

NOISE IMPACT STUDY

Proposed Residential Development

“1000 Maplevue Drive East”

Plan 51M-1221, Block 210
City of Barrie

Prepared for:

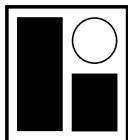
**970 Maplevue Inc.
c/o Fernbrook Homes**

Prepared by:

Ralph Bouwmeester, P. Eng.



April 28, 2023



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RBA File: A22019

EXECUTIVE SUMMARY

R. BOUWMEESTER & ASSOCIATES has been retained to assess potential noise impacts on residential uses within a proposed Site Plan on the north side of Maplevue Drive East midway between Prince William Way and 20 Sideroad in southeast Barrie.

The goals and objectives of this study are four-fold, namely:

1. To identify noise sources and noise-sensitive land uses.
2. To recommend mitigation measures, if and where required.
3. To identify those areas, if any, requiring more detailed studies.
4. To satisfy the development approval requirements of the City of Barrie.

The noise source potentially impacting this project is future traffic on Maplevue Drive East and future Terry Fox Drive.

Traffic data were provided by the City of Barrie. Roadway noise from cars and medium and heavy trucks has been accounted for in this analysis. The traffic volumes have been applied to Year 2033 thereby providing the 10-year minimum projection window required by the MECP.

The predicted equivalent outdoor sound levels at the subject site resulting from road traffic exceed the limits established by the MECP in certain areas. Mitigation measures are required to bring day and night-time sound levels down to acceptable levels.

Based on the configuration of the proposed Site Plan, no acoustic barriers are required.

Certain dwelling units and commercial units require forced-air heating systems with ductwork sized to accommodate the future installation of central air conditioning at the owners' option and expense. These units also require warning clauses registered on title; wording is provided. Construction meeting the minimum non-acoustical requirements of the Ontario Building Code will provide adequate sound insulation for these units.

The above applies to all dwelling units in Buildings 2 and 3; no acoustic requirements apply to Building 1.

The noise control requirements are summarized in Section 7, in Table 4, and in Figure 3.

In summary, the subject development as proposed can be developed in a manner that satisfies the requirements of MECP noise guideline NPC-300.

TABLE OF CONTENTS

EXECUTIVE SUMMARY		<u>Page</u>
1.	INTRODUCTION	1
2.	GOALS AND OBJECTIVES	1
3.	NOISE SOURCES	1
4.	GUIDELINES AND CRITERIA	1
	4.1 Sound Level Limits	1
	4.2 Noise Control Measures	2
5.	ANALYSIS PROCEDURES	3
	5.1 Surroundings and Site Characteristics	3
	5.2 Noise Sources	4
	5.3 Traffic Data	4
	5.4 Study Periods	4
	5.5 Sound Level Prediction Model	5
	5.6 Correction Factors	5
6.	CALCULATED EQUIVALENT SOUND LEVELS	5
7.	RECOMMENDATIONS	7
8.	CONCLUSIONS	7

REFERENCES

TABLES

Table 1 - Sound Level Limits	1
Table 2 - Sound Level Limits and Standard Mitigation Requirements	3
Table 3 - Predicted Outdoor Sound Levels	6
Table 4 - Summary of Noise Controls	8

FIGURES

Figure 1 - Location Plan
Figure 2 - Receptor Plan
Figure 3 - Noise Control Plan

APPENDICES

A. Road Traffic Data
B. Sample Sound Level Calculations
C. Site Plan Concept (source: 4Architecture)
D. Architectural Plans (source: 4Architecture)

1. INTRODUCTION

R. BOUWMEESTER & ASSOCIATES has been retained to assess potential noise impacts on residential uses within a proposed Site Plan on the north side of Maplevue Drive East midway between Prince William Way and 20 Sideroad in southeast Barrie. See Fig 1.

Our analysis is based on the configuration of the development as shown on a Site Plan Concept by 4Architecture dated Jan 2023 (plotted April 27, 2023). See Appendix 'C'.

2. GOALS AND OBJECTIVES

The goals and objectives of this study are four-fold, namely:

1. To identify noise sources and noise-sensitive land uses.
2. To recommend mitigation measures, if and where required.
3. To identify those areas, if any, requiring more detailed studies.
4. To satisfy the development approval requirements of the City of Barrie.

3. NOISE SOURCES

The noise source potentially impacting this project is future traffic on Maplevue Drive East and future Terry Fox Drive. Traffic data were provided by the City of Barrie.

4. GUIDELINES AND CRITERIA

Reference is made to the Ministry of the Environment, Conservation and Parks (MECP) publication, Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (Publication NPC-300, Aug 2013 ver. #22) which recommends the following sound level limits for indoor and outdoor settings.

4.1 Sound Level Limits

The following NPC-300 sound level limits apply to road traffic:

TABLE 1 - Sound Level Limits (Leq)

Location	Time Period		Limit (dBA)
<u>Outdoor</u>			
Outdoor Living Area	Day	0700-2300 hrs	55
<u>Indoor</u>			
Living/Dining Room	All	0700-0700 hrs	45
Bedroom (day)	Day	0700-2300 hrs	45
Bedroom (night)	Night	2300-0700 hrs	40

As compared to earlier MECP noise guidelines, NPC-300 has set indoor sound level limits in bedrooms for the daytime period in addition to nighttime.

4.2 Noise Control Measures

NPC-300 states that *"Noise control measures are not required if the sound level estimated in the OLA is 55 dBA or less during the daytime and 50 dBA or less in the plane of bedroom windows during either daytime or nighttime"*.

4.2.1 Outdoor Living Areas

The above-noted outdoor limit of 55 dBA applies to a protected Outdoor Living Area (OLA) of at least 56 m² (600 sq. ft.) in the case of single-family detached homes, 46 m² (500 sq. ft.) in the case of semi-detached units, and 37 m² (400 sq. ft.) in the case of row or townhouse units.

The MECP guidelines indicate that *"Noise control measures are not required if the sound level estimated in the OLA is 55 dBA or less during the daytime"*.

The guidelines state that if the sound level is greater than 55 dBA and less than or equal to 60 dBA, *"noise control measures may be applied to reduce the sound level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A"*.

The guidelines further state that if the sound level in the Outdoor Living Area is greater than 60 dBA, *"noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B. In the above situations, any excess above the limit will not be acceptable if it exceeds 5 dBA."* Acoustic barriers typically provide the mitigation needed, and warning clauses are required to be registered on title against the affected units.

4.2.2 Plane of Window - Ventilation Requirements

Ventilation requirements to reduce indoor sound levels, by allowing windows to remain closed if so desired by the occupants, include the following:

- For outdoor daytime sound levels in the plane of living/dining/bedroom windows greater than 55 dBA and less than or equal to 65 dBA, dwelling units must be equipped with forced air heating systems with ducting sized for the future installation of central air conditioning. Window, wall, and door components meeting normal Ontario Building Code requirements are typically adequate under these conditions, although warning clauses (Types B and C) must be registered on title against the affected lots.
- For outdoor daytime sound levels in the plane of living/dining/bedroom windows greater than 65 dBA, dwelling units must be equipped with central air conditioning. Warning clauses (Types B and D) must be registered on title against the affected lots.

Ventilation requirements under night-time conditions are similar to the above except that 50 and 60 dBA are used in place of 55 dBA and 65 dBA, respectively.

The location and installation of outdoor air conditioning devices must comply with the sound level limits of Publication NPC-216 and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices or such other criteria as specified by the municipality.

4.2.3 Indoor Living Areas - Building Component Requirements

If day-time sound levels outside living/dining/bedroom windows exceed 65 dBA (or night-time levels exceed 60 dBA) building components including windows, walls and doors must be designed so that the indoor sound levels meet the sound level limits quoted in Table 1.

The above sound level limits and mitigation requirements can be summarized as follows:

TABLE 2 - Sound Level Limits and Standard Mitigation Requirements

	<u>Outdoor Sound Level Limits (dBA)</u>		
	<u>Plane of Window</u>		OLA
	Day	Night	
Do nothing	≤55	≤50	≤55
Noise barrier or Warning Clause A			56 - 60
Mandatory noise barrier *			>60
Provision for future A/C **	56 - 65	51 - 60	
Mandatory A/C **	>65	>60	
Special building component design	>65	>60	

Notes:

* Warning Clause B is required if the net resultant sound level is 56-60 dBA (to the max. allowable 60 dBA).

** Warning clauses required (A, B and C for future central air; A, B and D for mandatory central air).

5. ANALYSIS PROCEDURES

5.1 Surroundings and Site Characteristics

The subject site is located on the northwest corner of Mapleview Drive East and Terry Fox Drive. See Figure 1. The surrounding lands are under development; residential to the west and north, mixed-use to the east and south across Mapleview.

The site is 0.76 ha in size. The development proposes 39 residential units in 3 building blocks and 940 sm of commercial space in the 2 blocks fronting the adjacent streets.

Outdoor living space is proposed in the form of private balconies. A ‘village square’ is proposed at the southeast corner of the site at the intersection of Mapleview Drive and Terry Fox Drive; it is not considered OLA since adequate space is provided by the balconies (at 12 sm per unit as required by the zoning bylaw – see Site Plan).

5.2 Noise Sources

The noise source of concern is future traffic on Mapleview Drive East and future Terry Fox Drive. The proposed internal road and nearby local roads are assumed insignificant.

Roadway noise from cars and medium and heavy trucks has been accounted for in this analysis. The noise source heights used are per MECP criteria.

This analysis accounts for all of Mapleview Drive East (i.e. infinitely long) and Terry Fox Drive north of Mapleview.

Mapleview Drive East adjacent to the subject site is currently a 2-lane rural road within a 20 m right-of-way. It is proposed for future widening to a 5-lane cross-section consisting of two lanes of through traffic in each direction and a centre left turn lane within a 34 m right-of-way. Terry Fox Drive is a 26 m wide major collector.

For roads with up to four lanes of through traffic, the MECP allows an even directional split in traffic with noise levels assumed to originate from the centreline of travel. For more than four through lanes, separate analyses must be carried out for each direction of travel (in sets of up to four lanes each).

5.3 Traffic Data

The City of Barrie provided current (Year 2022) traffic counts, truck percentages, and projected annual growth rates to Year 2031 and beyond for Mapleview Drive East; Terry Fox projections were provided for Years 2031 and 2041. Our analysis is based on Year 2033 traffic volumes which provide the 10-year minimum projection window required by the MECP.

We have assumed that truck traffic is split 50/50 between medium and heavy trucks.

The MECP requires increased truck noise on uphill grades to be accounted for when the grade is at least 2% and where the climb exceeds 6 m. The average grade adjacent to the subject site is less than 2%.

The MECP-recommended percentage splits for day and night time traffic volumes were used in this study (i.e. 90/10 for arterial roads).

The posted speed limit on Mapleview Drive East is currently 60/80 kph; the City has advised that this can be assumed to be 60 kph by 2033. 50 kph is assumed for Terry Fox.

See Appendix 'A' for further road traffic details.

5.4 Study Periods

The study periods, as per MECP guidelines, are the 16-hour day-time period between 7:00 AM and 11:00 PM, and the 8-hour night-time period from 11:00 PM and 7:00 AM.

5.5 Sound Level Prediction Model

Noise level calculations were carried out per MECP guidelines (Environmental Noise Assessment in Land Use Planning, Training Manual, Ontario Ministry of the Environment, 1987) and through the use of their road noise model ORNAMENT. See References.

5.6 Correction Factors

The corrections required by the MECP to be applied to the noise levels have been taken into account where applicable. These include corrections such as:

- a) Road segment lengths
- b) Ground surface type
- c) Source - receiver distance
- d) Height of elevated source/receiver, and
- e) Day/night split in traffic volumes.

6. CALCULATED EQUIVALENT SOUND LEVELS

Indoor sound levels are typically estimated by calculating outdoor levels along the face of a wall exposed to the noise source (i.e. in the plane of windows). Under NPC-300, day and night-time receiver heights are set at bedroom windows which are typically assumed to be 4.5 m (plus 3.0 m for each additional floor) above grade in a typical single or semi-detached house or townhouse when building plans are unavailable.

Building 1 is 3 storeys in height while Buildings 2 and 3 are 3.5 storeys. Since sound levels generally increase with building height (due to a reduction in the effect of ground attenuation), worst-case receptors are typically located at the top floor in multi-storey scenarios. Accordingly, we have used receptor heights of 8 m and 9 m, respectively, for the top-floor windows per the architectural elevations (see Appendix 'D').

Shielding by the proposed dwellings was accounted for in the determination of sound levels. Shielding by vegetation was not taken into account.

OLA sound levels are typically calculated for receivers 3.0 m from the mid-point of the rear wall of a dwelling at a height of 1.5 m above finished grade; none apply here.

Decks and balconies are exempt from the MECP outdoor noise limits unless they are the only outdoor living area available, and they are at least 4.0 m deep, outside the building façade, and unenclosed. Accordingly, the proposed balconies are exempt.

Our analysis includes a sampling of noise levels that can be expected along the building faces. These noise level predictions were used to flag those areas requiring more detailed analysis. A sample noise level for a central location within the proposed village square is provided for information only.

An overall summary of the predicted outdoor daytime and nighttime sound levels for

each of the receptor locations is presented in Table 3. See Figure 2 for receptor locations and Appendix 'B' for sample calculations.

TABLE 3 - Predicted Outdoor Sound Levels (dBA)

Receptor	Source / Receiver Dist. (m) (MVE / TFD)	Outdoor Equivalent Sound Levels (Leq) Due to Road Traffic (dBA)	
		Day	Night
Bldg 1, 3 rd flr	73.5 / ---	55	48
Bldg 2, 3 rd flr	17.7 / 39.2	64	57
Bldg 3, 3 rd flr	39.9 / 15.1	62	56
Village Square	28.7 / 27.8	61	--

Note: 1. MVE and TFD denote Mapleview Drive East and Terry Fox Drive, respectively.
2. Source-Receiver distances are to future C/L.

The results shown in Table 3 confirm that mitigation measures are required to ensure that the predicted sound levels meet the MECP criteria.

The following summarizes typical acoustic requirements and describes how they apply to this proposed development. See Section 7 and Figure 3 for detailed requirements.

Warning clauses must be registered on title and included in Agreements of Purchase and Sale or Lease where sound level limits are exceeded. Based on the predicted noise levels at the building faces, warning clauses are required for all units in Buildings 2 and 3 (see Table 4 and Figure 3) - suggested wording is given in the Notes to Table 4.

Central air conditioning is required where the sound level due to road traffic in the plane of a living/dining/bedroom window exceeds 65 dBA day-time or 60 dBA night-time. Air-cooled condenser units should be located in a noise-insensitive location. Central air conditioning is not meant to be a sound mitigating measure, although it does provide the dwelling occupants with the option of closing windows if so desired. This requirement does not apply to any units.

Special building component design, to ensure that indoor sound levels due to road traffic meet the limits specified in Section 4, is required for residential dwelling units where the sound level in the plane of a living/dining/bedroom window exceeds 65 dBA day-time or 60 dBA night-time. This requirement does not apply to any units.

Forced air heating systems, with ductwork sized to accommodate the future installation of central air conditioning, are required where the sound level due to road traffic in the plane of a living/dining/bedroom window exceeds 55 dBA day-time or 50 dBA night-time. Future air-cooled condenser units should be located in a noise-insensitive location. Construction meeting the minimum non-acoustical requirements of the Ontario Building Code will provide adequate sound insulation. This requirement applies to all units in Buildings 2 and 3. See Section 7, Table 4 and Figure 3 for details.

Acoustic barriers, to protect outdoor living areas, are required where the daytime outdoor sound level in the OLA exceeds 60 dBA. The MECF's sound level objective for outdoor living areas is 55 dBA; however, sound level excesses of up to 5 dBA are permitted with an appropriate warning clause. Residual noise levels (over 55 dBA) resulting from reduced fence heights must be covered through the use of an appropriately worded warning clause to be included in the Site Plan Agreement and all Offers of Purchase and Sale or Lease for the affected units, and the clause is to be registered on title against those units.

Based on the configuration of the proposed Site Plan, no acoustic barriers are required.

7. **RECOMMENDATIONS**

1. All units (residential and commercial) in Buildings 2 and 3 require warning clauses registered on title and included in Development Agreements and Agreements of Purchase and Sale or Lease. See Figure 3 and Table 4, and see Notes to Table 4 for wording.
2. All units (residential and commercial) in Buildings 2 and 3 require forced air heating systems sized for the future installation of central air conditioning at the dwelling owners' option and expense. See Figure 3 and Table 4 for locations.

8. **CONCLUSIONS**

With the incorporation of the recommended noise controls summarized in Section 7 and as contained in Table 4 and shown in Figures 3 and 4, the MECF noise guidelines can be met in all dwelling and commercial units.

In summary, the subject development as proposed can be developed in a manner that satisfies the requirements of MECF noise guideline NPC-300.

Respectfully submitted,

R. BOUWMEESTER & ASSOCIATES



Ralph Bouwmeester, P. Eng.
Principal

TABLE 4 - Summary of Noise Controls

Location ^{1.}	Central Air Conditioning	Exterior Windows, Walls and Doors	Acoustic Barrier	Warning Clauses ^{2.}
Building 1	No	OBC	No	None
Buildings 2 and 3 ^{3.}	Provision for Adding	OBC	No	A + B + C

Note:

1. Applies to all dwelling and commercial units in the building.
2. See Notes to Table 4 on the following page for wording.
3. Noise limits for commercial office/retail space apply to day-time only and are 5 dB less restrictive than those for residential uses. Nevertheless, commercial space within Buildings 2 and 3 require warning clauses and forced air heating sized for future central air as indicated.

NOTES TO TABLE 4

1. Air-cooled condenser units should be located in a noise-insensitive location. In addition, the location and installation of outdoor air conditioning devices must comply with the sound level limits of Publication NPC-216 and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices or such other criteria as specified by the municipality.
2. 'OBC' indicates that construction meeting the minimum non-acoustical requirements of the Ontario Building Code will provide adequate sound insulation. 'Special' indicates that exterior building components such as windows, walls and doors have to be determined by an acoustic consultant when house plans are available and before building permit issuance.
3. Acoustic barriers shall be of solid construction with no cracks, holes or gaps, and have a surface density of no less than 20 kg/sm. Any gaps under the noise barrier that are necessary for drainage purposes must be minimized and localized, and must not deteriorate the acoustical performance. A barrier may consist of a berm, a fence, or both.
4. The following warning clauses must be registered on title and included in the Subdivision Agreement and all Agreements of Purchase and Sale or Lease for those lots and blocks as specified in Table 4:

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 sound level limits of the Municipality and the Ministry of the Environment."*

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 occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."*

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 in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."*

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 sound level limits of the Municipality and the Ministry of the Environment."*

5. Conventional ventilated attic roof construction meeting OBC requirements is satisfactory.
6. All exterior doors must be fully weather-stripped.

REFERENCES

1. Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (MOE Publication NPC-300, Aug 2013 ver. #22)
2. Environmental Noise Assessment in Land Use Planning (MOE Training Manual, 1987)
3. Road and Rail Noise: Effects on Housing (CMHC, Rev. 1981)
4. ORNAMENT (Ontario Road Noise Analysis Method for Environment and Transportation) (MOE, October 1989)
5. Traffic data (City of Barrie)

FIGURES

Figure 1 - Location Plan

Figure 2 - Receptor Plan

Figure 3 - Noise Control Plan



Location Plan

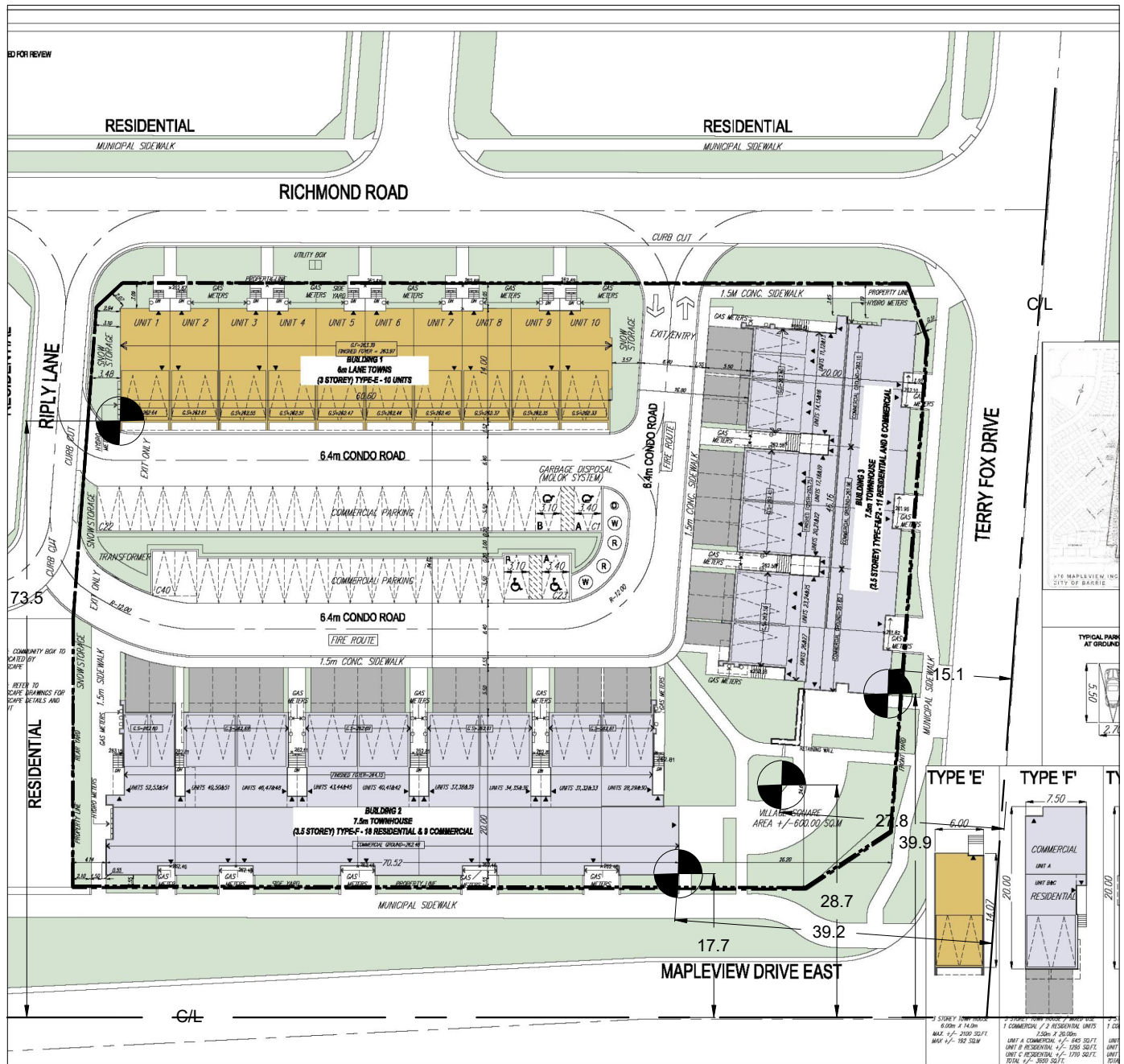
Scale: NTS

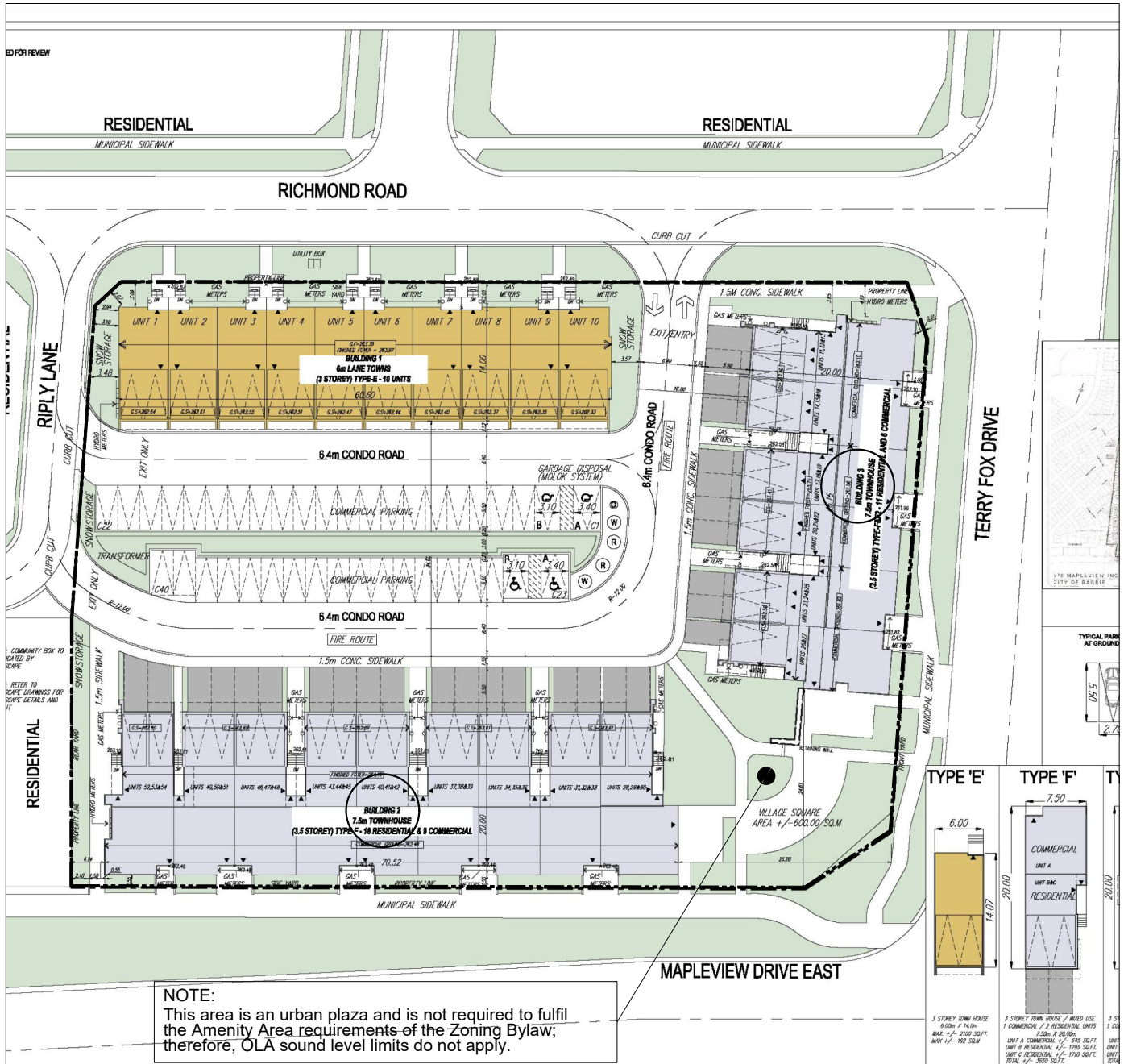
FIG. 1

April 2023

R. Bouwmeester & Associates

Base map source: Simcoe County





APPENDICES

- A. Road Traffic Data
- B. Sample Sound Level Calculations
- C. Site Plan Concept (source: 4Architecture)
- D. Architectural Plans (source: 4Architecture)

APPENDIX ‘A’

ROAD TRAFFIC DATA

City of Barrie

- Maplevue Drive East:
 - Current (Yr. 2022) ADT is 3,500 with 4% commercial and heavy vehicles.
 - Growth rate 8% compounded annually to a horizon year of 2031; 3% beyond 2031.
 - 60 kph (assumed by Year 2033 – currently partially 60 kph, partially 80 kph).
- Terry Fox Drive:
 - Year 2031 projected 5,500 ADT, Year 2041 projected 7,000 with 3% commercial and heavy vehicles.
 - Growth rate derived to be 2.44% compounded annually.

Ministry of the Environment, Conservation and Parks

The MECF recommended splits for day/night traffic are:

- arterial roads – 90/10

SUMMARY OF DATA USED IN THIS STUDY

For the purpose of this noise assessment, the following Year 2033 data apply:

	Maplevue	Terry Fox
Traffic volume (AADT) *	7,423	5,772
Day/night split (%)	90 / 10	90 / 10
Percent trucks M / H **	2.0 / 2.0	1.5 / 1.5
Posted Speed (kph)	60 (future)	50
Number of lanes	4 (future, + centre left turn lane)	4
ROW width (m)	34 (future)	26
Road Grade (%)	<2	<2
Pavement Type	normal asphalt	normal asphalt

* Note: Year 2033 AADT derived as follows:

Maplevue: $(3500 \times (1.08^9)) \times (1.03^2) = 7,425$

Terry Fox: $5,500 \times 1.0244^2 = 5,772$

**Note: assumed split 50/50

Ralph Bouwmeester

Subject: RE: Traffic Data Request - Mapleview east of Prince William
From: Justin MacDonald <Justin.MacDonald@barrie.ca>
Date: 04/21/2023, 10:06 AM
To: Ralph Bouwmeester <rbouwmeester@rogers.com>

Good morning Ralph,

I do not have detailed counts for Terry Fox; but the forecasted traffic it is anticipated to be 5,500 vpd by 2031 and 7,000 vpd by 2041. I would assume a 3% commercial and heavy given the roadway is classified as a major collector.

Hopefully this is sufficient and if you require further information, please let me know.

Justin MacDonald, C.E.T., PTP
Project Delivery – Transportation Planning, Development Services
The City of Barrie
Mobile 705-734-8020
Please consider the environment before printing this email.

From: Ralph Bouwmeester <rbouwmeester@rogers.com>
Sent: Thursday, April 20, 2023 3:08 PM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Subject: Re: Traffic Data Request - Mapleview east of Prince William

Hi Justin -

Hope you're doing well. In addition to the info you provided below, kindly send me the data for Terry Fox Drive north of Mapleview. Thank you.

Regards -
Ralph

Ralph Bouwmeester, P. Eng.
rbouwmeester@rogers.com

R. BOUWMEESTER & ASSOCIATES
Land Development Engineering
Barrie, ON Canada
tel/fax 705-726-3392

On 12/15/2022 1:16 PM, Justin MacDonald wrote:

Sorry it applies to 2022.

Justin MacDonald, C.E.T., PTP
Project Delivery – Transportation Planning, Development Services
The City of Barrie
Mobile 705-734-8020
Please consider the environment before printing this email.

From: Ralph Bouwmeester <rbouwmeester@rogers.com>
Sent: Thursday, December 15, 2022 12:17 PM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Subject: Re: Traffic Data Request - Mapleview east of Prince William

Hi Justin -

Thank you kindly. Just to clarify, what year does 'current' apply to?

Regards -
Ralph

Ralph Bouwmeester, P. Eng.
rbouwmeester@rogers.com

R. BOUWMEESTER & ASSOCIATES
Land Development Engineering
Barrie, ON Canada
tel/fax 705-726-3392

On 12/15/2022 10:16 AM, Justin MacDonald wrote:

Good morning Ralph,

As per your request, please see the updated numbers for MVD – East of Prince William Way
Current ADT – 3,500
Growth Rate – 8% per year to a horizon year of 2031; and 3% per year post 2031.
Heavy Vehicle – 4%
Posted Speed – 60km/h
Cross Section – future 5 lanes

Thanks.

Justin MacDonald, C.E.T., PTP
Project Delivery – Transportation Planning, Development Services
The City of Barrie
Mobile 705-734-8020
Please consider the environment before printing this email.

From: Ralph Bouwmeester <rbouwmeester@rogers.com>
Sent: Wednesday, December 7, 2022 4:22 PM
To: Justin MacDonald <Justin.MacDonald@barrie.ca>
Subject: Traffic Data Request - Maplevue east of Prince William

Hi Justin -

Hope you are doing well. Could you please review the attached projections you provided in 2016 in connection with the LM Barrie Subdivision and let me know if they are still valid. I am currently working on noise reports for two site plans which are Blocks 536 and 537 in the subdivision.

The relevant portion of the attached email is highlighted for your convenience.

Thank you.

--
Regards -
Ralph

Ralph Bouwmeester, P. Eng.
rbouwmeester@rogers.com

R. BOUWMEESTER & ASSOCIATES
Land Development Engineering
Barrie, ON Canada
tel/fax 705-726-3392

APPENDIX 'B'

SAMPLE SOUND LEVEL CALCULATIONS

STAMSON 5.0 NORMAL REPORT Date: 27-04-2023 13:36:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 2219dn1.te Time Period: Day/Night 16/8 hours
Description: Building 1 day/night at 3rd flr

Road data, segment # 1: Mapleview (day/night)

Car traffic volume : 6414/713 veh/TimePeriod *
Medium truck volume : 134/15 veh/TimePeriod *
Heavy truck volume : 134/15 veh/TimePeriod *
Posted speed limit : 60 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): 6997
Percentage of Annual Growth : 3.00
Number of Years of Growth : 2.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Mapleview (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 95 %
Surface : 2 (Reflective ground surface)
Receiver source distance : 73.50 / 73.50 m
Receiver height : 8.00 / 8.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Mapleview (day/night)

Car traffic volume : 6414/713 veh/TimePeriod *
Medium truck volume : 134/15 veh/TimePeriod *
Heavy truck volume : 134/15 veh/TimePeriod *
Posted speed limit : 60 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): 6997
Percentage of Annual Growth : 3.00

Number of Years of Growth : 2.00
 Medium Truck % of Total Volume : 2.00
 Heavy Truck % of Total Volume : 2.00
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Maplevue (day/night)

 Angle1 Angle2 : 0.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 73.50 / 73.50 m
 Receiver height : 8.00 / 8.00 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Maplevue (day)

Source height = 1.19 m

ROAD (0.00 + 44.85 + 0.00) = 44.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	63.99	0.00	-6.90	-3.01	0.00	-9.22	0.00	44.85

Segment Leq : 44.85 dBA

Results segment # 2: Maplevue (day)

Source height = 1.19 m

ROAD (0.00 + 54.07 + 0.00) = 54.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	63.99	0.00	-6.90	-3.01	0.00	0.00	0.00	54.07

Segment Leq : 54.07 dBA

Total Leq All Segments: 54.56 dBA

Results segment # 1: Maplevue (night)

Source height = 1.19 m

ROAD (0.00 + 38.34 + 0.00) = 38.34 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	57.47	0.00	-6.90	-3.01	0.00	-9.22	0.00	38.34

Segment Leq : 38.34 dBA

Results segment # 2: Mapleview (night)

Source height = 1.19 m

ROAD (0.00 + 47.56 + 0.00) = 47.56 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------	--------

0	90	0.00	57.47	0.00	-6.90	-3.01	0.00	0.00	0.00	47.56
---	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 47.56 dBA

Total Leq All Segments: 48.05 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.56

(NIGHT): 48.05

Filename: 2219dn2.te Time Period: Day/Night 16/8 hours
Description: Building 2 day/night at 3rd flr

Road data, segment # 1: Mapleview (day/night)

Car traffic volume : 6414/713 veh/TimePeriod *
Medium truck volume : 134/15 veh/TimePeriod *
Heavy truck volume : 134/15 veh/TimePeriod *
Posted speed limit : 60 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): 6997
Percentage of Annual Growth : 3.00
Number of Years of Growth : 2.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Mapleview (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 17.70 / 17.70 m
Receiver height : 9.00 / 9.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Terry Fox (day/night)

Car traffic volume : 5039/560 veh/TimePeriod *
Medium truck volume : 78/9 veh/TimePeriod *
Heavy truck volume : 78/9 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 5500
Percentage of Annual Growth : 2.44
Number of Years of Growth : 2.00
Medium Truck % of Total Volume : 1.50
Heavy Truck % of Total Volume : 1.50
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Terry Fox (day/night)

```

-----
Angle1   Angle2       : -45.00 deg   21.00 deg
Wood depth      :      0      (No woods.)
No of house rows :      0 / 0
Surface         :      2      (Reflective ground surface)
Receiver source distance : 39.20 / 39.20 m
Receiver height  :      9.00 / 9.00 m
Topography      :      1      (Flat/gentle slope; no barrier)
Reference angle  :      0.00

```

Results segment # 1: Mapleview (day)

Source height = 1.19 m

ROAD (0.00 + 63.27 + 0.00) = 63.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.99	0.00	-0.72	0.00	0.00	0.00	0.00	63.27

Segment Leq : 63.27 dBA

Results segment # 2: Terry Fox (day)

Source height = 1.11 m

ROAD (0.00 + 51.97 + 0.00) = 51.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	21	0.00	60.50	0.00	-4.17	-4.36	0.00	0.00	0.00	51.97

Segment Leq : 51.97 dBA

Total Leq All Segments: 63.58 dBA

Results segment # 1: Mapleview (night)

Source height = 1.19 m

ROAD (0.00 + 56.75 + 0.00) = 56.75 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	57.47	0.00	-0.72	0.00	0.00	0.00	0.00	56.75

Segment Leq : 56.75 dBA

Results segment # 2: Terry Fox (night)

Source height = 1.12 m

ROAD (0.00 + 45.53 + 0.00) = 45.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	21	0.00	54.06	0.00	-4.17	-4.36	0.00	0.00	0.00	45.53

Segment Leq : 45.53 dBA

Total Leq All Segments: 57.07 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.58
(NIGHT): 57.07

Filename: 2219dn3.te Time Period: Day/Night 16/8 hours
Description: Building 3 day/night at 3rd flr

Road data, segment # 1: Maplevue (day/night)

Car traffic volume : 6414/713 veh/TimePeriod *
Medium truck volume : 134/15 veh/TimePeriod *
Heavy truck volume : 134/15 veh/TimePeriod *
Posted speed limit : 60 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): 6997
Percentage of Annual Growth : 3.00
Number of Years of Growth : 2.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Maplevue (day/night)

Angle1 Angle2 : -90.00 deg 49.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 39.90 / 39.90 m
Receiver height : 9.00 / 9.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Maplevue (day/night)

Car traffic volume : 6414/713 veh/TimePeriod *
Medium truck volume : 134/15 veh/TimePeriod *
Heavy truck volume : 134/15 veh/TimePeriod *
Posted speed limit : 60 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): 6997
Percentage of Annual Growth : 3.00
Number of Years of Growth : 2.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 2.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Maplevue (day/night)

```

-----
Angle1   Angle2       : 49.00 deg  90.00 deg
Wood depth      :      0      (No woods.)
No of house rows :      1 / 1
House density    :     95 %
Surface         :      2      (Reflective ground surface)
Receiver source distance : 39.90 / 39.90 m
Receiver height  :     9.00 / 9.00 m
Topography      :      1      (Flat/gentle slope; no barrier)
Reference angle  :     0.00

```

Road data, segment # 3: Terry Fox (day/night)

```

-----
Car traffic volume : 5039/560 veh/TimePeriod *
Medium truck volume : 78/9 veh/TimePeriod *
Heavy truck volume : 78/9 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient      : 0 %
Road pavement      : 1 (Typical asphalt or concrete)

```

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

```

24 hr Traffic Volume (AADT or SADT): 5500
Percentage of Annual Growth      : 2.44
Number of Years of Growth        : 2.00
Medium Truck % of Total Volume   : 1.50
Heavy Truck % of Total Volume    : 1.50
Day (16 hrs) % of Total Volume   : 90.00

```

Data for Segment # 3: Terry Fox (day/night)

```

-----
Angle1   Angle2       : -90.00 deg  69.00 deg
Wood depth      :      0      (No woods.)
No of house rows :      0 / 0
Surface         :      2      (Reflective ground surface)
Receiver source distance : 15.10 / 15.10 m
Receiver height  :     9.00 / 9.00 m
Topography      :      1      (Flat/gentle slope; no barrier)
Reference angle  :     0.00

```

Results segment # 1: Mapleview (day)

Source height = 1.19 m

ROAD (0.00 + 58.61 + 0.00) = 58.61 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	49	0.00	63.99	0.00	-4.25	-1.12	0.00	0.00	0.00	58.61

Segment Leq : 58.61 dBA

Results segment # 2: Mapleview (day)

Source height = 1.19 m

ROAD (0.00 + 43.44 + 0.00) = 43.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
49	90	0.00	63.99	0.00	-4.25	-6.42	0.00	-9.87	0.00	43.44

Segment Leq : 43.44 dBA

Results segment # 3: Terry Fox (day)

Source height = 1.11 m

ROAD (0.00 + 59.93 + 0.00) = 59.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	69	0.00	60.50	0.00	-0.03	-0.54	0.00	0.00	0.00	59.93

Segment Leq : 59.93 dBA

Total Leq All Segments: 62.39 dBA

Results segment # 1: Mapleview (night)

Source height = 1.19 m

ROAD (0.00 + 52.10 + 0.00) = 52.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	49	0.00	57.47	0.00	-4.25	-1.12	0.00	0.00	0.00	52.10

Segment Leq : 52.10 dBA

Results segment # 2: Mapleview (night)

Source height = 1.19 m

ROAD (0.00 + 36.93 + 0.00) = 36.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
49	90	0.00	57.47	0.00	-4.25	-6.42	0.00	-9.87	0.00	36.93

Segment Leq : 36.93 dBA

Results segment # 3: Terry Fox (night)

Source height = 1.12 m

ROAD (0.00 + 53.49 + 0.00) = 53.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	69	0.00	54.06	0.00	-0.03	-0.54	0.00	0.00	0.00	53.49

Segment Leq : 53.49 dBA

Total Leq All Segments: 55.92 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.39
(NIGHT): 55.92

Filename: 2219ps.te Time Period: 16 hours
 Description: Village Square

Road data, segment # 1: Mapleview

 Car traffic volume : 6414 veh/TimePeriod *
 Medium truck volume : 134 veh/TimePeriod *
 Heavy truck volume : 134 veh/TimePeriod *
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Mapleview

 Angle1 Angle2 : -90.00 deg 49.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 28.70 m
 Receiver height : 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: Mapleview

 Car traffic volume : 6414 veh/TimePeriod *
 Medium truck volume : 134 veh/TimePeriod *
 Heavy truck volume : 134 veh/TimePeriod *
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Mapleview

 Angle1 Angle2 : 49.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 1
 House density : 95 %
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 28.70 m
 Receiver height : 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 3: Terry Fox

 Car traffic volume : 5039 veh/TimePeriod *
 Medium truck volume : 78 veh/TimePeriod *
 Heavy truck volume : 78 veh/TimePeriod *
 Posted speed limit : 50 km/h
 Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Terry Fox

Angle1 Angle2 : -45.00 deg 44.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 27.80 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Maplevue

Source height = 1.19 m

ROAD (0.00 + 60.05 + 0.00) = 60.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	49	0.00	63.99	0.00	-2.82	-1.12	0.00	0.00	0.00	60.05

Segment Leq : 60.05 dBA

Results segment # 2: Maplevue

Source height = 1.19 m

ROAD (0.00 + 44.64 + 0.00) = 44.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
49	90	0.00	63.99	0.00	-2.82	-6.42	0.00	-10.10	0.00	44.64

Segment Leq : 44.64 dBA

Results segment # 3: Terry Fox

Source height = 1.11 m

ROAD (0.00 + 54.76 + 0.00) = 54.76 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	44	0.00	60.50	0.00	-2.68	-3.06	0.00	0.00	0.00	54.76

Segment Leq : 54.76 dBA

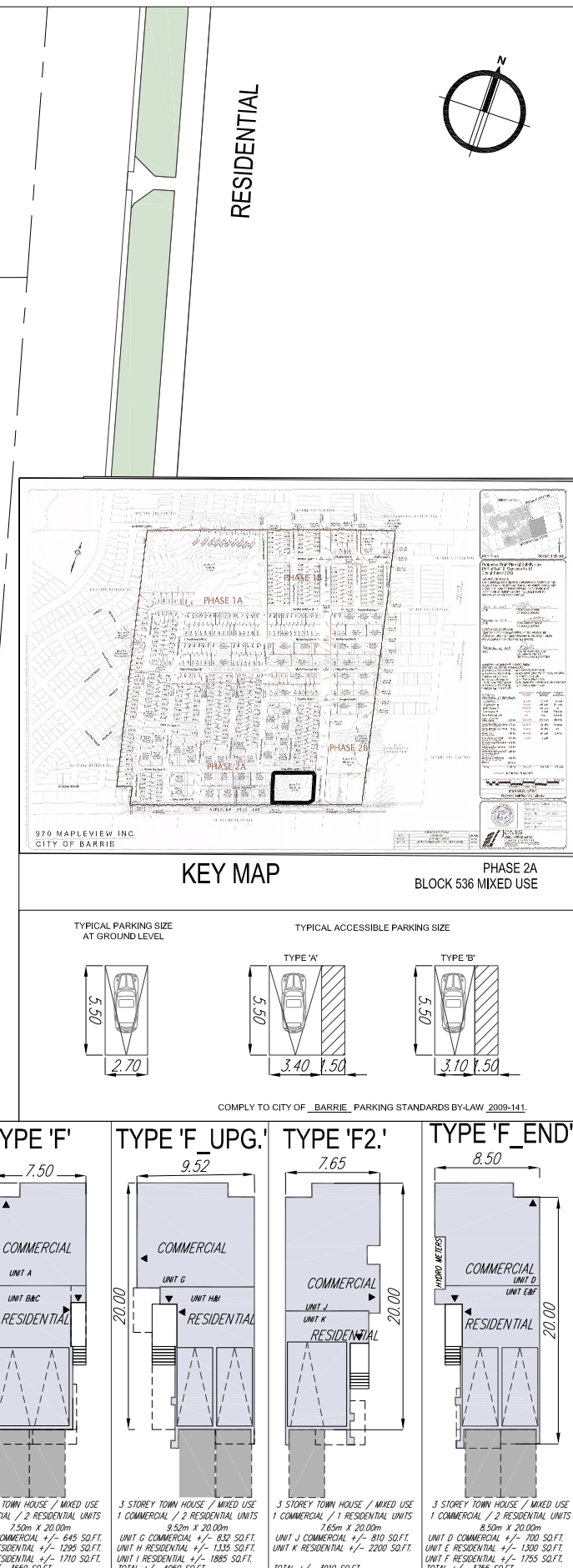
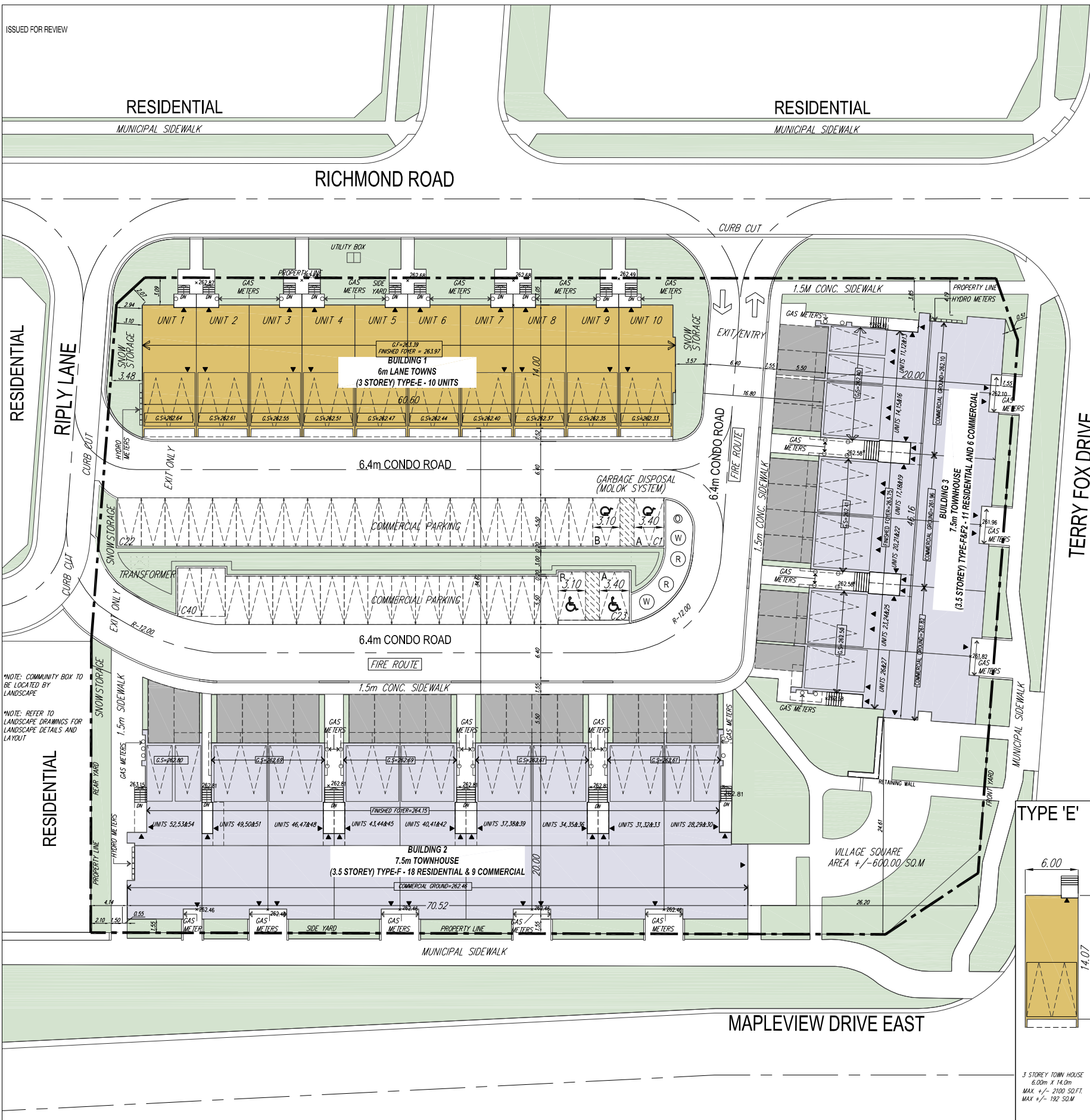
Total Leq All Segments: 61.27 dBA

TOTAL Leq FROM ALL SOURCES: 61.27

APPENDIX 'C'

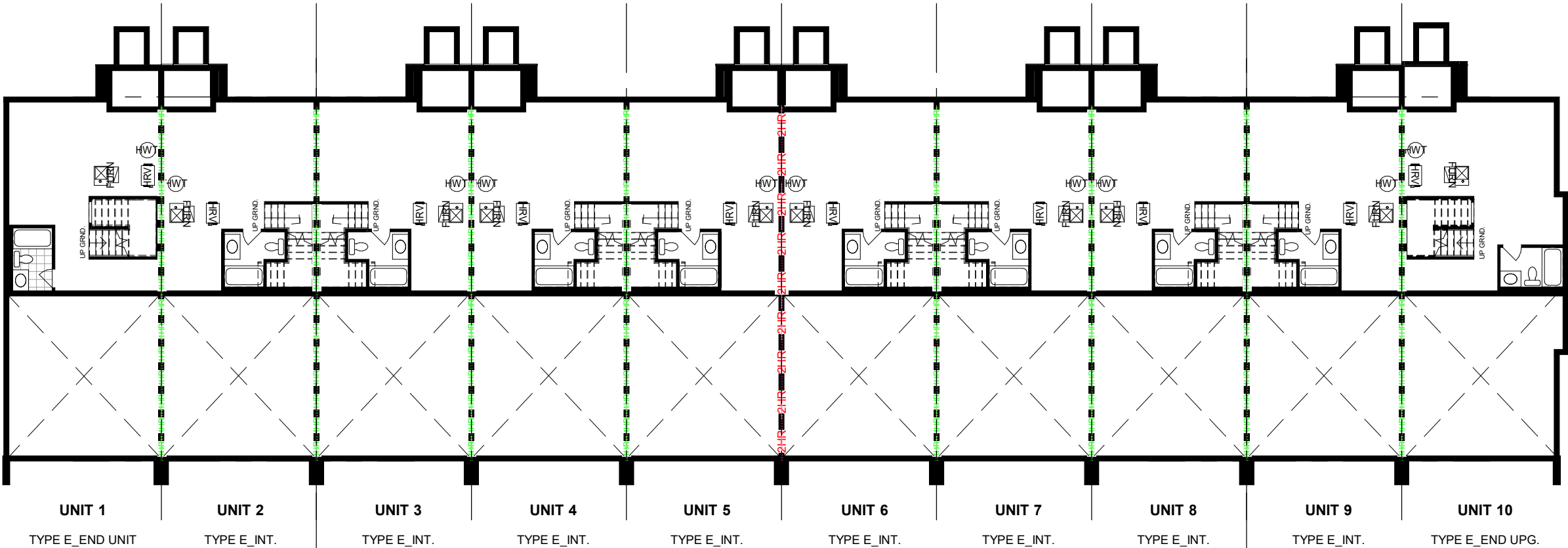
SITE PLAN

(Source: 4Architecture)

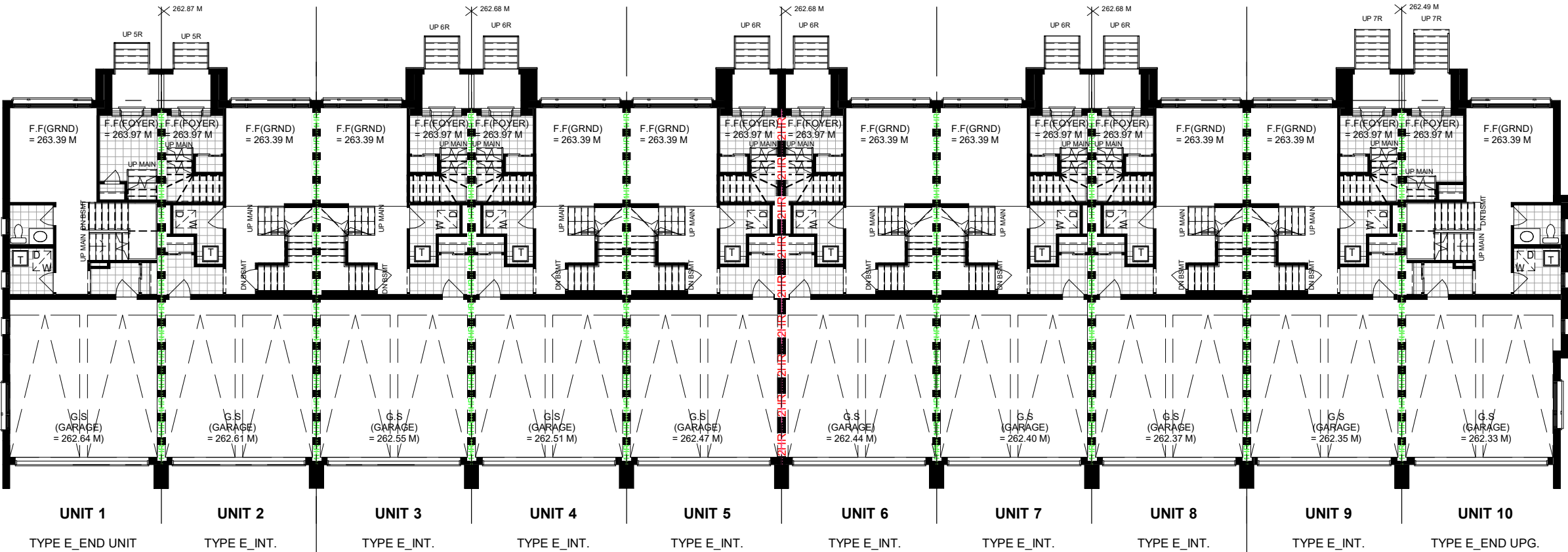
[illegible]

APPENDIX 'D'
ARCHITECTURAL PLANS

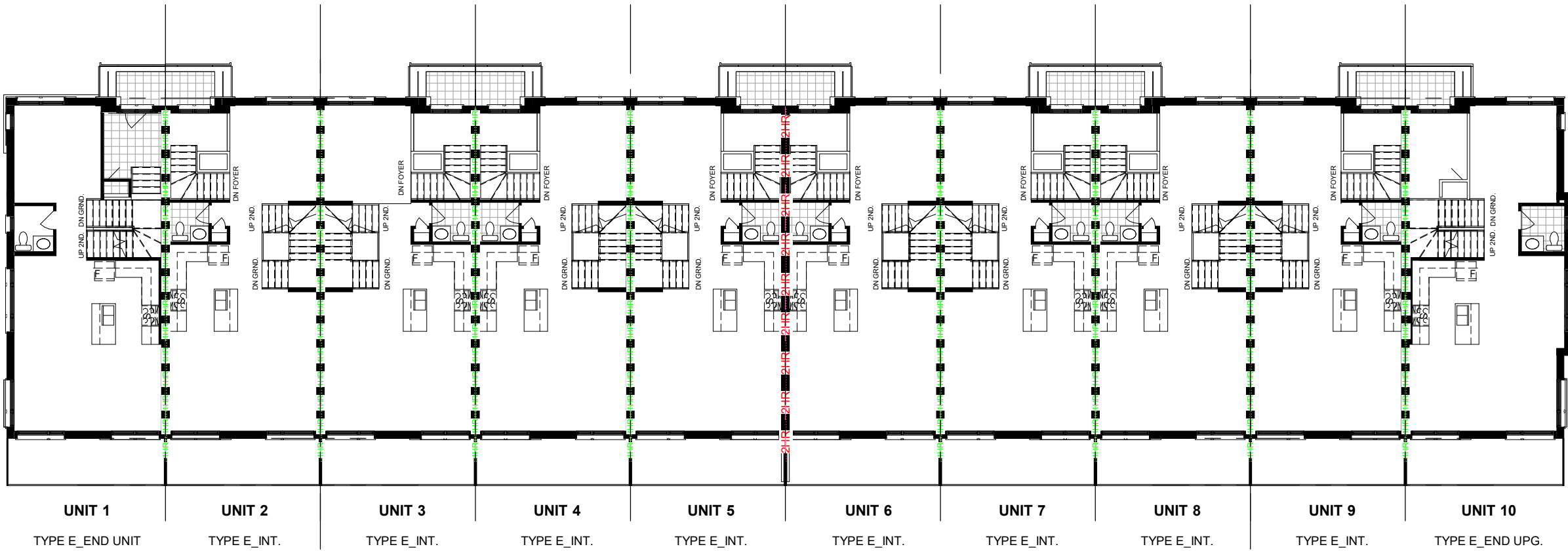
(Source: 4Architecture)



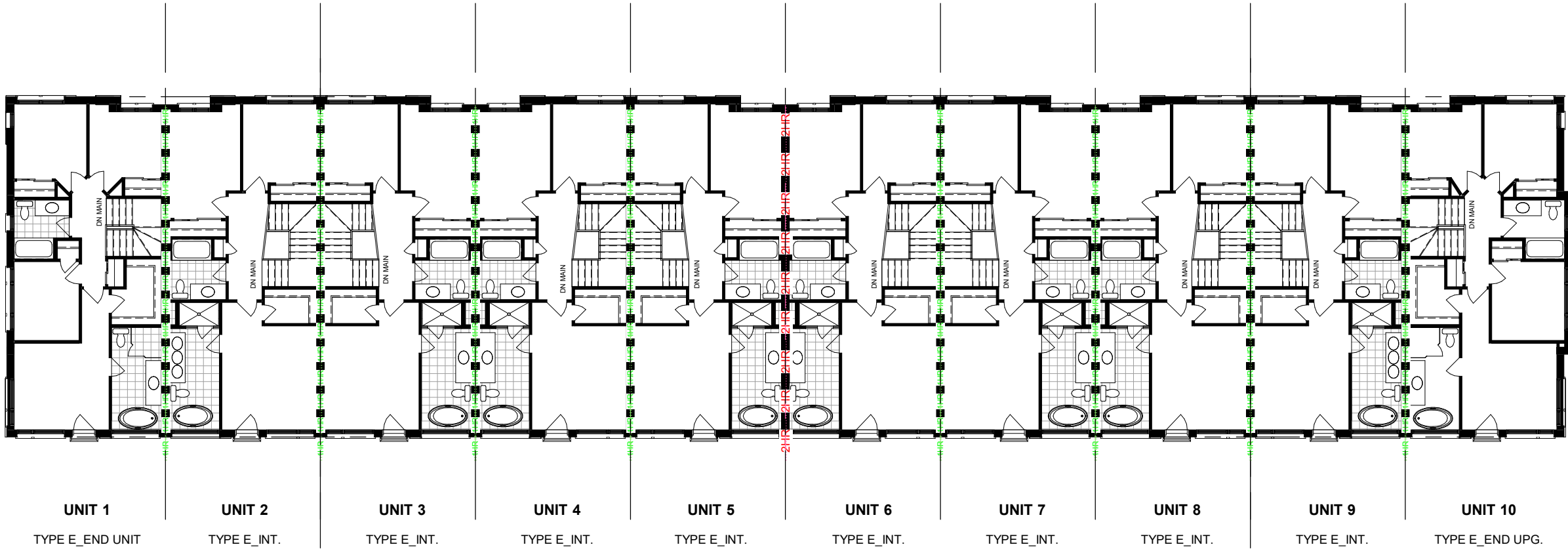
BUILDING 01_BASEMENT PLAN



BUILDING 01_GROUND FLOOR PLAN



BUILDING 01_MAIN FLOOR PLAN



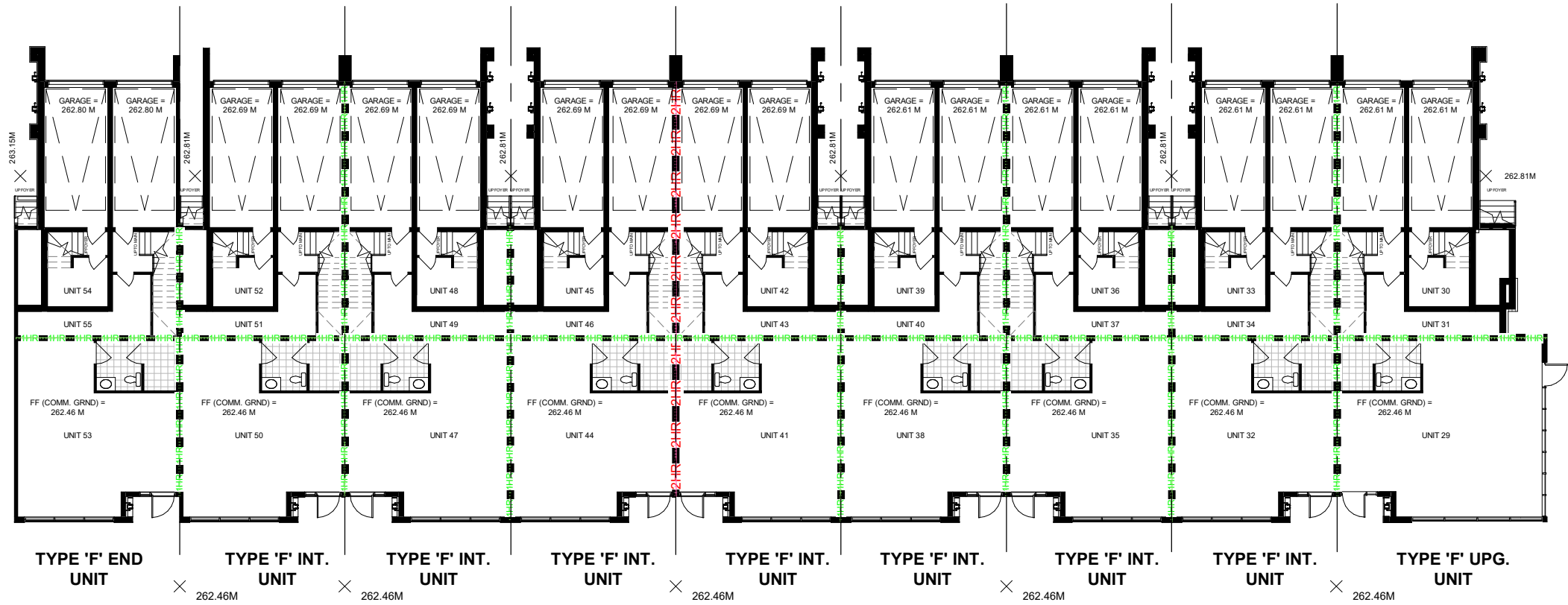
BUILDING 01_SECOND FLOOR PLAN



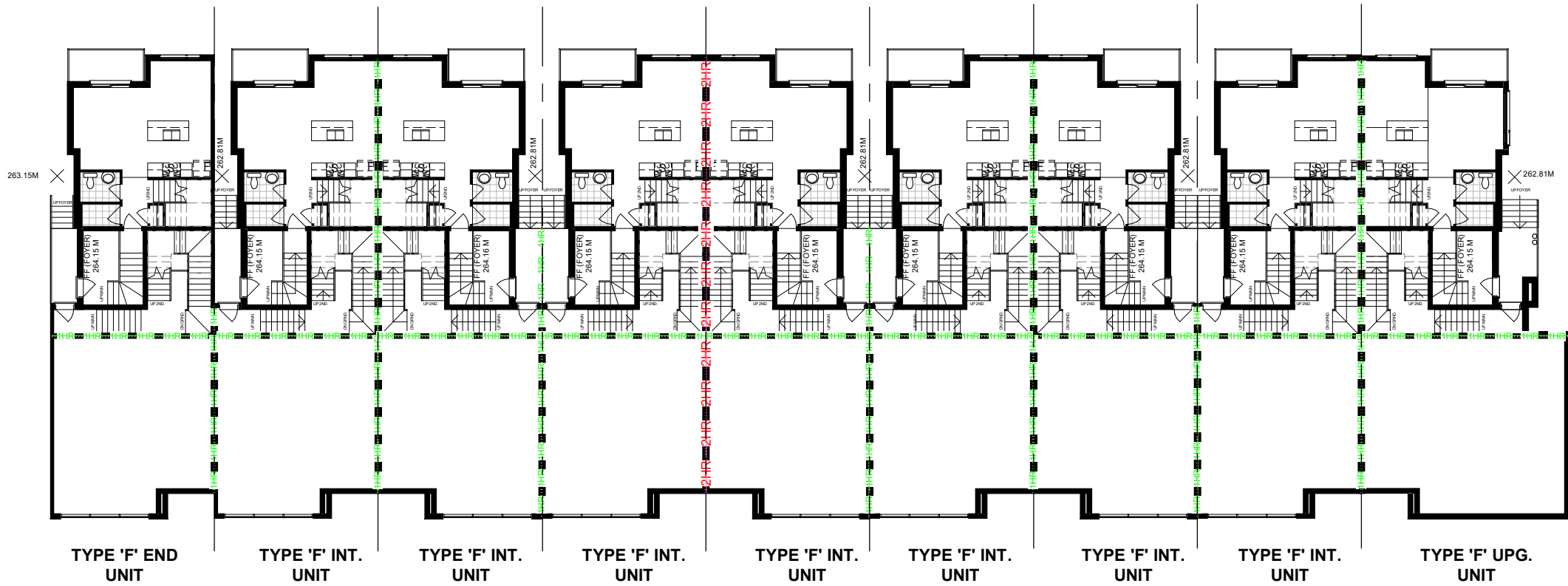
NORTH ELEVATION



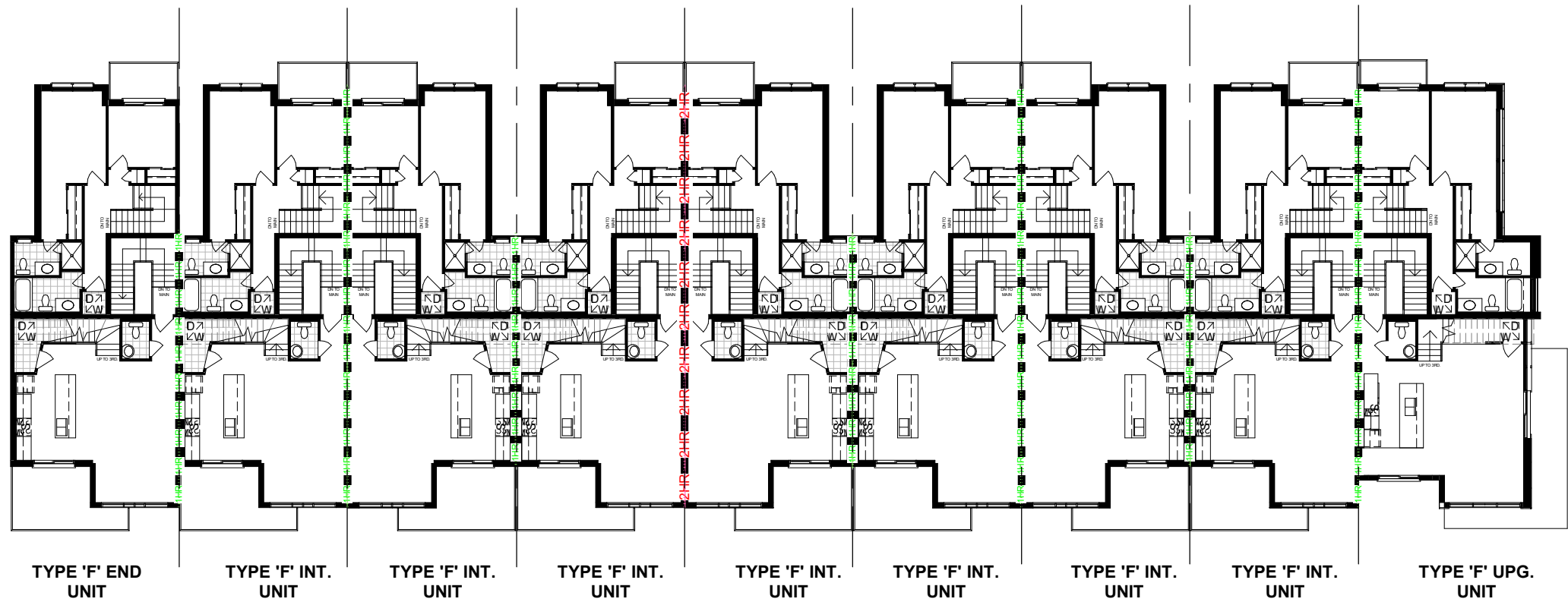
SOUTH ELEVATION



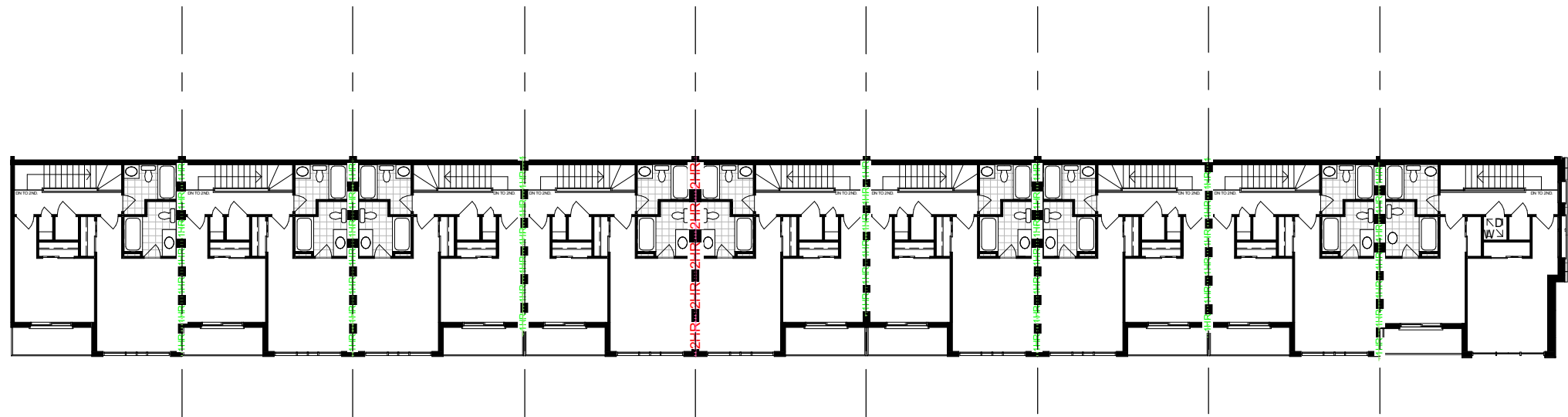
BUILDING 02_GROUND FLOOR PLAN



BUILDING 02_MAIN FLOOR PLAN



BUILDING 02_SECOND FLOOR PLAN



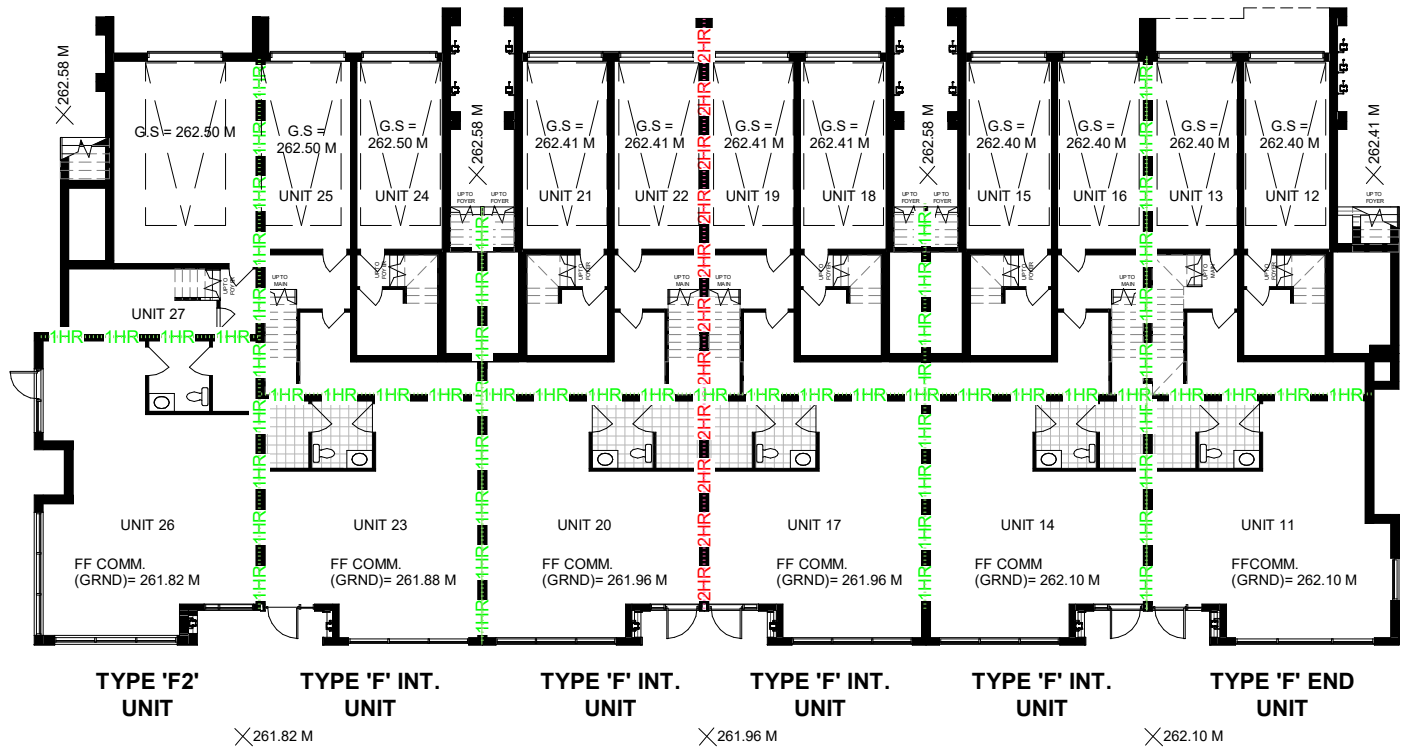
BUILDING 02_THIRD FLOOR PLAN



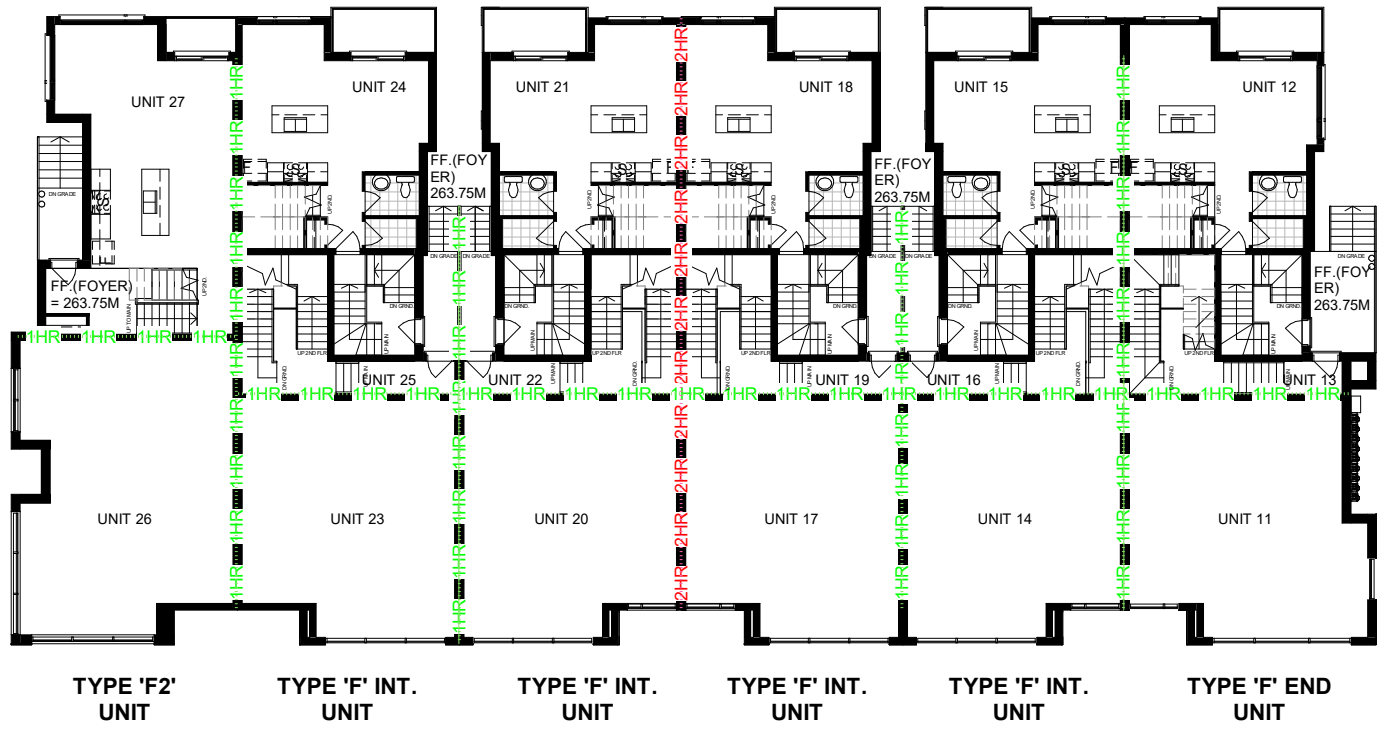
NORTH ELEVATION



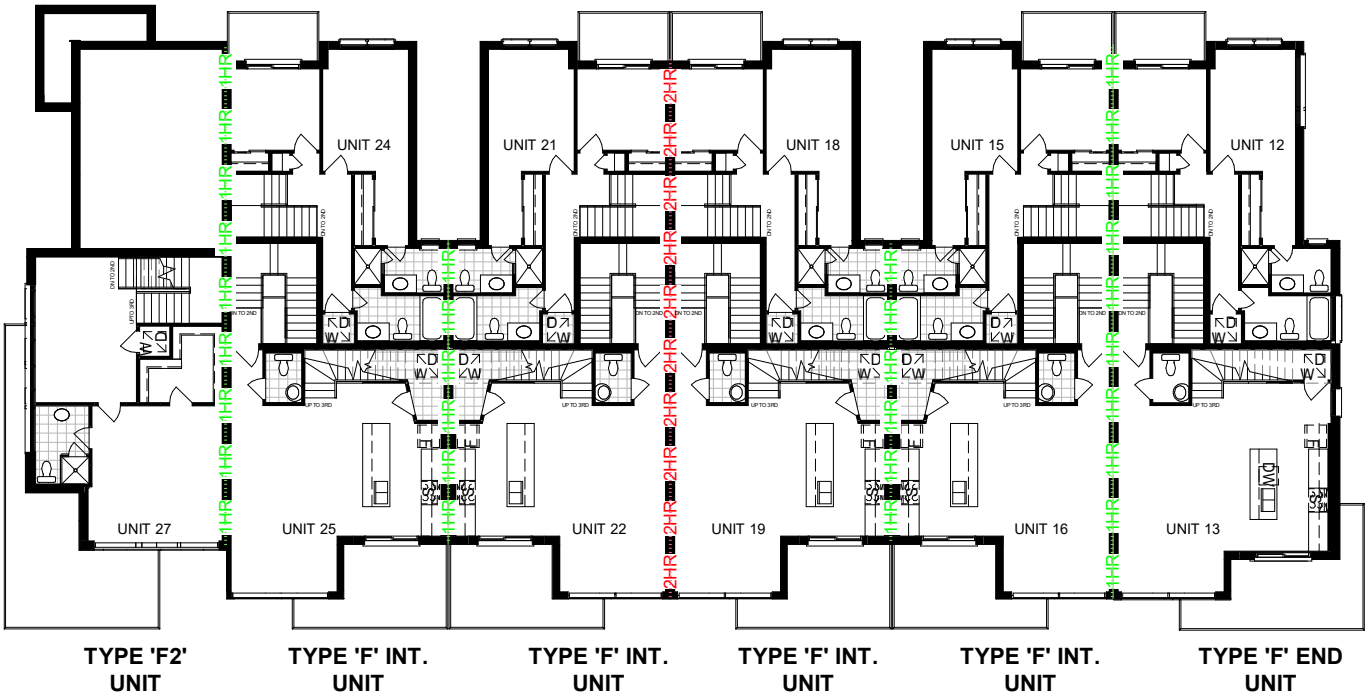
SOUTH ELEVATION



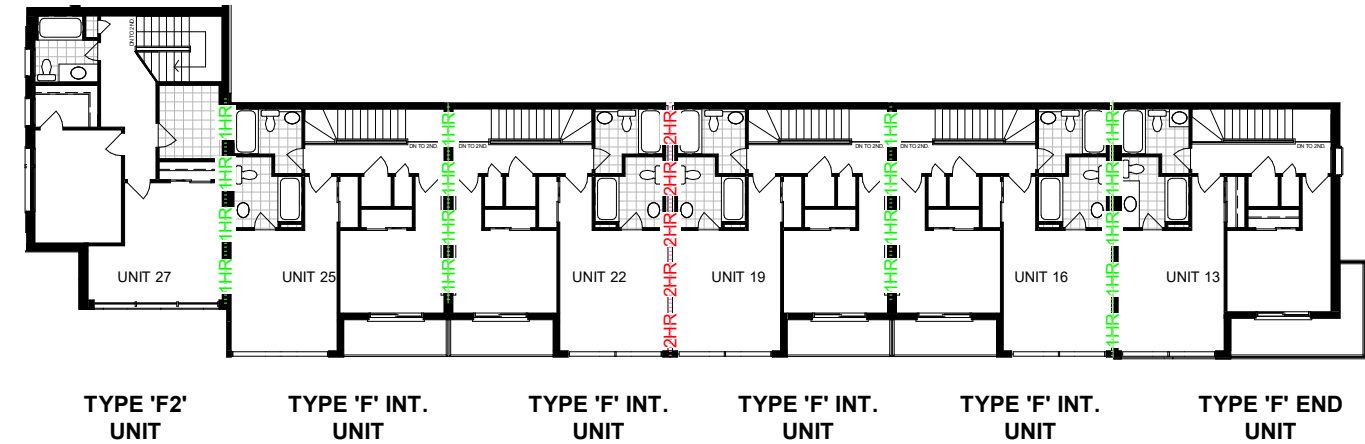
BUILDING 03_GROUND FLOOR PLAN



BUILDING 03_MAIN FLOOR PLAN



BUILDING 03_SECOND FLOOR PLAN



BUILDING 03_THIRD FLOOR PLAN



FRONT ELEVATION



REAR ELEVATION