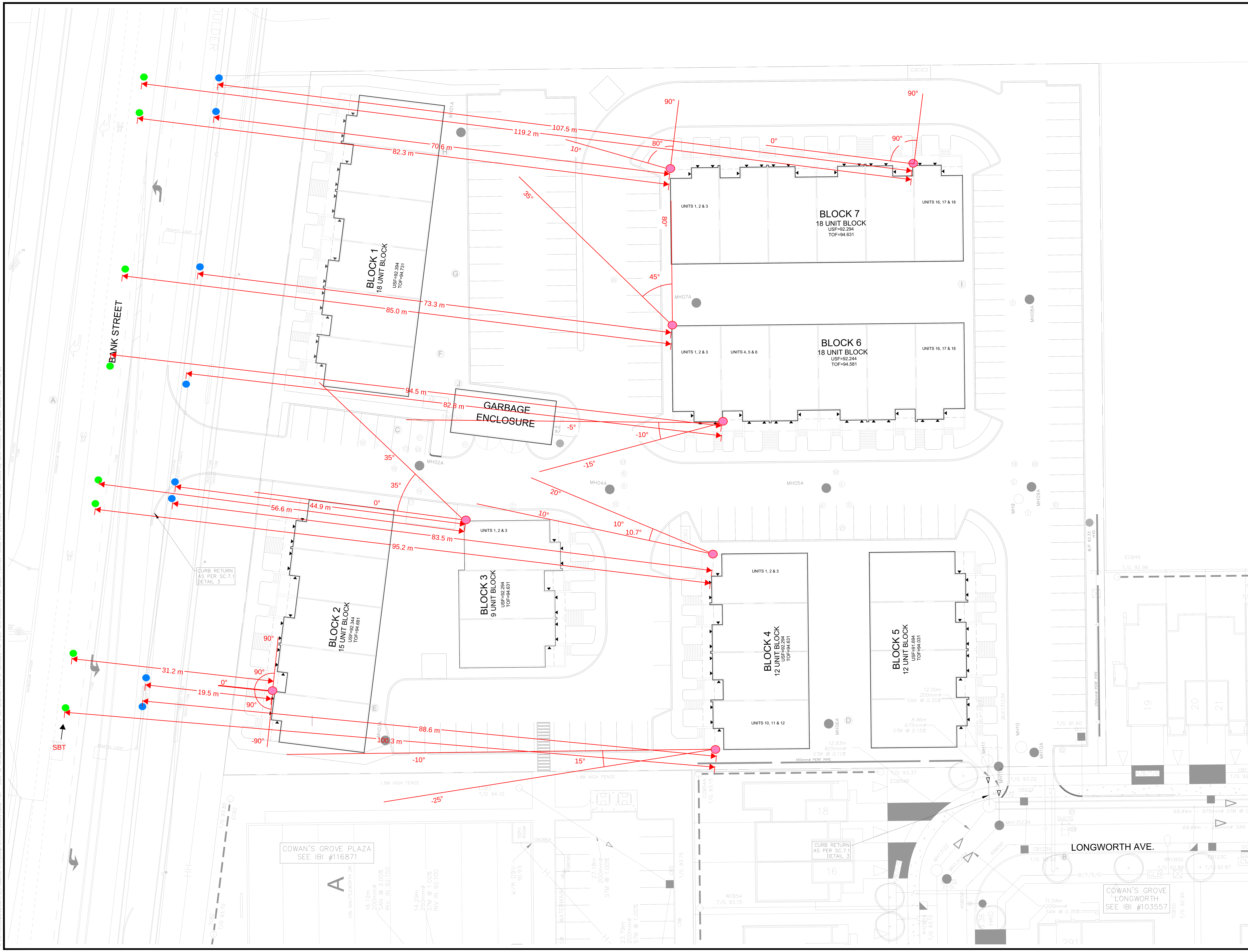
This report outlines the impact of roadway noise on the proposed Cowan's Grove Mid-Density Residential Block development, located within the Leitrim community of Ottawa at 4791 Bank Street. As indicated through the analysis conducted for this study, it is anticipated that noise levels will remain within the standards established by the City of Ottawa and Ministry of the Environment (MOE) with the exception of select units as indicated on **Drawing No. 121753-N2**. For these dwelling units, appropriate warning clauses and associated noise abatement measures must be provided on the Agreement of Purchase and Sale. Sound Transmission Class (STC) ratings for windows and glazed doors are provided for dwelling units with the highest exposure to Bank Street.

7 PROFESSIONAL AUTHORIZATION

Prepared by:

Ben Pascolo-Neveu, P.Eng.

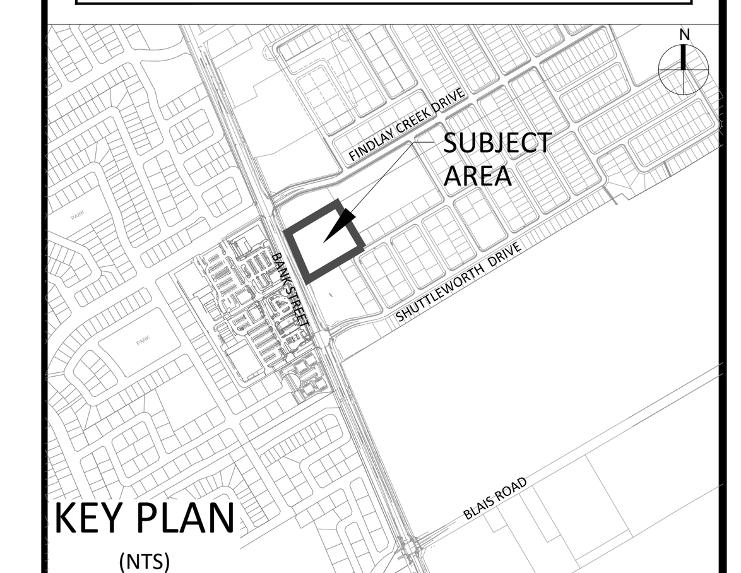
"J:\121753_CowansGrove\6.0_Technical\6.2_Civil_Eng_Muni_Transp\6.2.1_Brief_Noise\CTR_Environ Noise Impact Assessmt_2021-01-11.docx"



LEGEND

- NOISE SOURCE (NORTHBOUND TRAVEL LANES ON BANK ST.)
- NOISE SOURCE (SOUTHBOUND TRAVEL LANES ON BANK ST.)
- LOCATION OF INDOOR NOISE RECEPTOR
- NOISE RECEIVER LOCATION WARNING CLAUSE
- 17.5 m — PERPENDICULAR SOURCE-RECEIVER DISTANCE (M)
- 85° / 80° / 5° — NOISE ANGLES

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS



KEY PLAN
(NTS)

No.	REVISIONS	By	Date
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13			
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1	ISSUED TO CITY FOR REVIEW	TRB	2020:08:14

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title
COWAN'S GROVE
MID-DENSITY
4791 BANK STREET

LICENSED PROFESSIONAL ENGINEER
B. PASCOLO-NEVEU
100209797
2021-01-11
PROVINCE OF ONTARIO

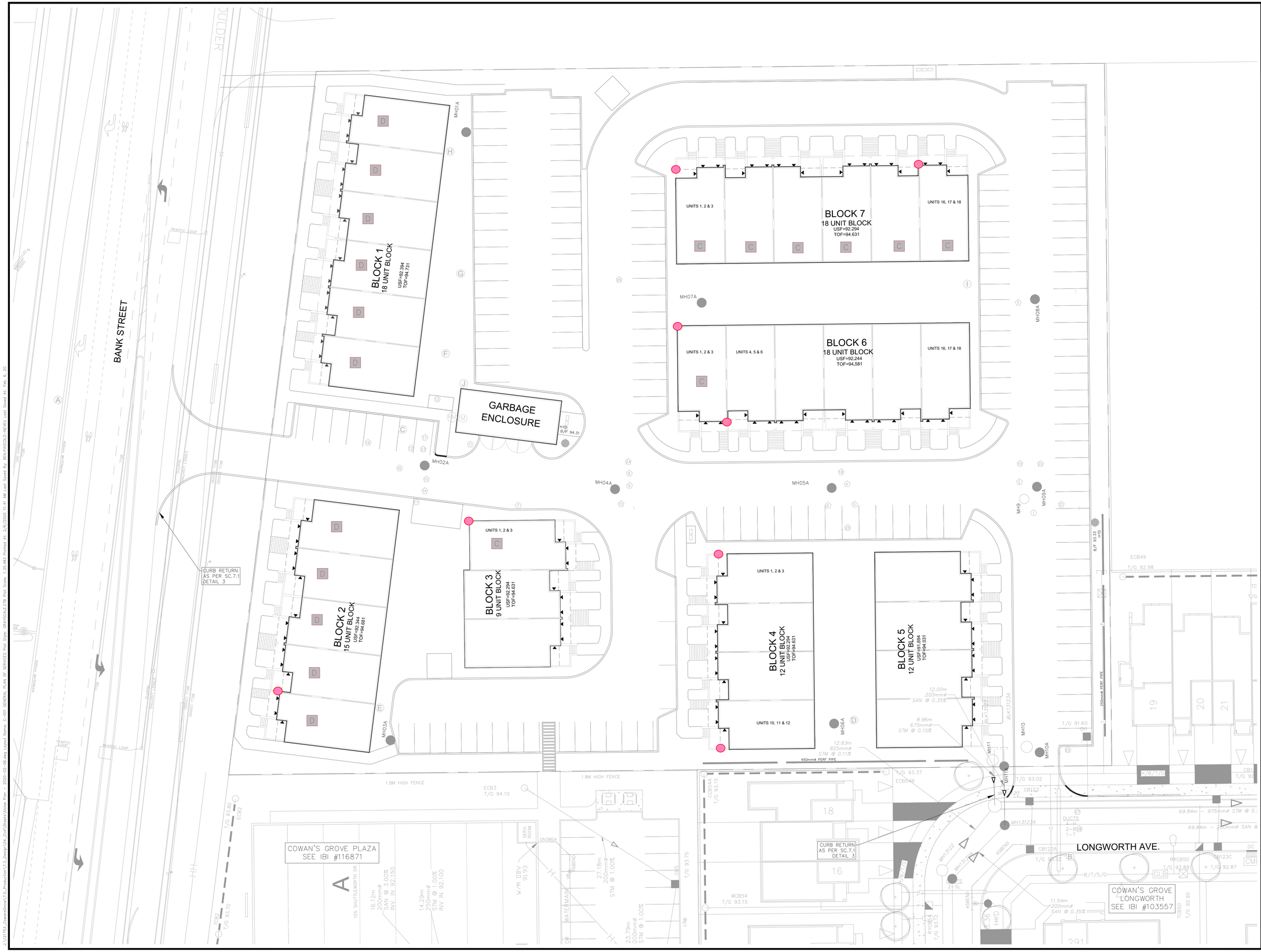
N

Drawing Title
INDOOR NOISE PARAMETERS

Scale 1: 1000

Design	Date
BPN	AUGUST 2020
Drawn	**Checked**
BPN	LME
Project No.	**Drawing No.**
121753	N1

CITY PLAN No.####
CITY FILE No. ####

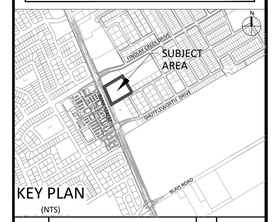


LEGEND:

C — NOISE RECEIVER LOCATION WARNING CLAUSE

LOCATION OF INDOOR NOISE RECEPTOR

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS



KEY PLAN
(NTS)

No.	REVISIONS	By	Date
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IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
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LICENSED PROFESSIONAL ENGINEER
B. PASCOLO-NEVEU
100209797
2021-01-11
PROVINCE OF ONTARIO

Drawing Title
NOISE PLAN

Scale
1: 1000

Design	Date
BPN	AUGUST 2020
Drawn	Checked
BPN	LME
Project No.	Drawing No.
121753	N2

CITY FILE No. ####
CITY PLAN No.####

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APPENDIX A
NOISE CALCULATIONS (STAMSON)

STAMSON 5.0 NORMAL REPORT Date: 07-01-2021 111:26:45
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank.te Time Period: Day/Night 16/8 hours
Description: Block 1 & 2, 2nd Floor Units

Road data, segment # 1: Bank St N (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank St N (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 19.50 / 19.50 m
Receiver height : 6.50 / 6.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↟
Road data, segment # 2: Bank St S (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank St S (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.20 / 31.20  m
Receiver height           :   6.50 / 6.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

🠝

```
Results segment # 1: Bank St N (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 69.07 + 0.00) = 69.07 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.51  71.98   0.00  -1.72  -1.19   0.00   0.00   0.00  69.07
-------------------------------------------------------------------------------

Segment Leq : 69.07 dBA
```

🠝

```
Results segment # 2: Bank St S (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.99 + 0.00) = 65.99 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.51  71.98   0.00  -4.80  -1.19   0.00   0.00   0.00  65.99
-------------------------------------------------------------------------------

Segment Leq : 65.99 dBA

Total Leq All Segments: 70.81 dBA
```

🠝

```
Results segment # 1: Bank St N (night)
-------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 61.47 + 0.00) = 61.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	64.39	0.00	-1.72	-1.19	0.00	0.00	0.00	61.47

Segment Leq : 61.47 dBA

Results segment # 2: Bank St S (night)

Source height = 1.50 m

ROAD (0.00 + 58.39 + 0.00) = 58.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	64.39	0.00	-4.80	-1.19	0.00	0.00	0.00	58.39

Segment Leq : 58.39 dBA

Total Leq All Segments: 63.21 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.81
(NIGHT): 63.21

STAMSON 5.0 NORMAL REPORT Date: 07-01-2021 111:29:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank.te Time Period: Day/Night 16/8 hours
Description: Block 1 & 2, 1st Floor Units

Road data, segment # 1: Bank St N (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank St N (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 19.50 / 19.50 m
Receiver height : 3.10 / 3.10 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↟
Road data, segment # 2: Bank St S (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank St S (day/night)
------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.20 / 31.20  m
Receiver height           :   3.10 / 3.10   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

🠝

```
Results segment # 1: Bank St N (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 68.77 + 0.00) = 68.77 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.61  71.98   0.00  -1.84  -1.38   0.00   0.00   0.00  68.77
-------------------------------------------------------------------------------

Segment Leq : 68.77 dBA
```

🠝

```
Results segment # 2: Bank St S (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.48 + 0.00) = 65.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.61  71.98   0.00  -5.13  -1.38   0.00   0.00   0.00  65.48
-------------------------------------------------------------------------------

Segment Leq : 65.48 dBA

Total Leq All Segments: 70.44 dBA
```

🠝

```
Results segment # 1: Bank St N (night)
-------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 61.18 + 0.00) = 61.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.61	64.39	0.00	-1.84	-1.38	0.00	0.00	0.00	61.18

Segment Leq : 61.18 dBA

Results segment # 2: Bank St S (night)

Source height = 1.50 m

ROAD (0.00 + 57.88 + 0.00) = 57.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.61	64.39	0.00	-5.13	-1.38	0.00	0.00	0.00	57.88

Segment Leq : 57.88 dBA

Total Leq All Segments: 62.85 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.44
(NIGHT): 62.85

STAMSON 5.0 NORMAL REPORT Date: 07-01-2021 111:31:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank.te Time Period: Day/Night 16/8 hours
Description: Block 1 & 2, Basement Units

Road data, segment # 1: Bank St N (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank St N (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 19.50 / 19.50 m
Receiver height : 0.60 / 0.60 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↟
Road data, segment # 2: Bank St S (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank St S (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  31.20 / 31.20  m
Receiver height           :   0.60 / 0.60   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

↟

```
Results segment # 1: Bank St N (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 68.64 + 0.00) = 68.64 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.66  71.98   0.00  -1.89  -1.46   0.00   0.00   0.00  68.64
-------------------------------------------------------------------------------

Segment Leq : 68.64 dBA
```

↟

```
Results segment # 2: Bank St S (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 65.25 + 0.00) = 65.25 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.66  71.98   0.00  -5.28  -1.46   0.00   0.00   0.00  65.25
-------------------------------------------------------------------------------

Segment Leq : 65.25 dBA

Total Leq All Segments: 70.28 dBA
```

↟

```
Results segment # 1: Bank St N (night)
-------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 61.04 + 0.00) = 61.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	64.39	0.00	-1.89	-1.46	0.00	0.00	0.00	61.04

Segment Leq : 61.04 dBA

Results segment # 2: Bank St S (night)

Source height = 1.50 m

ROAD (0.00 + 57.65 + 0.00) = 57.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	64.39	0.00	-5.28	-1.46	0.00	0.00	0.00	57.65

Segment Leq : 57.65 dBA

Total Leq All Segments: 62.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.28
(NIGHT): 62.68

STAMSON 5.0 NORMAL REPORT Date: 05-02-2020 17:23:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank.te Time Period: Day/Night 16/8 hours
Description: Block 3 Units 1, 2 & 3 - Indoor

Road data, segment # 1: Bank St N (day/night)

Car traffic volume	: 14168/1232	veh/TimePeriod *
Medium truck volume	: 1127/98	veh/TimePeriod *
Heavy truck volume	: 805/70	veh/TimePeriod *
Posted speed limit	: 70 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	17500
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: Bank St N (day/night)

Angle1 Angle2	: 0.00 deg	35.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 44.90 / 44.90	m
Receiver height	: 6.50 / 6.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Bank St S (day/night)

Car traffic volume	: 14168/1232	veh/TimePeriod *
Medium truck volume	: 1127/98	veh/TimePeriod *
Heavy truck volume	: 805/70	veh/TimePeriod *
Posted speed limit	: 70 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

	BANK
24 hr Traffic Volume (AADT or SADT)	17500
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: Bank St S (day/night)

Angle1 Angle2	0.00 deg	35.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	56.60 / 56.60	m
Receiver height	6.50 / 6.50	m
Topography	1	(Flat/gentle slope; no barrier)
Reference angle	0.00	

Results segment # 1: Bank St N (day)

Source height = 1.50 m

ROAD (0.00 + 57.54 + 0.00) = 57.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	35	0.51	71.98	0.00	-7.19	-7.25	0.00	0.00	0.00	57.54

Segment Leq : 57.54 dBA

Results segment # 2: Bank St S (day)

Source height = 1.50 m

ROAD (0.00 + 56.02 + 0.00) = 56.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	35	0.51	71.98	0.00	-8.71	-7.25	0.00	0.00	0.00	56.02

Segment Leq : 56.02 dBA

Total Leq All Segments: 59.86 dBA

Results segment # 1: Bank St N (night)

Source height = 1.50 m

ROAD (0.00 + 49.94 + 0.00) = 49.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	35	0.51	64.39	0.00	-7.19	-7.25	0.00	0.00	0.00	49.94

Segment Leq : 49.94 dBA

Results segment # 2: Bank St S (night)

Source height = 1.50 m

ROAD (0.00 + 48.43 + 0.00) = 48.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	35	0.51	64.39	0.00	-8.71	-7.25	0.00	0.00	0.00	48.43

Segment Leq : 48.43 dBA

Total Leq All Segments: 52.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.86
(NIGHT): 52.26

STAMSON 5.0 NORMAL REPORT Date: 14-08-2020 13:06:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank.te Time Period: Day/Night 16/8 hours
Description: Block 4 Units 1, 2 & 3 - Indoor

Road data, segment # 1: Bank St N (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank St N (day/night)

Angle1 Angle2 : 10.00 deg 20.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 83.50 / 83.50 m
Receiver height : 6.50 / 6.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↟
Road data, segment # 2: Bank St S (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank St S (day/night)
-------------------------------------------
Angle1   Angle2           :  10.00 deg   20.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  95.20 / 95.20  m
Receiver height           :   6.50 / 6.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

🠝
Results segment # 1: Bank St N (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.09 + 0.00) = 48.09 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    10     20   0.51  71.98   0.00 -11.26 -12.63   0.00   0.00   0.00  48.09
-------------------------------------------------------------------------------

Segment Leq : 48.09 dBA

🠝
Results segment # 2: Bank St S (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 47.23 + 0.00) = 47.23 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    10     20   0.51  71.98   0.00 -12.12 -12.63   0.00   0.00   0.00  47.23
-------------------------------------------------------------------------------

Segment Leq : 47.23 dBA

Total Leq All Segments: 50.69 dBA

🠝
Results segment # 1: Bank St N (night)
-------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 40.50 + 0.00) = 40.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
10	20	0.51	64.39	0.00	-11.26	-12.63	0.00	0.00	0.00	40.50

Segment Leq : 40.50 dBA

Results segment # 2: Bank St S (night)

Source height = 1.50 m

ROAD (0.00 + 39.64 + 0.00) = 39.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
10	20	0.51	64.39	0.00	-12.12	-12.63	0.00	0.00	0.00	39.64

Segment Leq : 39.64 dBA

Total Leq All Segments: 43.10 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.69
(NIGHT): 43.10

STAMSON 5.0 NORMAL REPORT Date: 05-02-2020 17:10:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank.te Time Period: Day/Night 16/8 hours
Description: Block 4 Units 10, 11 & 12 - Indoor

Road data, segment # 1: Bank St N (day/night)

Car traffic volume	: 14168/1232	veh/TimePeriod *
Medium truck volume	: 1127/98	veh/TimePeriod *
Heavy truck volume	: 805/70	veh/TimePeriod *
Posted speed limit	: 70 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	17500
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: Bank St N (day/night)

Angle1 Angle2	: -25.00 deg	-10.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 88.60 / 88.60	m
Receiver height	: 6.50 / 6.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Bank St S (day/night)

Car traffic volume	: 14168/1232	veh/TimePeriod *
Medium truck volume	: 1127/98	veh/TimePeriod *
Heavy truck volume	: 805/70	veh/TimePeriod *
Posted speed limit	: 70 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

```
                                        BANK
    24 hr Traffic Volume (AADT or SADT):  17500
    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: Bank St S (day/night)
-------------------------------------------
Angle1   Angle2           : -25.00 deg   -10.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 100.30 / 100.30 m
Receiver height           :   6.50 / 6.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

🠝
Results segment # 1: Bank St N (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 49.43 + 0.00) = 49.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -25    -10   0.51  71.98   0.00 -11.65 -10.90   0.00   0.00   0.00  49.43
-------------------------------------------------------------------------------

Segment Leq : 49.43 dBA

🠝
Results segment # 2: Bank St S (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.62 + 0.00) = 48.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -25    -10   0.51  71.98   0.00 -12.46 -10.90   0.00   0.00   0.00  48.62
-------------------------------------------------------------------------------

Segment Leq : 48.62 dBA

Total Leq All Segments: 52.05 dBA
```

Results segment # 1: Bank St N (night)

Source height = 1.50 m

ROAD (0.00 + 41.84 + 0.00) = 41.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-25	-10	0.51	64.39	0.00	-11.65	-10.90	0.00	0.00	0.00	41.84

Segment Leq : 41.84 dBA

Results segment # 2: Bank St S (night)

Source height = 1.50 m

ROAD (0.00 + 41.02 + 0.00) = 41.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-25	-10	0.51	64.39	0.00	-12.46	-10.90	0.00	0.00	0.00	41.02

Segment Leq : 41.02 dBA

Total Leq All Segments: 44.46 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.05
(NIGHT): 44.46

STAMSON 5.0 NORMAL REPORT Date: 05-02-2020 17:02:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank.te Time Period: Day/Night 16/8 hours
Description: Blocks 6 Units 1, 2 & 3 - Indoor

Road data, segment # 1: Bank St N (day/night)

Car traffic volume	: 14168/1232	veh/TimePeriod *
Medium truck volume	: 1127/98	veh/TimePeriod *
Heavy truck volume	: 805/70	veh/TimePeriod *
Posted speed limit	: 70 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	: 17500
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: Bank St N (day/night)

Angle1 Angle2	: 35.00 deg	80.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 73.30 / 73.30	m
Receiver height	: 6.50 / 6.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Bank St S (day/night)

Car traffic volume	: 14168/1232	veh/TimePeriod *
Medium truck volume	: 1127/98	veh/TimePeriod *
Heavy truck volume	: 805/70	veh/TimePeriod *
Posted speed limit	: 70 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

```
                                        BANK
    24 hr Traffic Volume (AADT or SADT):  17500
    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: Bank St S (day/night)
-------------------------------------------
Angle1   Angle2           :  35.00 deg   80.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  85.00 / 85.00  m
Receiver height           :   6.50 / 6.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

🠝
Results segment # 1: Bank St N (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.05 + 0.00) = 54.05 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    35     80   0.51  71.98   0.00 -10.41  -7.53   0.00   0.00   0.00  54.05
-------------------------------------------------------------------------------

Segment Leq : 54.05 dBA

🠝
Results segment # 2: Bank St S (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.07 + 0.00) = 53.07 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    35     80   0.51  71.98   0.00 -11.38  -7.53   0.00   0.00   0.00  53.07
-------------------------------------------------------------------------------

Segment Leq : 53.07 dBA

Total Leq All Segments: 56.60 dBA
```

Results segment # 1: Bank St N (night)

Source height = 1.50 m

ROAD (0.00 + 46.45 + 0.00) = 46.45 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
35	80	0.51	64.39	0.00	-10.41	-7.53	0.00	0.00	0.00	46.45

Segment Leq : 46.45 dBA

Results segment # 2: Bank St S (night)

Source height = 1.50 m

ROAD (0.00 + 45.48 + 0.00) = 45.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
35	80	0.51	64.39	0.00	-11.38	-7.53	0.00	0.00	0.00	45.48

Segment Leq : 45.48 dBA

Total Leq All Segments: 49.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.60
(NIGHT): 49.00

STAMSON 5.0 NORMAL REPORT Date: 06-02-2020 11:23:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank.te Time Period: Day/Night 16/8 hours
Description: Block 6 Units 4,5 & 6 - Indoor

Road data, segment # 1: Bank St N (day/night)

Car traffic volume	: 14168/1232	veh/TimePeriod *
Medium truck volume	: 1127/98	veh/TimePeriod *
Heavy truck volume	: 805/70	veh/TimePeriod *
Posted speed limit	: 70 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	17500
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: Bank St N (day/night)

Angle1 Angle2	: -15.00 deg	-5.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 82.80 / 82.80	m
Receiver height	: 6.50 / 6.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Bank St S (day/night)

Car traffic volume	: 14168/1232	veh/TimePeriod *
Medium truck volume	: 1127/98	veh/TimePeriod *
Heavy truck volume	: 805/70	veh/TimePeriod *
Posted speed limit	: 70 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

```
                                        BANK
    24 hr Traffic Volume (AADT or SADT):  17500
    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: Bank St S (day/night)
-----------------------------------------
Angle1   Angle2           : -15.00 deg   -5.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  94.50 / 94.50  m
Receiver height           :   6.50 / 6.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

🡅
Results segment # 1: Bank St N (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 48.19 + 0.00) = 48.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -15     -5   0.51  71.98   0.00 -11.20 -12.59   0.00   0.00   0.00  48.19
-------------------------------------------------------------------------------

Segment Leq : 48.19 dBA

🡅
Results segment # 2: Bank St S (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 47.32 + 0.00) = 47.32 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -15     -5   0.51  71.98   0.00 -12.07 -12.59   0.00   0.00   0.00  47.32
-------------------------------------------------------------------------------

Segment Leq : 47.32 dBA

Total Leq All Segments: 50.79 dBA
```

Results segment # 1: Bank St N (night)

Source height = 1.50 m

ROAD (0.00 + 40.59 + 0.00) = 40.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	-5	0.51	64.39	0.00	-11.20	-12.59	0.00	0.00	0.00	40.59

Segment Leq : 40.59 dBA

Results segment # 2: Bank St S (night)

Source height = 1.50 m

ROAD (0.00 + 39.73 + 0.00) = 39.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	-5	0.51	64.39	0.00	-12.07	-12.59	0.00	0.00	0.00	39.73

Segment Leq : 39.73 dBA

Total Leq All Segments: 43.19 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.79
(NIGHT): 43.19

STAMSON 5.0 NORMAL REPORT Date: 05-02-2020 16:57:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank.te Time Period: Day/Night 16/8 hours
Description: Blocks 7 Units 1, 2 & 3 - Indoor

Road data, segment # 1: Bank St N (day/night)

Car traffic volume	: 14168/1232	veh/TimePeriod *
Medium truck volume	: 1127/98	veh/TimePeriod *
Heavy truck volume	: 805/70	veh/TimePeriod *
Posted speed limit	: 70 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	: 17500
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: Bank St N (day/night)

Angle1 Angle2	: 10.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 70.60 / 70.60	m
Receiver height	: 6.50 / 6.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Road data, segment # 2: Bank St S (day/night)

Car traffic volume	: 14168/1232	veh/TimePeriod *
Medium truck volume	: 1127/98	veh/TimePeriod *
Heavy truck volume	: 805/70	veh/TimePeriod *
Posted speed limit	: 70 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

```
                                        BANK
    24 hr Traffic Volume (AADT or SADT):  17500
    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: Bank St S (day/night)
-----------------------------------------
Angle1   Angle2           :  10.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  82.30 / 82.30  m
Receiver height           :   6.50 / 6.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

🠝
Results segment # 1: Bank St N (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.94 + 0.00) = 56.94 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    10     90   0.51  71.98   0.00 -10.16  -4.89   0.00   0.00   0.00  56.94
-------------------------------------------------------------------------------

Segment Leq : 56.94 dBA

🠝
Results segment # 2: Bank St S (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 55.93 + 0.00) = 55.93 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    10     90   0.51  71.98   0.00 -11.16  -4.89   0.00   0.00   0.00  55.93
-------------------------------------------------------------------------------

Segment Leq : 55.93 dBA

Total Leq All Segments: 59.47 dBA
```

Results segment # 1: Bank St N (night)

Source height = 1.50 m

ROAD (0.00 + 49.34 + 0.00) = 49.34 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
10	90	0.51	64.39	0.00	-10.16	-4.89	0.00	0.00	0.00	49.34

Segment Leq : 49.34 dBA

Results segment # 2: Bank St S (night)

Source height = 1.50 m

ROAD (0.00 + 48.33 + 0.00) = 48.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
10	90	0.51	64.39	0.00	-11.16	-4.89	0.00	0.00	0.00	48.33

Segment Leq : 48.33 dBA

Total Leq All Segments: 51.87 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.47
(NIGHT): 51.87

STAMSON 5.0 NORMAL REPORT Date: 14-08-2020 13:14:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bank.te Time Period: Day/Night 16/8 hours
Description: Block 7 Units 16,17 & 18 - Indoor

Road data, segment # 1: Bank St N (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank St N (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 107.50 / 107.50 m
Receiver height : 6.50 / 6.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↟
Road data, segment # 2: Bank St S (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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: Bank St S (day/night)
------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 119.20 / 119.20 m
Receiver height           :   6.50 / 6.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

🠝
Results segment # 1: Bank St N (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.86 + 0.00) = 54.86 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.51  71.98   0.00 -12.92  -4.20   0.00   0.00   0.00  54.86
-------------------------------------------------------------------------------

Segment Leq : 54.86 dBA

🠝
Results segment # 2: Bank St S (day)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.19 + 0.00) = 54.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.51  71.98   0.00 -13.59  -4.20   0.00   0.00   0.00  54.19
-------------------------------------------------------------------------------

Segment Leq : 54.19 dBA

Total Leq All Segments: 57.55 dBA

🠝
Results segment # 1: Bank St N (night)
-------------------------------------
```

Source height = 1.50 m

ROAD (0.00 + 47.27 + 0.00) = 47.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.51	64.39	0.00	-12.92	-4.20	0.00	0.00	0.00	47.27

Segment Leq : 47.27 dBA

Results segment # 2: Bank St S (night)

Source height = 1.50 m

ROAD (0.00 + 46.59 + 0.00) = 46.59 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.51	64.39	0.00	-13.59	-4.20	0.00	0.00	0.00	46.59

Segment Leq : 46.59 dBA

Total Leq All Segments: 49.95 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.55
(NIGHT): 49.95

APPENDIX B
SOUND TRANSMISSION CLASS (STC)
CALCULATIONS

Living/Dining Room - Blocks 1 & 2 - Side Wall - Basement

Reverse Evaluation of Sound Transmission Class (STC) for Building Components

1.0	Free field sound level		70.28	dBA	Noise source
	Correction for reflections		3	dBA	Road
	Outdoor sound level		73.28	dBA	Indoor Quarters
	Indoor sound level	(Daytime)	45	dBA	Living
	Required Noise Reduction (NR)		28.28	dB	Subtract indoor from outdoor sound level
2.0	Sound angle of insidence	0 to 90 degrees			C_1 Correction from Table 7.7 0 dB
					Sum 28.28 dB

	Component:	Wall		STC 40 dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		C_4 from Table 7.10 7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling		Correction -7 dB
4.0	Room floor area	44.3 m^2	35.44018 % of floor area	
	Component Area	15.7 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9 -11 dB
				Correction 11 dB
5.0	Noise reduction if only this component transmits sound			44 dB
6.0	Required noise reduction (from Step 1)			28 dB
7.0	Term C_2: Subtract the Required NR from the Noise Reduction for this component			16 dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy			5 %

	Component:	Window		After step 2 28.28 dB
9.0	Transmits	95 % of total sound energy		C_2 from Table 7.8 0 dB
10.0	Room floor area	44.3 m^2	6.546275 % of floor area	
	Component Area	2.9 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9 -11 dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		
	Component category	d. Sealed thick window, or exterior wall, or roof/ceil		C_4 from Table 7.10 7 dB
			$STC=NR+C_1+C_2+C_3+C_4$	Required STC 24

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE

Bedroom 2 - Blocks 1 & 2 - Side Wall - Basement

Reverse Evaluation of Sound Transmission Class (STC) for Building Components

1.0	Free field sound level		62.68	dBA	Noise source
	Correction for reflections		3	dBA	Road
	Outdoor sound level		65.68	dBA	Indoor Quarters
	Indoor sound level	(Night time)	40	dBA	Sleeping
	Required Noise Reduction (NR)		25.68	dB	Subtract indoor from outdoor sound level
2.0	Sound angle of insidence	0 to 90 degrees			C_1 Correction from Table 7.7 0 dB
					Sum 25.68 dB

	Component:	Wall		STC 40 dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		C_4 from Table 7.10 7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling		Correction -7 dB
4.0	Room floor area	14.3 m^2	62.23776 % of floor area	
	Component Area	8.9 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9 -11 dB
				Correction 11 dB
5.0	Noise reduction if only this component transmits sound			44 dB
6.0	Required noise reduction (from Step 1)			26 dB
7.0	Term C_2: Subtract the Required NR from the Noise Reduction for this component			18 dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy			5 %

	Component:	Window		After step 2 25.68 dB
9.0	Transmits	95 % of total sound energy		C_2 from Table 7.8 0 dB
10.0	Room floor area	14.3 m^2	6.993007 % of floor area	
	Component Area	1 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9 -11 dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		
	Component category	d. Sealed thick window, or exterior wall, or roof/ceil		C_4 from Table 7.10 7 dB
			$STC=NR+C_1+C_2+C_3+C_4$	Required STC 22

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE

Living/Dining Room - Blocks 1 &2 - Front Wall Basement

Reverse Evaluation of Sound Transmission Class (STC) for Building Components

1.0	Free field sound level		70.28	dBA	Noise source
	Correction for reflections		3	dBA	Road
	Outdoor sound level		73.28	dBA	Indoor Quarters
	Indoor sound level	(Daytime)	45	dBA	Living
	Required Noise Reduction (NR)		28.28	dB	Subtract indoor from outdoor sound level
2.0	Sound angle of insidence	0 to 90 degrees			C_1 Correction from Table 7.7 0 dB
					Sum 28.28 dB

	Component:	Wall		STC 40 dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		C_4 from Table 7.10 7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling		Correction -7 dB
4.0	Room floor area	44.3 m^2	27.31377 % of floor area	
	Component Area	12.1 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9 -10 dB
				Correction 10 dB
5.0	Noise reduction if only this component transmits sound			43 dB
6.0	Required noise reduction (from Step 1)			28 dB
7.0	Term C_2: Subtract the Required NR from the Noise Reduction for this component			15 dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy			5 %

	Component:	Window		After step 2 28.28 dB
9.0	Transmits	95 % of total sound energy		C_2 from Table 7.8 0 dB
10.0	Room floor area	44.3 m^2	9.255079 % of floor area	
	Component Area	4.1 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9 -10 dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		
	Component category	d. Sealed thick window, or exterior wall, or roof/ceil		C_4 from Table 7.10 7 dB
			$STC=NR+C_1+C_2+C_3+C_4$	Required STC 25

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE

Living/Dining Room - Blocks 1 & 2 - Side Wall - First Floor

Reverse Evaluation of Sound Transmission Class (STC) for Building Components

1.0	Free field sound level		70.44	dBA	Noise source: Road
	Correction for reflections		3	dBA	
	Outdoor sound level		73.44	dBA	Indoor Quarters: Living
	Indoor sound level	(Daytime)	45	dBA	
	Required Noise Reduction (NR)		28.44	dB	Subtract indoor from outdoor sound level
2.0	Sound angle of insidence	0 to 90 degrees			C_1 Correction from Table 7.7: 0 dB
					Sum: 28.44 dB

	Component:	Wall		STC 40 dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		C_4 from Table 7.10: 7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling		Correction: -7 dB
4.0	Room floor area	39.9 m^2	67.16792 % of floor area	
	Component Area	26.8 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9: #N/A dB
				Correction: ### dB
5.0	Noise reduction if only this component transmits sound			### dB
6.0	Required noise reduction (from Step 1)			28 dB
7.0	Term C_2: Subtract the Required NR from the Noise Reduction for this component			### dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy			### %

	Component:	Window		After step 2: 28.44 dB
9.0	Transmits	#N/A	% of total sound energy	C_2 from Table 7.8: #N/A dB
10.0	Room floor area	39.9 m^2	3.258145 % of floor area	
	Component Area	1.3 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9: #N/A dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		
	Component category	d. Sealed thick window, or exterior wall, or roof/ceil		C_4 from Table 7.10: 7 dB
			$STC=NR+C_1+C_2+C_3+C_4$	Required STC: #N/A

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE

Bedroom 2 - Blocks 1 & 2 - Side Wall - First Floor

Reverse Evaluation of Sound Transmission Class (STC) for Building Components

1.0	Free field sound level		62.85 dBA	Noise source	
	Correction for reflections		3 dBA	Road	
	Outdoor sound level		65.85 dBA	Indoor Quarters	
	Indoor sound level	(Night time)	40 dBA	Sleeping	
	Required Noise Reduction (NR)		25.85 dB	Subtract indoor from outdoor sound level	
2.0	Sound angle of insidence	0 to 90 degrees		C_1 Correction from Table 7.7	0 dB
				Sum	25.85 dB

	Component:	Wall		STC	40 dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		C_4 from Table 7.10	7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling		Correction	-7 dB
4.0	Room floor area	14.3 m^2	62.23776 % of floor area		
	Component Area	8.9 m^2			
	Room absorption category	Intermediate		C_3 from Table 7.9	-11 dB
				Correction	11 dB
5.0	Noise reduction if only this component transmits sound				44 dB
6.0	Required noise reduction (from Step 1)				26 dB
7.0	Term C_2: Subtract the Required NR from the Noise Reduction for this component				18 dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy				5 %

	Component:	Window		After step 2	25.85 dB
9.0	Transmits	95 % of total sound energy		C_2 from Table 7.8	0 dB
10.0	Room floor area	14.3 m^2	6.993007 % of floor area		
	Component Area	1 m^2			
	Room absorption category	Intermediate		C_3 from Table 7.9	-11 dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft			
	Component category	d. Sealed thick window, or exterior wall, or roof/ceil		C_4 from Table 7.10	7 dB
			$STC=NR+C_1+C_2+C_3+C_4$	Required STC	22

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE

Living/Dining Room - Blocks 1 & 2 - Front Wall - 1st Floor

Reverse Evaluation of Sound Transmission Class (STC) for Building Components

1.0	Free field sound level		70.44	dBA	Noise source
	Correction for reflections		3	dBA	Road
	Outdoor sound level		73.44	dBA	Indoor Quarters
	Indoor sound level	(Daytime)	45	dBA	Living
	Required Noise Reduction (NR)		28.44	dB	Subtract indoor from outdoor sound level
2.0	Sound angle of insidence	0 to 90 degrees			C_1 Correction from Table 7.7 0 dB
					Sum 28.44 dB

	Component:	Wall			STC 40 dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft			C_4 from Table 7.10 7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling			Correction -7 dB
4.0	Room floor area		39.9	m^2	33.33333 % of floor area
	Component Area		13.3	m^2	
	Room absorption category	Intermediate			C_3 from Table 7.9 -6 dB
					Correction 6 dB
5.0	Noise reduction if only this component transmits sound				39 dB
6.0	Required noise reduction (from Step 1)				28 dB
7.0	Term C_2: Subtract the Required NR from the Noise Reduction for this component				11 dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy				8 %

	Component:	Window			After step 2 28.44 dB
9.0	Transmits	92 % of total sound energy			C_2 from Table 7.8 0 dB
10.0	Room floor area		39.9	m^2	24.81203 % of floor area
	Component Area		9.9	m^2	
	Room absorption category	Intermediate			C_3 from Table 7.9 -6 dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft			
	Component category	d. Sealed thick window, or exterior wall, or roof/ceil			C_4 from Table 7.10 7 dB
					$STC=NR+C_1+C_2+C_3+C_4$ Required STC 29

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE

Living/Dining Room - Blocks 1 & 2 - Side Wall - 2nd Floor

Reverse Evaluation of Sound Transmission Class (STC) for Building Components

1.0	Free field sound level		70.81	dBA	Noise source: Road
	Correction for reflections		3	dBA	
	Outdoor sound level		73.81	dBA	Indoor Quarters: Living
	Indoor sound level	(Daytime)	45	dBA	
	Required Noise Reduction (NR)		28.81	dB	Subtract indoor from outdoor sound level
2.0	Sound angle of insidence	0 to 90 degrees			C_1 Correction from Table 7.7: 0 dB
					Sum: 28.81 dB

	Component:	Wall		STC 40 dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		C_4 from Table 7.10: 7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling		Correction: -7 dB
4.0	Room floor area	49.8 m^2	60.22088 % of floor area	
	Component Area	29.99 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9: #N/A dB
				Correction: ### dB
5.0	Noise reduction if only this component transmits sound			### dB
6.0	Required noise reduction (from Step 1)			29 dB
7.0	Term C_2: Subtract the Required NR from the Noise Reduction for this component			### dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy			### %

	Component:	Window		After step 2: 28.81 dB
9.0	Transmits	#N/A	% of total sound energy	C_2 from Table 7.8: #N/A dB
10.0	Room floor area	49.8 m^2	1.405622 % of floor area	
	Component Area	0.7 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9: #N/A dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		
	Component category	d. Sealed thick window, or exterior wall, or roof/ceil		C_4 from Table 7.10: 7 dB
			$STC=NR+C_1+C_2+C_3+C_4$	Required STC: #N/A

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE

Bedroom 2 - Blocks 1 & 2 - Side Wall - 2nd Floor

Reverse Evaluation of Sound Transmission Class (STC) for Building Components

1.0	Free field sound level		63.21	dBA	Noise source
	Correction for reflections		3	dBA	Road
	Outdoor sound level		66.21	dBA	Indoor Quarters
	Indoor sound level	(Night time)	40	dBA	Sleeping
	Required Noise Reduction (NR)		26.21	dB	Subtract indoor from outdoor sound level
2.0	Sound angle of insidence	0 to 90 degrees			C_1 Correction from Table 7.7 0 dB
					Sum 26.21 dB

	Component:	Wall		STC 40 dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		C_4 from Table 7.10 7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling		Correction -7 dB
4.0	Room floor area	14.3 m^2	62.23776 % of floor area	
	Component Area	8.9 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9 -9 dB
				Correction 9 dB
5.0	Noise reduction if only this component transmits sound			42 dB
6.0	Required noise reduction (from Step 1)			26 dB
7.0	Term C_2: Subtract the Required NR from the Noise Reduction for this component			16 dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy			5 %

	Component:	Window		After step 2 26.21 dB
9.0	Transmits	95 % of total sound energy		C_2 from Table 7.8 0 dB
10.0	Room floor area	14.3 m^2	10.48951 % of floor area	
	Component Area	1.5 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9 -9 dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		
	Component category	d. Sealed thick window, or exterior wall, or roof/ceil		C_4 from Table 7.10 7 dB
			$STC=NR+C_1+C_2+C_3+C_4$	Required STC 24

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE

Living/Dining Room - Blocks 1 & 2 - Front Wall - 2nd Floor

Reverse Evaluation of Sound Transmission Class (STC) for Building Components

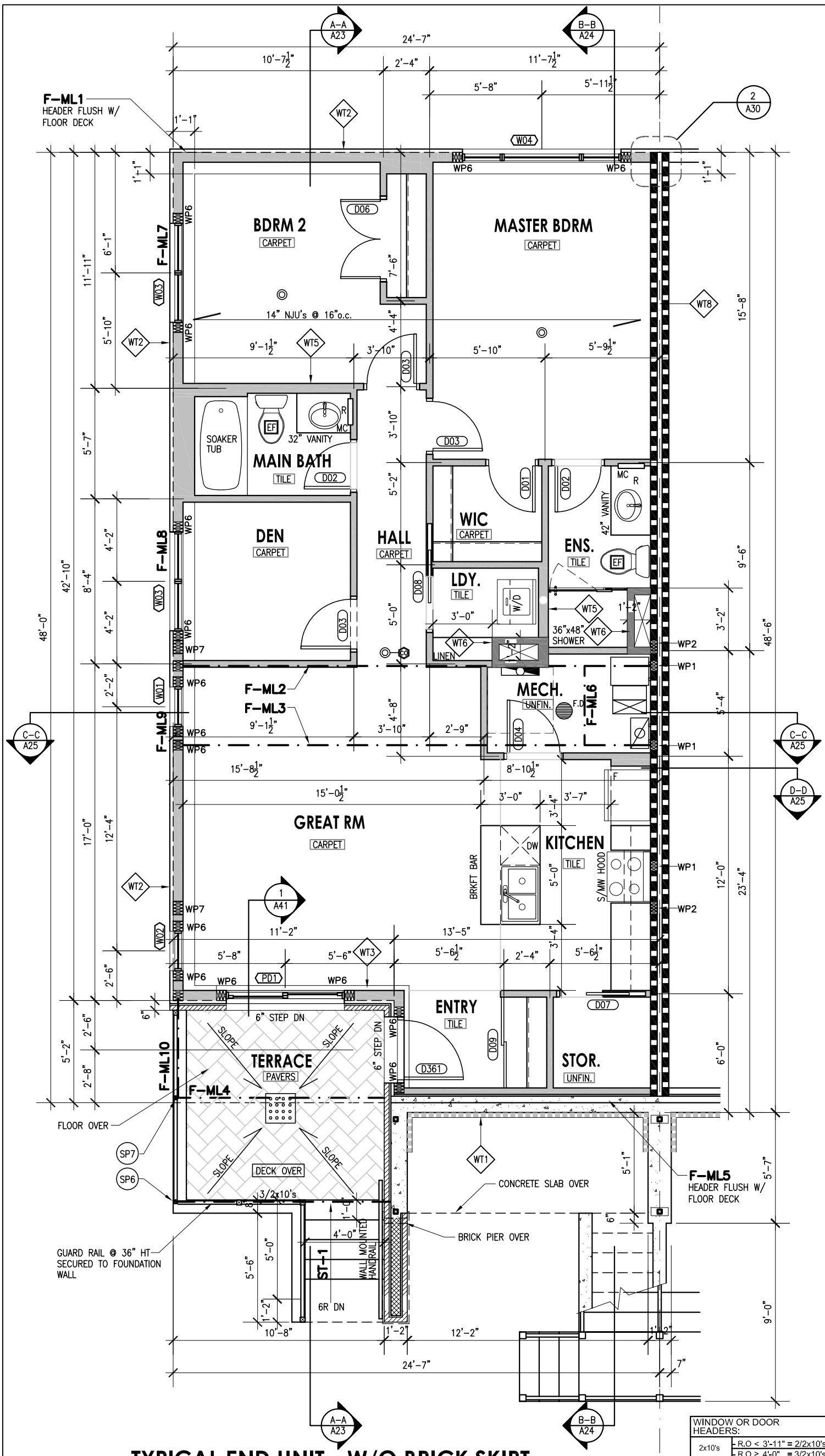
1.0	Free field sound level		70.81	dBA	Noise source
	Correction for reflections		3	dBA	Road
	Outdoor sound level		73.81	dBA	Indoor Quarters
	Indoor sound level	(Daytime)	45	dBA	Living
	Required Noise Reduction (NR)		28.81	dB	Subtract indoor from outdoor sound level
2.0	Sound angle of insidence	0 to 90 degrees			C_1 Correction from Table 7.7 0 dB
					Sum 28.81 dB

	Component:	Wall		STC 40 dB
3.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		C_4 from Table 7.10 7 dB
	Component category	d. Sealed thick window, or exterior wall, or roof/ceiling		Correction -7 dB
4.0	Room floor area	49.8 m^2	29.51807 % of floor area	
	Component Area	14.7 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9 -7 dB
				Correction 7 dB
5.0	Noise reduction if only this component transmits sound			40 dB
6.0	Required noise reduction (from Step 1)			29 dB
7.0	Term C_2: Subtract the Required NR from the Noise Reduction for this component			11 dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy			8 %

	Component:	Window		After step 2 28.81 dB
9.0	Transmits	92 % of total sound energy		C_2 from Table 7.8 0 dB
10.0	Room floor area	49.8 m^2	17.06827 % of floor area	
	Component Area	8.5 m^2		
	Room absorption category	Intermediate		C_3 from Table 7.9 -7 dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		
	Component category	d. Sealed thick window, or exterior wall, or roof/ceil		C_4 from Table 7.10 7 dB
			$STC=NR+C_1+C_2+C_3+C_4$	Required STC 29

Tables from Environmental Noise Assessment in Land Use Planning, dated 1999, published by the MOE

APPENDIX C
SAMPLE ARCHITECTURAL DRAWINGS



TYPICAL END UNIT - W/O BRICK SKIRT
BRIXTON- BASEMENT FLOOR PLAN (1119sq.ft)

UNOBSTUCTED GLASS AREA REQUIREMENT OBC (9.7.2.3.(1))

ROOM	CLEAR FLOOR AREA	WINDOW GLAZING AREA	% UNOBSTRUCTED GLASS AREA	
			PROVIDED	REQUIRED
BDRM 2	120.1ϕ	10.9ϕ	9.1%	5.0%
M. BDRM	165.0ϕ	12.9ϕ	7.8%	5.0%
DEN	67.7ϕ	10.9ϕ	16.1%	10.0%
GREAT RM	245.0ϕ	42.2ϕ	17.2%	10.0%

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS, ONLY FIGURED DIMENSIONS ARE TO BE USED. WHERE DOUBT EXISTS, FILE REQUEST FOR INTERPRETATION AND REQUEST CLARITY.
2. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO VERIFY DIMENSIONS ON SITE, REPORT DISCREPANCES TO THE ARCHITECT PROMPLY.
3. GENERAL CONTRACTOR TO TAKE INTO ACCOUNT CONSTRUCTION TOLERANCE & COORDINATE THE WORK OF DIFFERENT TRADES TO COMPLY WITH DESIGN INTENT.
4. ALL WORK DISCRIBED IN THESE DRAWINGS AND SPECIFICATIONS ARE TO COMPLY WITH THE CURRENT EDITION OF THE ONTARIO BUILDING CODE 2012 OR NATIONAL BUILDING CODE 2015, INCLUDING MOST RECENT AMENDMENTS.
5. DRAWINGS & SPECIFICATIONS ARE COMPLIMENTARY AND ARE TO BE READ TOGETHER.

BSMT FLR NOTES:

- REFER TO PAGE A2 FOR LEGEND.
- REFER TO PAGE A35 FOR WINDOW AND DOOF DETAILS.

ST-1: STAIR FROM GRADE TO TERRACE:
- POURED CONCRETE
- 6 RISERS @ *6.67"
- 5 TREADS @ 10" + 1" NOSING
- BLACK ALUM. HANDRAILS & GUARDS

*RISER HEIGHTS MAY VARY DUE TO GRADING VARIANCE, RISERS ARE TO BE EQUAL WITHIN RUNS. RISER HTS TO BE BETWEEN 4 7/8" min. TO 7 7/8" max. TO COMPLY WITH OBC (9.8.4.2)

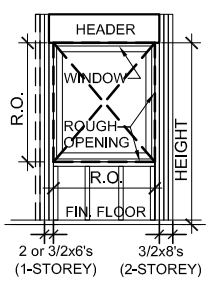
LEGEND:

- IRREGULAR FOUNDATION CONCRETE WALL (DIM. ARE SPECIFIED)
- 10" FOUNDATION CONCRETE WALL
- 8" TYP. FOUNDATION CONCRETE WALL
- 1 HOUR FIRE RATED WALL (WT7/ WT8)

WINDOW OR DOOR HEADERS:

2x10's	- R.O < 3'-11" = 2/2x10's - R.O ≥ 4'-0" = 3/2x10's
LVL's	SEE PLANS

*UNLESS NOTED OTHERWISE



WINDOW OR DOOR STUDS:

FOR 2x10 HEADERS
-(SPAN < 10ft): 1 CONT. FULL HT + 1 JACK STUD
-(SPAN ≥ 10ft): 1 CONT. FULL HT + 2 JACK STUDS

FOR LVL HEADERS
-(ALL SPANS): 1 CONT. FULL HT + 2 JACK STUDS

*UNLESS NOTED OTHERWISE

ISSUE RECORD:

NO.	DISCRIPTION	DATE

CLIENT:
URBANDALE CONSTRUCTION LTD
2193 ARCH STREET, OTTAWA
TEL: 613-731-6331

PRELIMINARY NOT FOR CONSTRUCTION

REVIEWED:	APPROVED:	JOB NO.

PROJECT:
LOCALE FLATS
URBANDALE STACKED TOWNHOMES
COWAN'S GROVE

DWG: **TYPICAL END UNIT BASEMENT FLOOR PLAN W/O BRICK SKIRT**

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

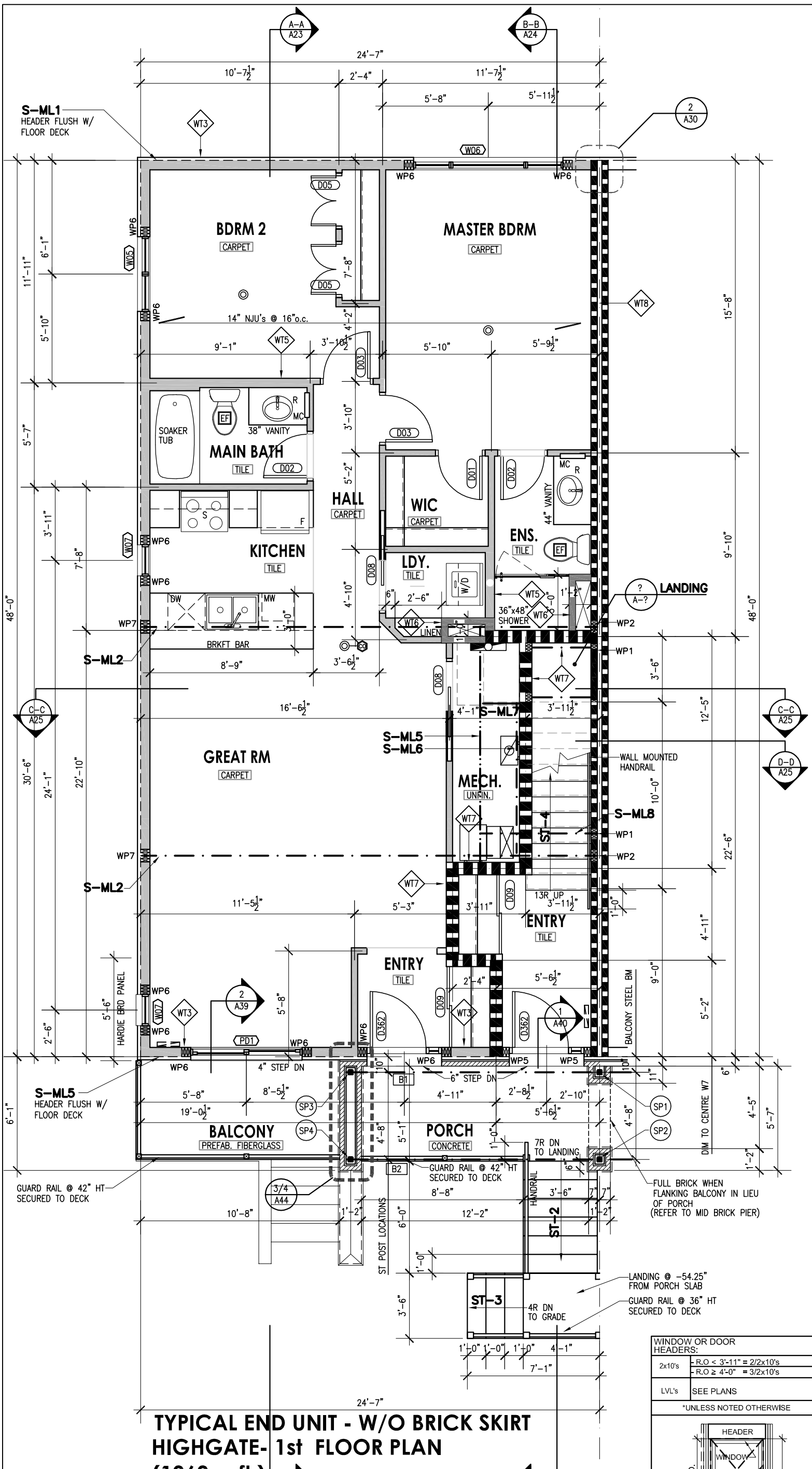
DWG No: **A7**

DATE: MARCH 5,2020

OF 17

ARCHITECTURAL

D07-04-20-0003



TYPICAL END UNIT - W/O BRICK SKIRT
HIGHGATE- 1st FLOOR PLAN
(1060sq.ft.)

A–A A23 B–B A24

GENERAL NOTES:

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4. ALL WORK DISCRIBED IN THESE DRAWINGS AND SPECIFICATIONS ARE TO COMPLY WITH THE CURRENT EDITION OF THE ONTARIO BUILDING CODE 2012 OR NATIONAL BUILDING CODE 2015, INCLUDING MOST RECENT AMENDMENTS.
5. DRAWINGS & SPECIFICATIONS ARE COMPLIMENTARY AND ARE TO BE READ TOGETHER.

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1st FLR NOTES:

- REFER TO PAGE A2 FOR LEGEND.
- REFER TO PAGE A35 FOR WINDOW AND DOOR DETAILS.

ST–2: STAIR FROM PORCH TO LANDING:
- POURED CONCRETE
- 7 RISERS @ 7.75"
- 6 TREADS @ 10" + 1" NOSING
- BLACK ALUM. HANDRAILS & GUARDS

ST–3: STAIR FROM LANDING TO GRADE:
- POURED CONCRETE
- 4 RISERS @ *7.44"
- 3 TREADS @ 10" + 1" NOSING
- BLACK ALUM. HANDRAILS & GUARDS

*RISER HEIGHTS MAY VARY DUE TO GRADING VARIANCE, RISERS ARE TO BE EQUAL WITHIN RUNS. RISER HTS TO BE BETWEEN 4 7/8" min. TO 7 7/8" max. TO COMPLY WITH OBC (9.8.4.2)

ST–4: STAIR UP TO 2nd FLOOR:
- FINISHED: OAK HARDWOOD
- 13 RISERS @ 7.44"
- 12 TREADS @ 10" + 1" NOSING
- OAK HANDRAILS & SPINDLES

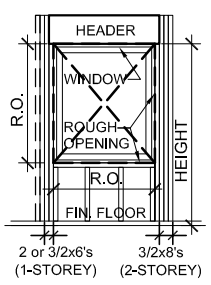
ST–5: STAIR UP TO 2nd FLOOR:
- FINISHED: OAK HARDWOOD
- 4 RISERS @ 7.44"
- 3 TREADS @ 10" + 1" NOSING
- OAK HANDRAILS & SPINDLES

LEGEND:

1 HOUR FIRE RATED WALL (WT7/ WT8)

SPACE RESERVED FOR WATER, SEWER LINES & STACK VENT (ENCLOSED W/ WT6)

WINDOW OR DOOR HEADERS:	
2x10's	- R.O < 3'-11" = 2/2x10's - R.O ≥ 4'-0" = 3/2x10's
LVL's	SEE PLANS
*UNLESS NOTED OTHERWISE	



WINDOW OR DOOR STUDS:
FOR 2x10 HEADERS -(SPAN < 10ft): 1 CONT. FULL HT + 1 JACK STUD -(SPAN ≥ 10ft): 1 CONT. FULL HT + 2 JACK STUDS
FOR LVL HEADERS -(ALL SPANS): 1 CONT. FULL HT + 2 JACK STUDS
*UNLESS NOTED OTHERWISE

ISSUE RECORD:

NO.	DISCRIPTION	DATE

CLIENT:
URBANDALE CONSTRUCTION LTD
2193 ARCH STREET, OTTAWA
TEL: 613–731–6331

PRELIMINARY
NOT FOR CONSTRUCTION

REVIEWED:	APPROVED:	JOB NO.

PROJECT:
LOCALE FLATS
URBANDALE STACKED TOWNHOMES
COWAN'S GROVE

DWG: **TYPICAL END UNIT 1st FLOOR PLAN W/O BRICK SKIRT**

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

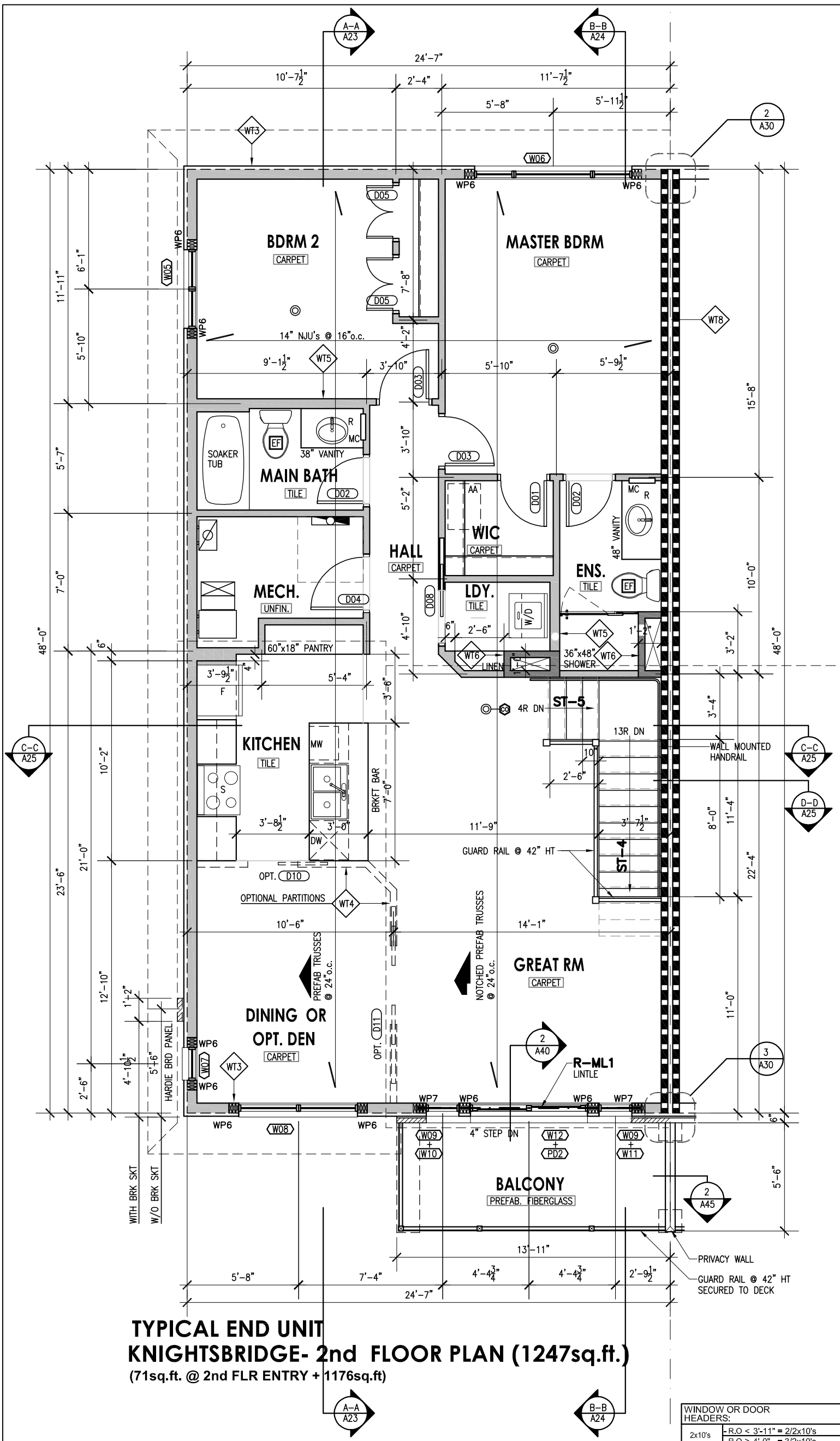
DWG No: **A9**

DATE: **MARCH 5,2020**

OF 17

ARCHITECTURAL

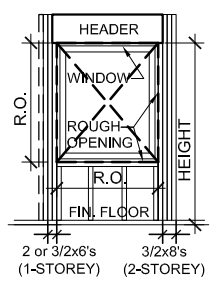
D07-04-20-0003



TYPICAL END UNIT
KNIGHTSBRIDGE- 2nd FLOOR PLAN (1247sq.ft.)

(71sq.ft. @ 2nd FLR ENTRY + 1176sq.ft)

WINDOW OR DOOR HEADERS:	
2x10's	- R.O < 3'-11" = 2/2x10's
	- R.O ≥ 4'-0" = 3/2x10's
LVL's	SEE PLANS
*UNLESS NOTED OTHERWISE	



WINDOW OR DOOR STUDS:
FOR 2x10 HEADERS -(SPAN < 10ft): 1 CONT. FULL HT + 1 JACK STUD -(SPAN ≥ 10ft): 1 CONT. FULL HT + 2 JACK STUDS
FOR LVL HEADERS -(ALL SPANS): 1 CONT. FULL HT + 2 JACK STUDS
*UNLESS NOTED OTHERWISE

GENERAL NOTES:

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2nd FLR NOTES:

- REFER TO PAGE A2 FOR LEGEND.
- REFER TO PAGE A35 FOR WINDOW AND DOOR DETAILS.

ST-4: STAIR UP TO 2nd FLOOR:
- FINISHED: OAK HARDWOOD
- 13 RISERS @ 7.44"
- 12 TREADS @ 10" + 1" NOSING
- OAK HANDRAILS & SPINDLES

ST-5: STAIR UP TO 2nd FLOOR:
- FINISHED: OAK HARDWOOD
- 4 RISERS @ 7.44"
- 3 TREADS @ 10" + 1" NOSING
- OAK HANDRAILS & SPINDLES

LEGEND:

1 HOUR FIRE RATED WALL (WT7/ WT8)

SPACE RESERVED FOR WATER, SEWER LINES & STACK VENT (ENCLOSED W/ WT6)

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REVIEWED:	APPROVED:	JOB NO.

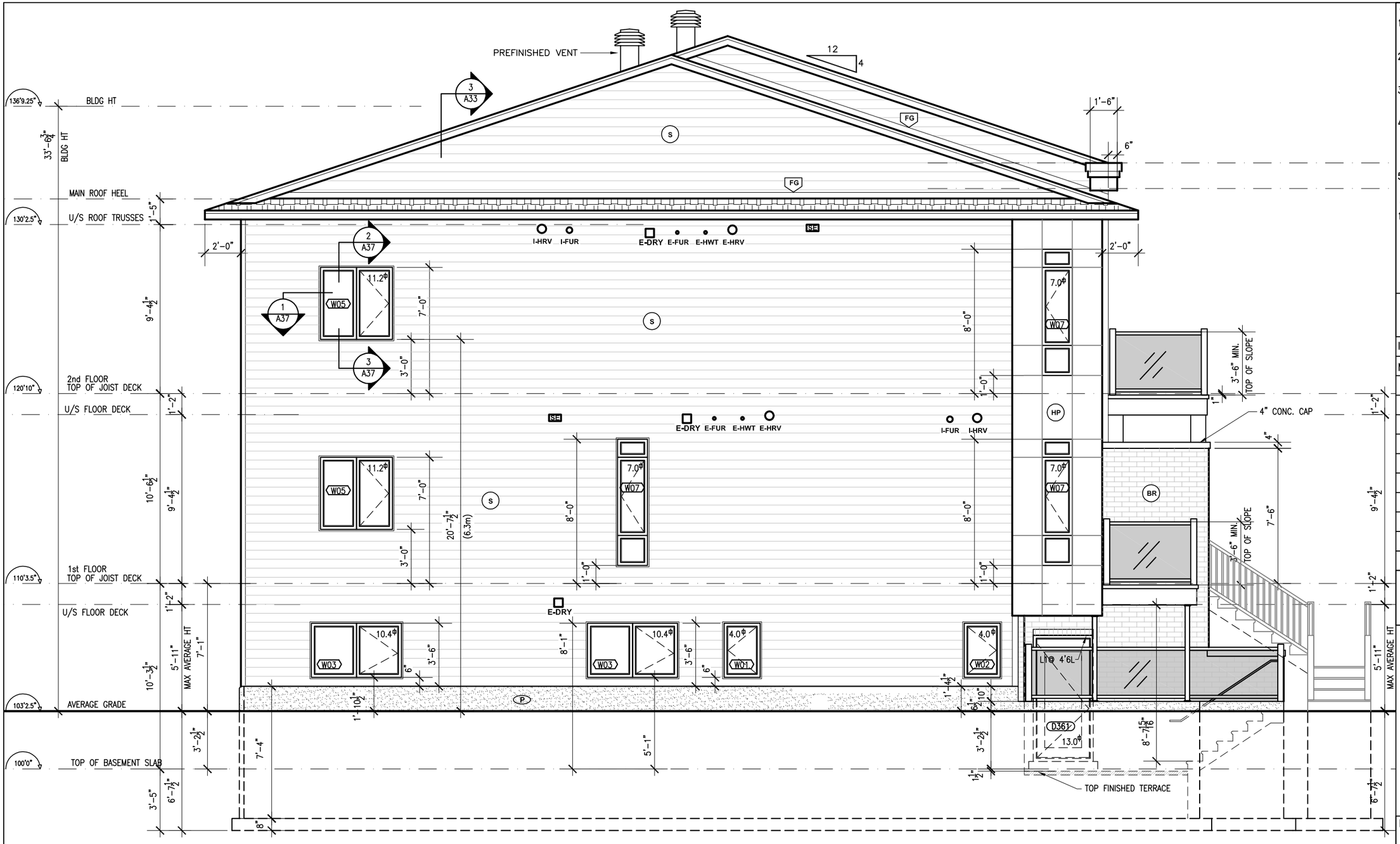
PROJECT:
LOCALE FLATS
URBANDALE STACKED TOWNHOMES
COWAN'S GROVE

DWG:
TYPICAL END UNIT
2nd FLOOR PLAN

SCALE:	DWG No:
3/16" = 1'-0"	A11
DATE: MARCH 5,2020	OF 17

ARCHITECTURAL

D07-04-20-0003



END UNIT- LEFT SIDE ELEVATION - W/O BRICK SKIRT

TOTAL EXPOSED BLDG FACE (TEBF)= 1300.17 sq.ft. (120.8 sq.m.)
TOTAL GLAZED OPENING AREA= 85.2 sq.ft. (7.9 sq.m.) = 6.6%
LIMITING DISTANCE 10'-2" (3.1m) / ALLOWABLE UNPROTECTED OPENING 10.0%

ELEVATION NOTES:

WINDOWS
- ALL WINDOWS TO BE ZONE C
- LOW E ARGON THROUGHOUT

BRICK FACADE
- WEEP HOLES @ WALL @ BASE & OVER ALL OPENING TO BE SPACED 31" MAX.
- FLASHING @ TOP & BOTTOM OF OPENINGS & TOP OF BRICK SKIRT

LEGEND:

S	ALUM. OR VINYL SIDING	FG	FLASHING	○ E-HRV	6"D EXHAUST-HRV
AS	ASPHALT SHINGLES	RV	ROOF VENT	□ E-DRY	EXHAUST-DRIER
BR	BRICK	P	PARGING	• E-HWT	2"D EXHAUST-HOT WATER
HP	HARDI BOARD PANEL	ISF	STOVE EXHAUST	• E-FUR	2"D EXHAUST-FURNACE
AF	ALUMINUM FASCIA	○ I-HRV	6"D INTAKE-HRV		
AVS	ALUMINUM VENTED SOFFIT	○ I-FUR	4"D INTAKE-FURNACE		

GENERAL NOTES:

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TEL: 613-731-6331

PRELIMINARY
NOT FOR CONSTRUCTION

REVIEWED:	APPROVED:	JOB NO.

PROJECT: **LOCALE FLATS**
URBANDALE STACKED TOWNHOMES
COWAN'S GROVE

DWG: **TYP. END UNIT SIDE ELEVATION W/O BRICK SKIRT**

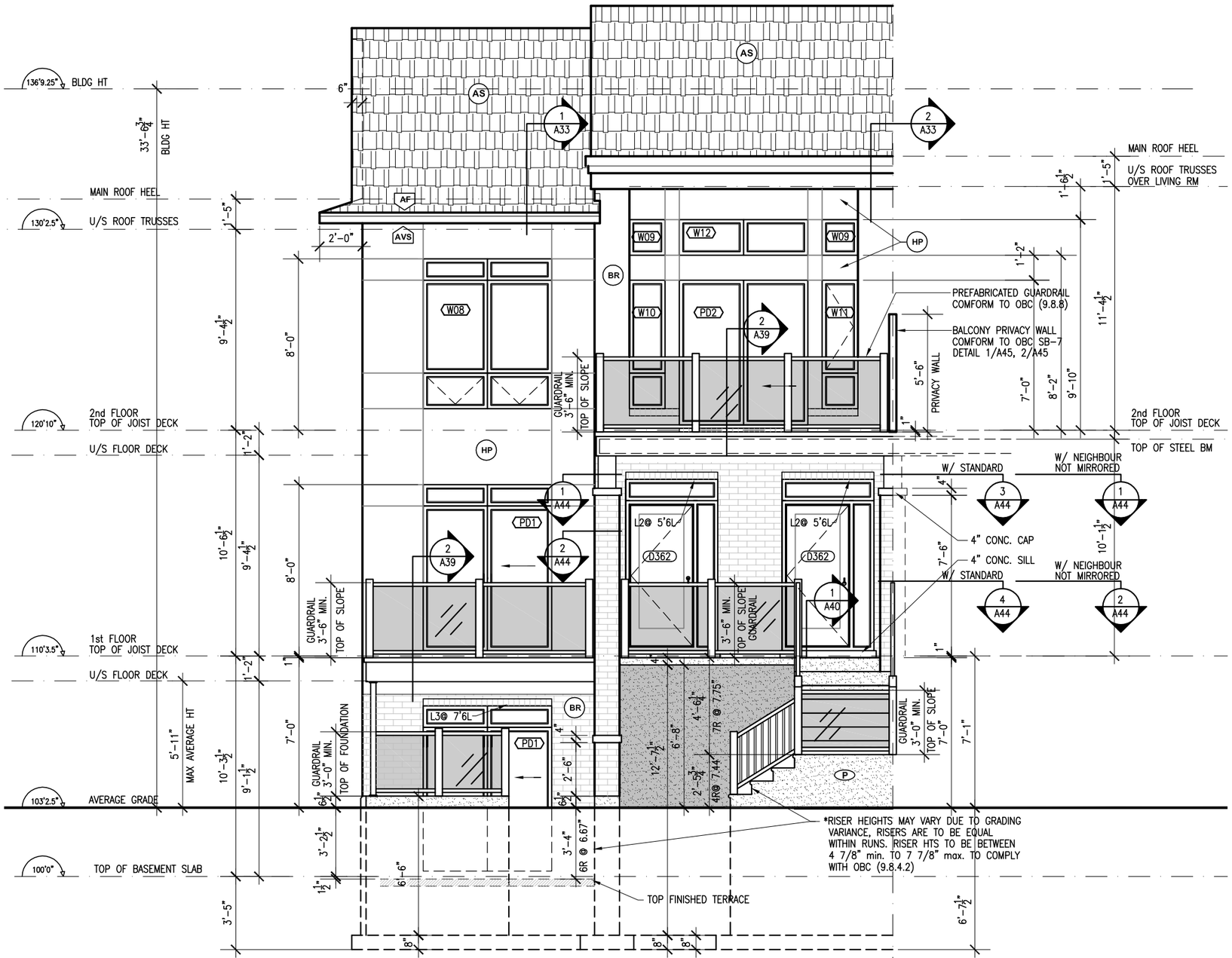
SCALE: 3/16" = 1'-0"

DWG No: **A14** OF 17

DATE: MARCH 5,2020

ARCHITECTURAL

D07-04-20-0003



TYPICAL END UNIT- FRONT ELEVATION

MAX AVERAGE HT FROM U/S BASEMENT CLG TO GRADE= 5'11"
PREFABRICATED GUARDRAILS TO COMPLY WITH OBC (9.8.8)

STEEL LINTELS		
LENGTH	NAME	DIMENSIONS (mm)
≤ 3'-11"	L1	(L-89 x 89 x 6.4)
≤ 4'-11"	L2	(L-89 x 89 x 7.9)
≤ 6'-11"	L3	(L-102 x 89 x 7.9)
≤ 7'-10"	L4	(L-127 x 89 x 7.9)
≤ 8'-10"	L5	(L-127 x 89 x 11)
≤ 9-10"	L6	(L-152 x 102 x 11)

ELEVATION NOTES:

WINDOWS
- ALL WINDOWS TO BE ZONE C
- LOW E ARGON THROUGHOUT

BRICK FACADE
- WEEP HOLES @ WALL @ BASE & OVER ALL OPENING TO BE SPACED 31" MAX.
- FLASHING @ TOP & BOTTOM OF OPENINGS & TOP OF BRICK SKIRT

LEGEND:

S	ALUM. OR VINYL SIDING
AS	ASPHALT SHINGLES
BR	BRICK
HP	HARDI BOARD PANEL
AF	ALUMINUM FASCIA
AVS	ALUMINUM VENTED SOFFIT
FG	FLASHING
RV	ROOF VENT
P	PARGING
SE	STOVE EXHAUST
I-HRV	6"D INTAKE-HRV
I-FUR	4"D INTAKE-FURNACE
E-HRV	6"D EXHAUST-HRV
E-DRY	EXHAUST-DRIER
E-HWT	2"D EXHAUST-HOT WATER
E-FUR	2"D EXHAUST-FURNACE

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS, ONLY FIGURED DIMENSIONS ARE TO BE USED. WHERE DOUBT EXISTS, FILE REQUEST FOR INTERPRETATION AND REQUEST CLARITY.
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TEL: 613-731-6331

PRELIMINARY
NOT FOR CONSTRUCTION

REVIEWED:	APPROVED:	JOB NO.

PROJECT:
LOCALE FLATS
URBANDALE STACKED TOWNHOMES
COWAN'S GROVE

DWG:
TYP. END UNIT FRONT ELEVATION

SCALE: 3/16" = 1'-0"
DWG No: **A16** OF 17
DATE: MARCH 5,2020

ARCHITECTURAL

D07-04-20-0003