REPORT
PROJECT: 134569-6.04-01

ENVIRONMENTAL NOISE IMPACT ASSESSMENT SOUTH KEYS PHASE 1

Prepared for SmartCentres Real Estate Investment Trust
by IBI Group

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1 Introduction

This Environmental Noise Impact Assessment has been prepared in support of a combined Zoning By-law Amendment and Site Plan Control application for a proposed high-rise residential development at 2200 Bank Street within the South Keys Shopping Centre in Ottawa, referred to as South Keys Phase 1. Ultimately, four phases are planned to occupy the subject lands, however the scope of this study was limited to Phase 1, as the subsequent phases are still highly-conceptual in nature and will be reviewed as part of separate Site Plan applications, as required. This study evaluated the expected transportation-related noise levels within the development and recommended any warning clauses and associated noise abatement measures required in the Tenancy Agreement for each dwelling unit included in Phase 1.

The proposed development consists of two, 21-storey towers joined by a podium ranging in height from four to six storeys. The north and south towers are referred to herein as Tower 'A' and Tower 'B', respectively.

The site location and its surrounding context are shown in **Figure 1** below.

Figure 1 – Site Location

2 Background

2.1 Noise Sources

The study area is primarily subjected to roadway noise from the existing Bus Rapid Transit (BRT) corridor. There are no other collector or higher-order roadways within close enough proximity to generate noise sources of any significance within the site.

Aircraft noise from the Ottawa International Airport impacts the whole site, as it is located entirely within the Airport Vicinity Development Zone (AVDZ). As such, consideration will be given to aircraft noise in this study.

In accordance with the City of Ottawa Environmental Noise Control (ENC) Guidelines (January 2016), rail lines within 500 metres of the site must be taken into consideration in the noise analysis. A review of the study area indicates that the Trillium Line Extension Light Rail Transit (LRT) corridor is presently under construction immediately west and parallel to the existing BRT line.

2.2 Sound Level Limits for Road & Rail Traffic

Sound level criteria for road traffic were extracted from the ENC Guidelines. 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 – ventilation and warning clause requirements

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)
- Living Room – 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.

As discussed previously, the proposed development consists of two, 21-storey towers joined by a podium ranging in height from 4 to 6 storeys. For the purpose of assessing the most significant indoor noise in this study, the outdoor noise levels are observed at 58.0 metres above the ground for the plane of the living room for daytime noise and 61.0 metres above the plane of the bedroom windows to assess nighttime noise. These receiver heights were determined by reviewing the living room and bedroom window locations for the upper-floor loft-style units from architectural drawings provided by the proponent, and were analysed to determine noise impacts with respect the adjacent transportation network.

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

As per Table 2.2a of the ENC Guidelines, the sound level criteria for the outdoor living area (OLA) during the daytime (i.e. 07:00 and 23:00 hours) is 55 dBA Leq (16). Sound levels for the OLA are calculated 3 metres from the building face at the centre of the unit, or in the middle of the OLA at a height of 1.5 metres above the ground/elevated terrace.

If the Leq sound level is less than or equal to the above criteria, then no further action is required by the developer. If the sound level exceeds the criteria by less than 5 dBA then the developer may, with City approval, either provide a warning clause to prospective tenants or install physical attenuation. For sound levels greater than 5 dBA above the criteria control measures are required to reduce the noise levels as close to 55 dBA as technically, economically and administratively possible. Should the sound levels with the barrier in place exceed 55 dBA a warning clause is also required.

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 these criteria, then the building component (walls, windows etc.) must be designed to achieve indoor sound level criteria.

2.3 Sound Level Limits for Aircraft Noise

Aircraft noise impact assessment is based on the Noise Exposure Forecast (NEF) and Noise Exposure Projection (NEP) methods approved by Transport Canada. The noise contours were used to define the Airport Operating Influence Zone (AOIZ) and Airport Vicinity Development Zone (AVDZ) which is shown on Annex 10 of the Official Plan.

No new noise sensitive developments are permitted within the AOIZ. Noise sensitive development is permitted within the AVDZ and outside of the AOIZ subject to a noise study or under the Prescribed Measures for Aircraft Noise in Part 6 of the ENC Guidelines. Indoor and outdoor sound level limits for aircraft noise is included in Table 4.2a of the ENC Guidelines.

3 Roadway Noise

3.1 Road & Rail Traffic Data

Based on the configuration of the road and rail transportation network with respect to the proposed development, it is assumed that the major sources of transportation noise impacting the site will originate from the existing Bus Rapid Transit (BRT) and the future Trillium Line Extension.

Bus Rapid Transit (BRT) Corridor

The dedicated Bus Rapid Transit corridor, also referred to as the Transitway, exists immediately west of the subject site. Based on discussions with City staff, it is understood that the existing BRT line will continue to operate between the Hunt Club Road Transitway Loop and Hurdman Station once the Trillium Line Extension is open for full revenue service.

Appropriate traffic inputs parameters for the BRT line were conservatively determined based on a review of current OC Transpo schedules for South Keys Station which indicate that the station typically serves approximately 760 buses during a typical weekday. This figure was rounded up to 800 buses per day to account for 'deadhead' (i.e. out-of-service) buses travelling through the station. The daytime and nighttime splits were determined based on a review of OC Transpo routes serving South Keys Station and found to be consistent with the proportions used in the Trillium Line Extension EA Study, as discussed below.

Trillium Line Extension

The Trillium Line Extension is part of Ottawa's Light Rail Transit (LRT) Stage 2 and involves the expansion of the north-south transit line from its current terminus at Greenboro Station further south to the future Limebank Station in Riverside South. The Trillium Line Extension, slated to open for full revenue service in late 2022, will serve South Keys Station adjacent to the subject site and will be located just west of the existing BRT corridor.

Consistent with the Noise, Vibration & Air Quality Report O-Train Extension Environmental Assessment (January 2016), the noise impacts of the Trillium Line Extension were modelled using a 4-car SRT (Scarborough Rapid Transit) vehicle with an assumed operating speed of 70km/h and 2031 projected volumes. Daytime and nighttime splits were based on a review of train schedules obtained from OC Transpo as part of the EA study. Relevant extracts from the Trillium Line EA Study are included in **Appendix A**.

Table 3.1 below summarizes the traffic, road and rail parameters are used to assess the noise levels.

TABLE 3.1 – TRAFFIC AND ROAD DATA SUMMARY

	BUS RAPID TRANSIT (BRT) CORRIDOR	TRILLIUM LINE EXTENSION
Annual Average Daily Traffic (AADT)	800 buses	432 trains[1]
Posted Speed Limit (km/h)	80	70
% Medium Trucks	-	-
% Heavy Trucks	-	-
% Daytime Traffic	89%	89%

Notes: [1] 216 trains per direction as projected in Trillium Line Extension EA study under 2031 conditions.

It should be noted that Dazé Street, which is identified in the Official Plan as a collector road, is separated from the subject site by a significant distance of at least 105 metres. As such, the transportation-related noise impacts from this road were not considered in the analysis for this study.

3.2 Calculation Methods

Roadway noise was calculated using the STAMSON 5.04 computer program from the Ontario Ministry of the Environment. In the STAMSON program, both the LRT and BRT lines were simulated with custom noise sources.

Unattenuated daytime and nighttime noise levels at the building face, calculated to determine indoor sound levels, are presented in **Table 3.2** below. Parameters used for calculating the noise levels, including the perpendicular distance from the source to receiver and the roadway segment angles are also indicated. The noise impacts associated with LRT were modelled separately for northbound and southbound directions and then combined to maintain consistency with the Trillium Line Extension EA Study.

As indicated on **Noise Plan – Drawing No. 135639-N1**, there are two outdoor living areas (OLAs), referred to as the 5th Floor Terrace (Shared Amenity Area #1) and the 7th Floor Terrace (Shared Amenity Area #2). An analysis of the 5th Floor Terrace is presented in **Table 3.3** below. The noise level for the 5th Floor Terrace was evaluated at location 'P1' on the Noise Plan in accordance with the ENC Guidelines which indicate that the midpoint should be used to assess this type of shared amenity area. The balconies associated with each unit have depths of less than 4 metres and are therefore not defined as 'outdoor living areas' in the ENC Guidelines.

STAMSON noise calculations conducted for this study are included in **Appendix B**.

TABLE 3.2 – UNATTENUATED NOISE LEVELS AT BUILDING FACE (INDOOR)

LOCATION	ROADWAY	SOURCE RECEIVER DISTANCE (m)	NOISE ANGLES		NOISE (dBA)	
			LEFT	RIGHT	DAYTIME	NIGHTTIME
West Façade Tower 'A'	LRT NB LRT SB BRT	46.3 57.3 23.3	-90 -90 -90	90 90 90	64.08	60.14
North Façade Tower 'A'	LRT NB LRT SB BRT	47.3 58.3 24.3	0 0 0	90 90 90	60.90	56.96
Northeast Façade Tower 'A'	LRT NB LRT SB BRT	88.8 99.8 65.8	0 0 0	90 90 90	56.96	52.88
West Façade Tower 'B' (20th & 21st Floor)	LRT NB LRT SB BRT	42.4 54.4 18.4	-90 -90 -90	90 90 90	64.98	61.10
West Façade Tower 'B' (4th Floor)	LRT NB LRT SB BRT	38.6 50.6 15.0	-90 -90 -90	90 90 90	64.85	61.07
South Façade Tower 'B'	LRT NB LRT SB BRT	43.4 55.4 19.4	-90 -90 -90	0 0 0	61.76	57.87
Southeast Corner Tower 'B'	LRT NB LRT SB BRT	85.5 97.5 61.5	-90 -90 -90	0 0 0	57.21	53.15

As indicated in **Table 3.2** above, the daytime noise exceeds 55 dBA at numerous locations.

TABLE 3.3 – UNATTENUATED NOISE LEVELS AT OLA

LOCATION	ROADWAY	SOURCE RECEIVER DISTANCE (M)	ANGLES		DAYTIME
			LEFT	RIGHT	NOISE (dBA)
5th Floor Terrace – P1 Shared Amenity Area #1	LRT NB LRT SB BRT	57.5 69.5 33.5	-45 -45 -45	55 55 55	48.54

As indicated in **Table 3.3** above, the daytime noise is not expected to exceed 55 dBA at the 5th Floor Terrace. Given that the 7th Floor Terrace is even further set back from the LRT/BRT lines, and will have additional screening from Towers ‘A’ and ‘B’, no analysis was required for Shared Amenity Area #2.

4 Abatement Measures

4.1 Indoor Sound Levels

As identified in **Table 3.2** above, dwelling units on the west façade of either tower have direct exposure to noise from the existing LRT and BRT lines and are expected to exceed 60 dBA at the building face during the nighttime. As such, mandatory central air conditioning, a review of building components are required, as well as a Type ‘D’ warning clause on the Tenancy Agreement for each west-facing unit.

For dwelling units on the north or south facades of either Tower ‘A’ or ‘B’, which will be indirectly exposed to noise from the existing BRT and future LRT lines, daytime noise levels were determined to be less than 65 dBA but still are still expected to exceed 55 dBA (or nighttime noise level is less than 60 dBA but exceeds 50 dBA). As such, an alternative means of ventilation is required, as well as a Type ‘C’ warning clause in the Tenancy Agreement for each north- or south-facing unit. Alternative means of ventilation usually consist of a forced air heating system with ducts sized for future installation of central air conditioning.

4.2 Outdoor Living Area

Not Applicable – As discussed previously, abatement measures are not required for Shared Amenity Area #1 or #2, given that the noise levels are expected to remain below 55 dBA.

4.3 Building Components

An analysis of the required building components for dwelling units expected to experience noise levels at the building face is typically required when noise levels are either 65 dBA (daytime) or 60 dBA (nighttime). In this circumstance, the results presented in **Table 3.2** above indicate that daytime noise levels at the western building façade will be very close to 65 dBA threshold (64.98 dBA), while the nighttime noise levels were found to exceed the 60 dBA threshold (61.10 dBA). As such, an assessment of building components was conducted under both daytime and nighttime conditions. 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.

Exterior walls were assumed to have an STC rating of 50, which is a conservative value for a pre-cast concrete wall designed to accommodate Ottawa winters from the Ontario Building Code. With the exterior walls in place, the amount of sound energy absorbed by the windows is calculated in order to determine the STC rating required to meet the sound criteria. 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. As indicated in **Table 4.1** below, the maximum required STC rating for the largest west-facing windows and glazed doors was calculated to be 31. This rating was conservatively based on the expected noise levels for the top-floor, loft-style units with the highest exposure to the existing BRT and future LRT lines.

Preliminary plan and profile architectural drawings are provided in **Appendix C**, while STC calculations for the proposed development are included in **Appendix D**.

TABLE 4.1: SOUND TRANSMISSION CLASS (STC) RATINGS

DWELLING UNIT	LEVEL	ROOM TYPE	REQUIRED STC RATING FOR WINDOWS & GLAZED DOORS
Tower ‘B’ West Façade	20^{th} Floor	Living Room	30
	21^{st} Floor	Bedroom	31

4.4 Aircraft Sound Levels

As stated in Section 2.1, the subject site is entirely located within the Airport Vicinity Development Zone (AVDZ). The site is, however, outside of the 25 NEF/NEP contour line so the building components and ventilation requirements, presented in Part 6: Prescribed Measures for Aircraft Noise of the ENC Guidelines, do not apply. A warning clause is required for the residential units inside the AVDZ, which in this case applies to all dwelling units proposed within the South Keys Phase 1 development.

The warning clause for aircraft noise is as follows:

“Purchasers/tenants are advised that due to the proximity of the Ottawa Macdonald-Cartier International Airport, noise from the airport and individual aircraft may at times interfere with outdoor or indoor activities”.

5 Summary of Attenuation Measures

5.1 Warning Clauses

A clause regarding noise must appear on the Tenancy Agreement for the dwelling units indicated on the **Noise Plan - Drawing No. 134569-N1**:

Type 'C' Tower 'A' – North & South Façades

Tower 'B' – North & South Façades

Type 'D' Towers 'A' & 'B' – West Façade

Aircraft Warning South Keys Phase 1 – All dwelling units

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

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."

The aircraft warning clause was provided previously in Section 4.4.

5.2 Ventilation Requirements and Building Components

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

All dwelling units with a Type 'D' warning clause require mandatory central air conditioning and an acoustical review of building components.

5.3 Noise Barrier

Based on the foregoing analysis, it is not anticipated that any noise barriers will be required to accommodate the proposed development.

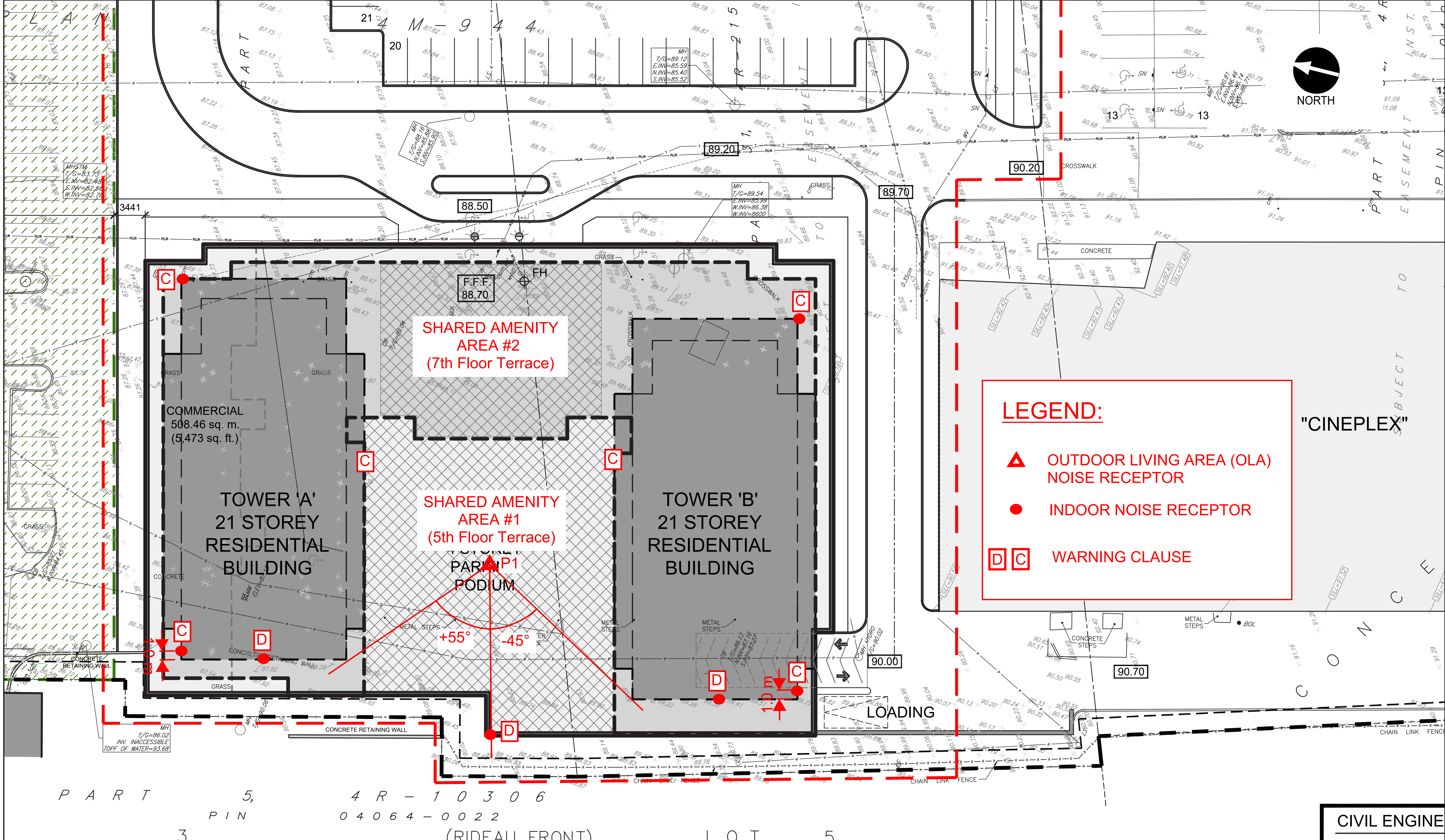
6 Conclusion

This report outlines the impact of transportation-related noise on the proposed development, located at 2200 Bank Street, within the South Keys Shopping Centre in Ottawa. Based on the analysis conducted for this study, it is expected 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 identified on **Drawing No. 134569-N1**. For these dwelling units, appropriate warning clauses and associated noise abatement measures must be provided on the Tenancy Agreement. Sound Transmission Class (STC) ratings for windows and glazed doors are provided for dwelling units with the highest exposure to the LRT and BRT corridors. Since the subject site is located entirely within the Airport Vicinity Development Zone (AVDZ), a warning clause will be required in the Tenancy Agreement for each dwelling unit.

7 Professional Authorization

Prepared by:

Ben Pascolo-Neveu, P. Eng.



IBI

South Keys Phase 1
Environmental Noise Impact Assessment

Noise Plan - Drawing No. 134569-N1

PROJECT No. 134569

SCALE: 0m 5m 10m

Appendix A –
Trillium Line Extension EA Extracts

TABLE 5: AADT TRAFFIC AND RAIL VOLUMES (EXISTING AND FUTURE)

Road Segment	AADT		Speed (km/h)
	Existing (2015)	Projected (2031)	
Bayview Road	5,518	6,731	50
Gladstone Avenue	4,758	5,804	40
Highway 417 (/direction)	93,000	11,3450	100
Preston Street	19,976	24,369	50
Airport Parkway	24,879	33,359	80
Airport Parkway (SB Walkley Exit)	5,891	7,899	80
Walkley Road	21,390	26,093	50
Huntclub Road	28,986	35,360	60
Flannery Drive	9,648	11,769	40
O-Train LRT	180	216	70
VIA Rail	14	20	150

Transportation noise calculations have been based on the Ontario Road Noise Analysis Method for Environmental and Transportation (ORNAMENT), and calculated using the MOECC approved software STAMSON (5.04). This method calculates noise levels based on: (i) AADT volumes, posted speed limits, and vehicle mix data for roadways, representing the source; and (ii) source-receiver distance, exposure angles and intermediate ground surface characteristics, and source-receiver ground elevation, as characterizing the path of noise. This method was developed by the MOECC and satisfies City of Ottawa requirements. Unless otherwise specified in Table 5, AADT volumes on surrounding streets were considered to be split 92% daytime, and 8% nighttime, for each roadway segment, as well as a vehicle mix of 7% and 5% for medium and heavy trucks, respectively. Speed limits used in the calculations are presented in Table 5.

The O-Train was modelled in STAMSON as a 4-car SRT (Scarborough Rapid Transit) vehicle; operating at an assumed speed of 70 km/h. Daytime and nighttime split is based on current train schedules obtained from OC Transpo.

Appendix B –
STAMSON Noise Calculations

Indoor Noise at Building Face

```
STAMSON 5.0        NORMAL REPORT        Date: 07-10-2021 37:36:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wtowA.te             Time Period: Day/Night 16/8 hours
Description: West Facade - Tower 'A' - Indoor


RT/Custom data, segment # 1: O-Train NB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: O-Train NB (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  :  46.30 / 46.30  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 2: O-Train SB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: O-Train SB (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  :  57.30 / 57.30  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 3: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   712/156   veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 3: BRT (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  :  23.30 / 23.30  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: O-Train NB (day)
-------------------------------------

Source height = 0.50 m
```

```
RT/Custom (0.00 + 54.05 + 0.00) = 54.05 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  58.95  -4.89   0.00   0.00   0.00   0.00  54.05
----------------------------------------------------------------------

Segment Leq : 54.05 dBA


Results segment # 2: O-Train SB (day)
-------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 53.13 + 0.00) = 53.13 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  58.95  -5.82   0.00   0.00   0.00   0.00  53.13
----------------------------------------------------------------------

Segment Leq : 53.13 dBA


Results segment # 3: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 63.22 + 0.00) = 63.22 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  65.13  -1.91   0.00   0.00   0.00   0.00  63.22
----------------------------------------------------------------------

Segment Leq : 63.22 dBA

Total Leq All Segments: 64.08 dBA


Results segment # 1: O-Train NB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 48.03 + 0.00) = 48.03 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  52.93  -4.89   0.00   0.00   0.00   0.00  48.03
----------------------------------------------------------------------

Segment Leq : 48.03 dBA


Results segment # 2: O-Train SB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 47.11 + 0.00) = 47.11 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  52.93  -5.82   0.00   0.00   0.00   0.00  47.11
----------------------------------------------------------------------

Segment Leq : 47.11 dBA
```

FF

Results segment # 3: BRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 59.63 + 0.00) = 59.63 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	61.55	-1.91	0.00	0.00	0.00	0.00	59.63

Segment Leq : 59.63 dBA

Total Leq All Segments: 60.14 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 64.08
(NIGHT): 60.14

FF

FF

```
STAMSON 5.0        NORMAL REPORT        Date: 07-10-2021 38:10:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ntowA.te             Time Period: Day/Night 16/8 hours
Description: North Facade - Tower 'A' Indoor


RT/Custom data, segment # 1: O-Train NB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: O-Train NB (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  :  47.30 / 47.30  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 2: O-Train SB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: O-Train SB (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  :  58.30 / 58.30  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 3: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   712/156   veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 3: BRT (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  :  24.30 / 24.30  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: O-Train NB (day)
-------------------------------------

Source height = 0.50 m
```

```
RT/Custom (0.00 + 50.95 + 0.00) = 50.95 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     90   0.00  58.95  -4.99  -3.01   0.00   0.00   0.00  50.95
----------------------------------------------------------------------

Segment Leq : 50.95 dBA

FF
Results segment # 2: O-Train SB (day)
-------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 50.04 + 0.00) = 50.04 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     90   0.00  58.95  -5.90  -3.01   0.00   0.00   0.00  50.04
----------------------------------------------------------------------

Segment Leq : 50.04 dBA

FF
Results segment # 3: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 60.02 + 0.00) = 60.02 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     90   0.00  65.13  -2.10  -3.01   0.00   0.00   0.00  60.02
----------------------------------------------------------------------

Segment Leq : 60.02 dBA

Total Leq All Segments: 60.90 dBA

FF
Results segment # 1: O-Train NB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 44.93 + 0.00) = 44.93 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     90   0.00  52.93  -4.99  -3.01   0.00   0.00   0.00  44.93
----------------------------------------------------------------------

Segment Leq : 44.93 dBA

FF
Results segment # 2: O-Train SB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 44.02 + 0.00) = 44.02 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     90   0.00  52.93  -5.90  -3.01   0.00   0.00   0.00  44.02
----------------------------------------------------------------------

Segment Leq : 44.02 dBA
```

FF

Results segment # 3: BRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 56.44 + 0.00) = 56.44 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	61.55	-2.10	-3.01	0.00	0.00	0.00	56.44

Segment Leq : 56.44 dBA

Total Leq All Segments: 56.96 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 60.90
(NIGHT): 56.96

FF
FF

```
STAMSON 5.0        NORMAL REPORT        Date: 08-10-2021 135:38:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: netowa.te            Time Period: Day/Night 16/8 hours
Description: Northeast Tower 'A' - Indoor


RT/Custom data, segment # 1: O-Train NB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: O-Train NB (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  :  88.80 / 88.80  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 2: O-Train SB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: O-Train SB (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  :  99.80 / 99.80  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 3: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   712/156   veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 3: BRT (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  :  65.80 / 65.80  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: O-Train NB (day)
-------------------------------------

Source height = 0.50 m
```

```
RT/Custom (0.00 + 48.21 + 0.00) = 48.21 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
------------------------------------------------------------------------
     0     90   0.00  58.95  -7.72  -3.01   0.00   0.00   0.00  48.21
------------------------------------------------------------------------

Segment Leq : 48.21 dBA

FF
Results segment # 2: O-Train SB (day)
--------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 47.71 + 0.00) = 47.71 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
------------------------------------------------------------------------
     0     90   0.00  58.95  -8.23  -3.01   0.00   0.00   0.00  47.71
------------------------------------------------------------------------

Segment Leq : 47.71 dBA

FF
Results segment # 3: BRT (day)
-------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 55.70 + 0.00) = 55.70 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
------------------------------------------------------------------------
     0     90   0.00  65.13  -6.42  -3.01   0.00   0.00   0.00  55.70
------------------------------------------------------------------------

Segment Leq : 55.70 dBA

Total Leq All Segments: 56.96 dBA

FF
Results segment # 1: O-Train NB (night)
----------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 42.19 + 0.00) = 42.19 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
------------------------------------------------------------------------
     0     90   0.00  52.93  -7.72  -3.01   0.00   0.00   0.00  42.19
------------------------------------------------------------------------

Segment Leq : 42.19 dBA

FF
Results segment # 2: O-Train SB (night)
----------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 41.69 + 0.00) = 41.69 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
------------------------------------------------------------------------
     0     90   0.00  52.93  -8.23  -3.01   0.00   0.00   0.00  41.69
------------------------------------------------------------------------

Segment Leq : 41.69 dBA
```

FF

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

Source height = 0.50 m

RT/Custom (0.00 + 52.11 + 0.00) = 52.11 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
     0     90   0.00  61.55  -6.42  -3.01   0.00   0.00   0.00  52.11
----------------------------------------------------------------------

Segment Leq : 52.11 dBA

Total Leq All Segments: 52.88 dBA
```

FF

```
TOTAL Leq FROM ALL SOURCES (DAY): 56.96
                         (NIGHT): 52.88
```

FF

FF

```
STAMSON 5.0        NORMAL REPORT        Date: 07-10-2021 37:42:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wtowB.te             Time Period: Day/Night 16/8 hours
Description: West Facade Tower 'B' - Indoor


RT/Custom data, segment # 1: O-Train NB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: O-Train NB (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  :  42.40 / 42.40  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


RT/Custom data, segment # 2: O-Train SB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: O-Train SB (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  :  54.40 / 54.40  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


RT/Custom data, segment # 3: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   712/156   veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 3: BRT (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  :  18.40 / 18.40  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


Results segment # 1: O-Train NB (day)
-------------------------------------

Source height = 0.50 m
```

```
RT/Custom (0.00 + 54.43 + 0.00) = 54.43 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  58.95  -4.51   0.00   0.00   0.00   0.00  54.43
----------------------------------------------------------------------

Segment Leq : 54.43 dBA

FF
Results segment # 2: O-Train SB (day)
-------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 53.35 + 0.00) = 53.35 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  58.95  -5.60   0.00   0.00   0.00   0.00  53.35
----------------------------------------------------------------------

Segment Leq : 53.35 dBA

FF
Results segment # 3: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 64.24 + 0.00) = 64.24 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  65.13  -0.89   0.00   0.00   0.00   0.00  64.24
----------------------------------------------------------------------

Segment Leq : 64.24 dBA

Total Leq All Segments: 64.98 dBA

FF
Results segment # 1: O-Train NB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 48.41 + 0.00) = 48.41 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  52.93  -4.51   0.00   0.00   0.00   0.00  48.41
----------------------------------------------------------------------

Segment Leq : 48.41 dBA

FF
Results segment # 2: O-Train SB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 47.33 + 0.00) = 47.33 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  52.93  -5.60   0.00   0.00   0.00   0.00  47.33
----------------------------------------------------------------------

Segment Leq : 47.33 dBA
```

FF

Results segment # 3: BRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 60.66 + 0.00) = 60.66 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	61.55	-0.89	0.00	0.00	0.00	0.00	60.66

Segment Leq : 60.66 dBA

Total Leq All Segments: 61.10 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 64.98
(NIGHT): 61.10

FF

FF

```
STAMSON 5.0        NORMAL REPORT        Date: 07-10-2021 40:08:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: stowb4th.te          Time Period: Day/Night 16/8 hours
Description: West Facade Tower 'B' - 4th Floor


RT/Custom data, segment # 1: O-Train NB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: O-Train NB (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  :  38.60 / 38.60  m
Receiver height           :  14.50 / 14.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 2: O-Train SB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: O-Train SB (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  :  50.60 / 50.60  m
Receiver height           :  14.50 / 14.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 3: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   712/156   veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 3: BRT (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  :  15.00 / 15.00  m
Receiver height           :  14.50 / 14.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: O-Train NB (day)
-------------------------------------

Source height = 0.50 m
```

```
RT/Custom (0.00 + 52.84 + 0.00) = 52.84 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.30  58.95  -5.34  -0.77   0.00   0.00   0.00  52.84
----------------------------------------------------------------------

Segment Leq : 52.84 dBA

Results segment # 2: O-Train SB (day)
-------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 51.31 + 0.00) = 51.31 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.30  58.95  -6.86  -0.77   0.00   0.00   0.00  51.31
----------------------------------------------------------------------

Segment Leq : 51.31 dBA

Results segment # 3: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 64.36 + 0.00) = 64.36 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.30  65.13   0.00  -0.77   0.00   0.00   0.00  64.36
----------------------------------------------------------------------

Segment Leq : 64.36 dBA

Total Leq All Segments: 64.85 dBA

Results segment # 1: O-Train NB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 46.82 + 0.00) = 46.82 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.30  52.93  -5.34  -0.77   0.00   0.00   0.00  46.82
----------------------------------------------------------------------

Segment Leq : 46.82 dBA

Results segment # 2: O-Train SB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 45.29 + 0.00) = 45.29 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.30  52.93  -6.86  -0.77   0.00   0.00   0.00  45.29
----------------------------------------------------------------------

Segment Leq : 45.29 dBA
```

```
FF
Results segment # 3: BRT (night)
--------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 60.78 + 0.00) = 60.78 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.30  61.55   0.00  -0.77   0.00   0.00   0.00  60.78
----------------------------------------------------------------------

Segment Leq : 60.78 dBA

Total Leq All Segments: 61.07 dBA

FF



TOTAL Leq FROM ALL SOURCES (DAY): 64.85
                         (NIGHT): 61.07
FF
FF
```

```
STAMSON 5.0        NORMAL REPORT        Date: 07-10-2021 38:20:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: stowb.te             Time Period: Day/Night 16/8 hours
Description: South Facade - Tower 'B' - indoor


RT/Custom data, segment # 1: O-Train NB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: O-Train NB (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  43.40 / 43.40  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 2: O-Train SB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: O-Train SB (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  55.40 / 55.40  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 3: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   712/156   veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 3: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  19.40 / 19.40  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: O-Train NB (day)
-------------------------------------

Source height = 0.50 m
```

```
RT/Custom (0.00 + 51.32 + 0.00) = 51.32 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.00  58.95  -4.61  -3.01   0.00   0.00   0.00  51.32
----------------------------------------------------------------------

Segment Leq : 51.32 dBA

FF
Results segment # 2: O-Train SB (day)
-------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 50.26 + 0.00) = 50.26 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.00  58.95  -5.67  -3.01   0.00   0.00   0.00  50.26
----------------------------------------------------------------------

Segment Leq : 50.26 dBA

FF
Results segment # 3: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 61.00 + 0.00) = 61.00 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.00  65.13  -1.12  -3.01   0.00   0.00   0.00  61.00
----------------------------------------------------------------------

Segment Leq : 61.00 dBA

Total Leq All Segments: 61.76 dBA

FF
Results segment # 1: O-Train NB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 45.30 + 0.00) = 45.30 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.00  52.93  -4.61  -3.01   0.00   0.00   0.00  45.30
----------------------------------------------------------------------

Segment Leq : 45.30 dBA

FF
Results segment # 2: O-Train SB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 44.24 + 0.00) = 44.24 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.00  52.93  -5.67  -3.01   0.00   0.00   0.00  44.24
----------------------------------------------------------------------

Segment Leq : 44.24 dBA
```

FF

Results segment # 3: BRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 57.42 + 0.00) = 57.42 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	61.55	-1.12	-3.01	0.00	0.00	0.00	57.42

Segment Leq : 57.42 dBA

Total Leq All Segments: 57.87 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 61.76
(NIGHT): 57.87

FF
FF

```
STAMSON 5.0        NORMAL REPORT        Date: 07-10-2021 38:47:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: stowb2.te            Time Period: Day/Night 16/8 hours
Description: Southeast Tower 'B' - Indoor


RT/Custom data, segment # 1: O-Train NB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: O-Train NB (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  85.50 / 85.50  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 2: O-Train SB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: O-Train SB (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  97.50 / 97.50  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
RT/Custom data, segment # 3: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   712/156   veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 3: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  61.50 / 61.50  m
Receiver height           :  58.00 / 61.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Results segment # 1: O-Train NB (day)
-------------------------------------

Source height = 0.50 m
```

```
RT/Custom (0.00 + 48.38 + 0.00) = 48.38 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.00  58.95  -7.56  -3.01   0.00   0.00   0.00  48.38
----------------------------------------------------------------------

Segment Leq : 48.38 dBA

FF
Results segment # 2: O-Train SB (day)
-------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 47.81 + 0.00) = 47.81 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.00  58.95  -8.13  -3.01   0.00   0.00   0.00  47.81
----------------------------------------------------------------------

Segment Leq : 47.81 dBA

FF
Results segment # 3: BRT (day)
------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 55.99 + 0.00) = 55.99 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.00  65.13  -6.13  -3.01   0.00   0.00   0.00  55.99
----------------------------------------------------------------------

Segment Leq : 55.99 dBA

Total Leq All Segments: 57.21 dBA

FF
Results segment # 1: O-Train NB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 42.36 + 0.00) = 42.36 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.00  52.93  -7.56  -3.01   0.00   0.00   0.00  42.36
----------------------------------------------------------------------

Segment Leq : 42.36 dBA

FF
Results segment # 2: O-Train SB (night)
---------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 41.79 + 0.00) = 41.79 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90      0   0.00  52.93  -8.13  -3.01   0.00   0.00   0.00  41.79
----------------------------------------------------------------------

Segment Leq : 41.79 dBA
```

FF

Results segment # 3: BRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 52.41 + 0.00) = 52.41 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	61.55	-6.13	-3.01	0.00	0.00	0.00	52.41

Segment Leq : 52.41 dBA

Total Leq All Segments: 53.15 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 57.21
(NIGHT): 53.15

FF
FF

Outdoor Living Area (OLA)

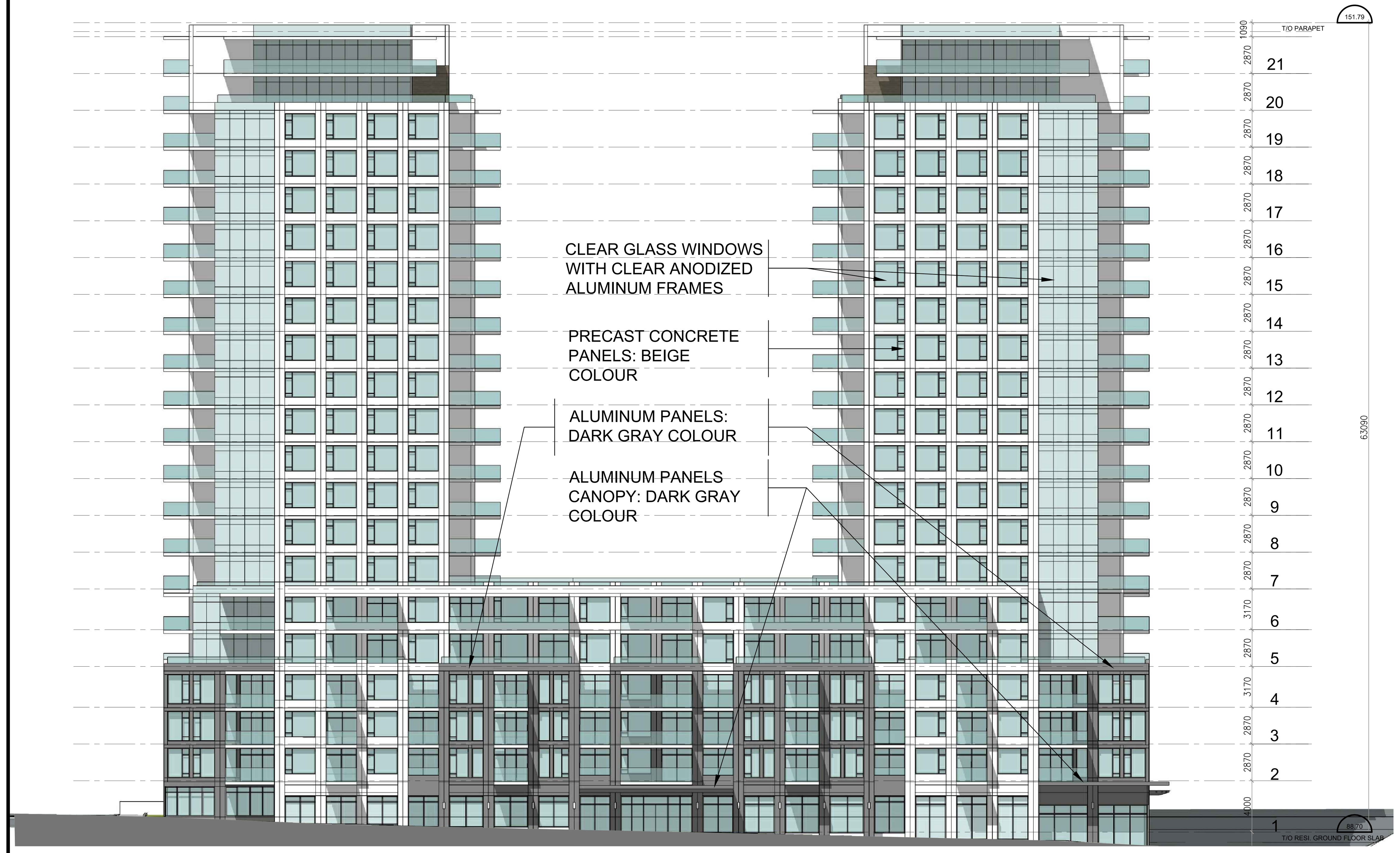
```
STAMSON 5.0        NORMAL REPORT        Date: 07-10-2021 37:15:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: p1.te                Time Period: Day/Night 16/8 hours
Description: Shared Amenity Area #1 - P1


RT/Custom data, segment # 1: O-Train NB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: O-Train NB (day/night)
--------------------------------------------
Angle1   Angle2           : -45.00 deg   55.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  57.50 / 57.50  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -45.00 deg   Angle2 : 55.00 deg
Barrier height            :  13.00 m
Barrier receiver distance :  14.50 / 14.50  m
Source elevation          :  90.50 m
Receiver elevation        : 100.50 m
Barrier elevation         :  87.50 m
Reference angle           :   0.00

RT/Custom data, segment # 2: O-Train SB (day/night)
---------------------------------------------------
1 - 4-car SRT:
Traffic volume    :   192/24    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: O-Train SB (day/night)
--------------------------------------------
Angle1   Angle2           : -45.00 deg   55.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  69.50 / 69.50  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -45.00 deg   Angle2 : 55.00 deg
Barrier height            :  13.00 m
Barrier receiver distance :  14.50 / 14.50  m
Source elevation          :  90.50 m
Receiver elevation        : 100.50 m
Barrier elevation         :  87.50 m
Reference angle           :   0.00

RT/Custom data, segment # 3: BRT (day/night)
--------------------------------------------
1 - Bus:
Traffic volume    :   712/156   veh/TimePeriod
Speed             :    80 km/h

Data for Segment # 3: BRT (day/night)
-------------------------------------
Angle1   Angle2           : -45.00 deg   55.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
```

```
Surface                     :      1       (Absorptive ground surface)
Receiver source distance  :  33.50 / 33.50  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -45.00 deg   Angle2 : 55.00 deg
Barrier height            :  13.00 m
Barrier receiver distance :  14.50 / 14.50  m
Source elevation          :  90.50 m
Receiver elevation        : 100.50 m
Barrier elevation         :  87.50 m
Reference angle           :   0.00

FF
Results segment # 1: O-Train NB (day)
-------------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        1.50 !       11.73 !        99.23

RT/Custom (0.00 + 42.93 + 0.00) = 42.93 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -45     55   0.00  58.95  -5.84  -2.55   0.00   0.00  -7.63  42.93
----------------------------------------------------------------------

Segment Leq : 42.93 dBA

FF
Results segment # 2: O-Train SB (day)
-------------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        1.50 !       12.21 !        99.71

RT/Custom (0.00 + 43.61 + 0.00) = 43.61 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -45     55   0.00  58.95  -6.66  -2.55   0.00   0.00  -6.12  43.61
----------------------------------------------------------------------

Segment Leq : 43.61 dBA

FF
Results segment # 3: BRT (day)
------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        1.50 !        9.74 !        97.24
```

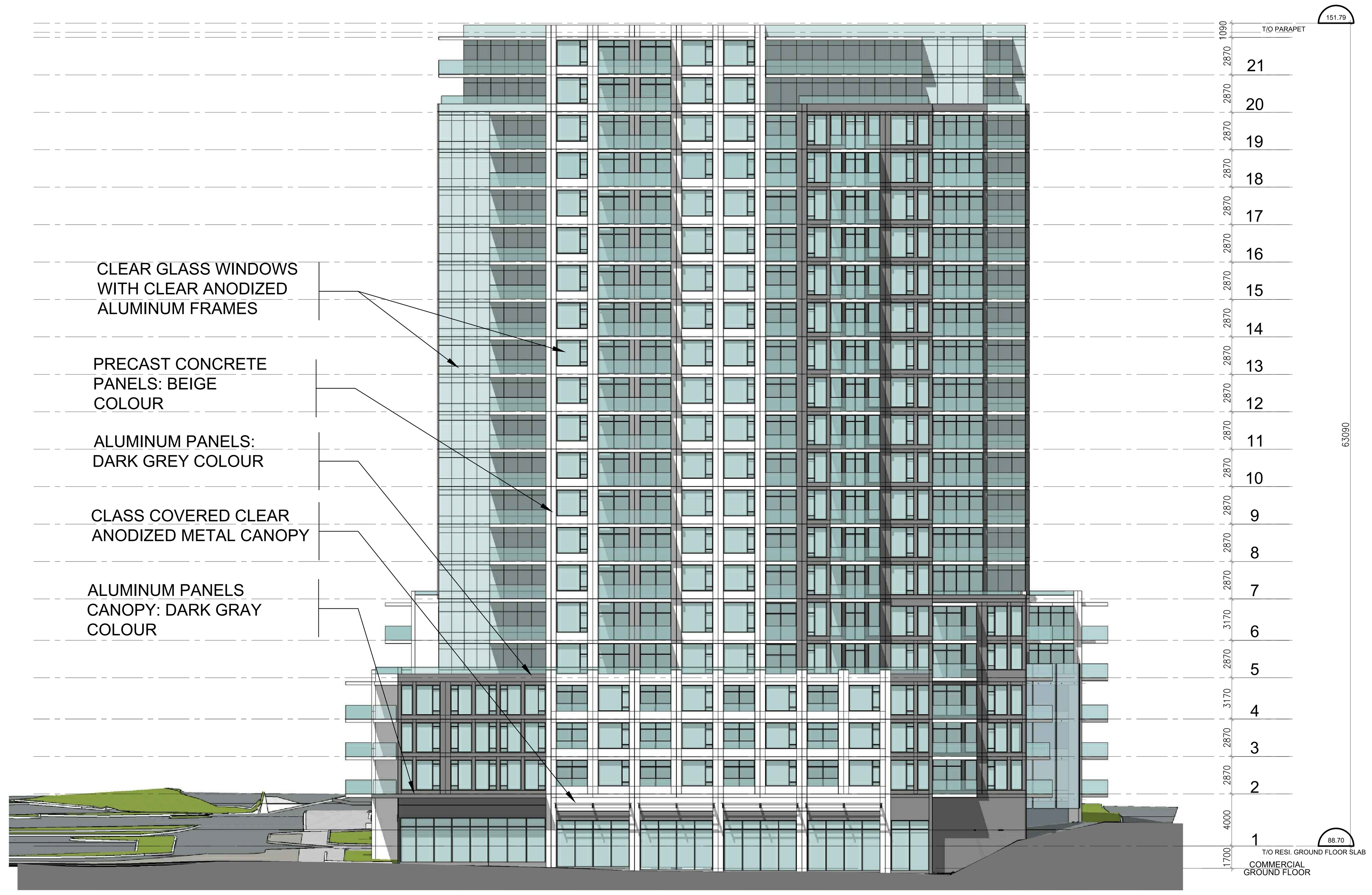
```
RT/Custom (0.00 + 44.59 + 0.00) = 44.59 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -45     55   0.00  65.13  -3.49  -2.55   0.00   0.00 -14.50  44.59
----------------------------------------------------------------------

Segment Leq : 44.59 dBA

Total Leq All Segments: 48.54 dBA

FF
Results segment # 1: O-Train NB (night)
---------------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        1.50 !       11.73 !        99.23

RT/Custom (0.00 + 36.91 + 0.00) = 36.91 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -45     55   0.00  52.93  -5.84  -2.55   0.00   0.00  -7.63  36.91
----------------------------------------------------------------------

Segment Leq : 36.91 dBA

FF
Results segment # 2: O-Train SB (night)
---------------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        1.50 !       12.21 !        99.71

RT/Custom (0.00 + 37.59 + 0.00) = 37.59 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -45     55   0.00  52.93  -6.66  -2.55   0.00   0.00  -6.12  37.59
----------------------------------------------------------------------

Segment Leq : 37.59 dBA

FF
Results segment # 3: BRT (night)
--------------------------------

Source height = 0.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       0.50 !        1.50 !        9.74 !        97.24
```

```
RT/Custom (0.00 + 41.01 + 0.00) = 41.01 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -45     55   0.00  61.55  -3.49  -2.55   0.00   0.00 -14.50  41.01
----------------------------------------------------------------------

Segment Leq : 41.01 dBA

Total Leq All Segments: 43.67 dBA

FF



TOTAL Leq FROM ALL SOURCES (DAY): 48.54
                         (NIGHT): 43.67
FF
FF
```

Appendix C –
Architectural Drawings



EAST ELEVATION



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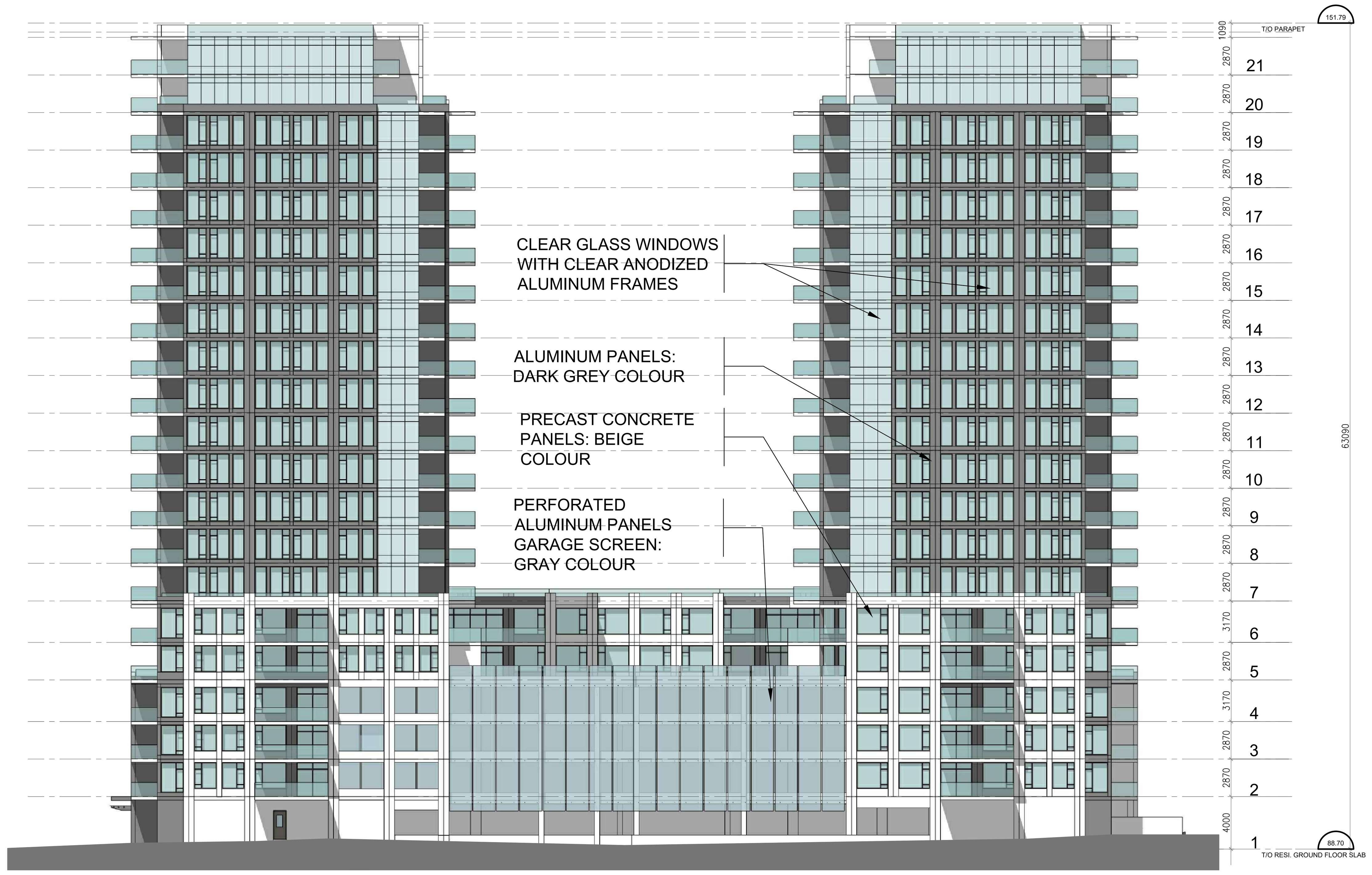


WEST ELEVATION

SOUTH ELEVATION

NOTATION SYMBOLS:

INDICATES DRAWING NOTES, LISTED ON EACH SHEET.

INDICATES ASSEMBLIE TYPE; REFER TO TYPICAL ASSEMBLIES SCHEDUAL.

INDICATES WINDOW TYPE; REFER TO WINDOW ELEVATIONS AND DETAILS ON A900 SERIES.

INDICATES DOOR TYPE; REFER TO DOOR SCHEDULE AND DETAILS ON A900 SERIES.

DETAIL NUMBER

TITLE
SCALE

DETAIL REFERENCE PAGE

DETAIL CROSS REFERENCE PAGE

No.	DESCRIPTION	DATE
6		
5		
4		
3		
2	ISSUED FOR SPC APPLICATION	2021 10 27
1	ISSUED FOR REVIEW	2021 09 23

REVISIONS:

ARCHITECT SEAL:

ONTARIO ASSOCIATION OF ARCHITECTS
RODERICK I. LAHEY
LICENCE
4375

SEAL DATE: STAMP DATE

NORTH ARROW:

SMARTCENTRES
REAL ESTATE INVESTMENT TRUST

ARCHITECT:

RODERICKLAHEY
ARCHITECT INC
56 Beech Street, Ottawa, Ontario K1S 3J6
t.613.724.9932 f.613.724.1209 www.rodericklahey.ca

PROJECT TITLE:

SOUTH KEYS SMART CENTER PHASE 1
OTTAWA ONTARIO

SHEET TITLE:

ELEVATIONS

DRAWN: T.Z.

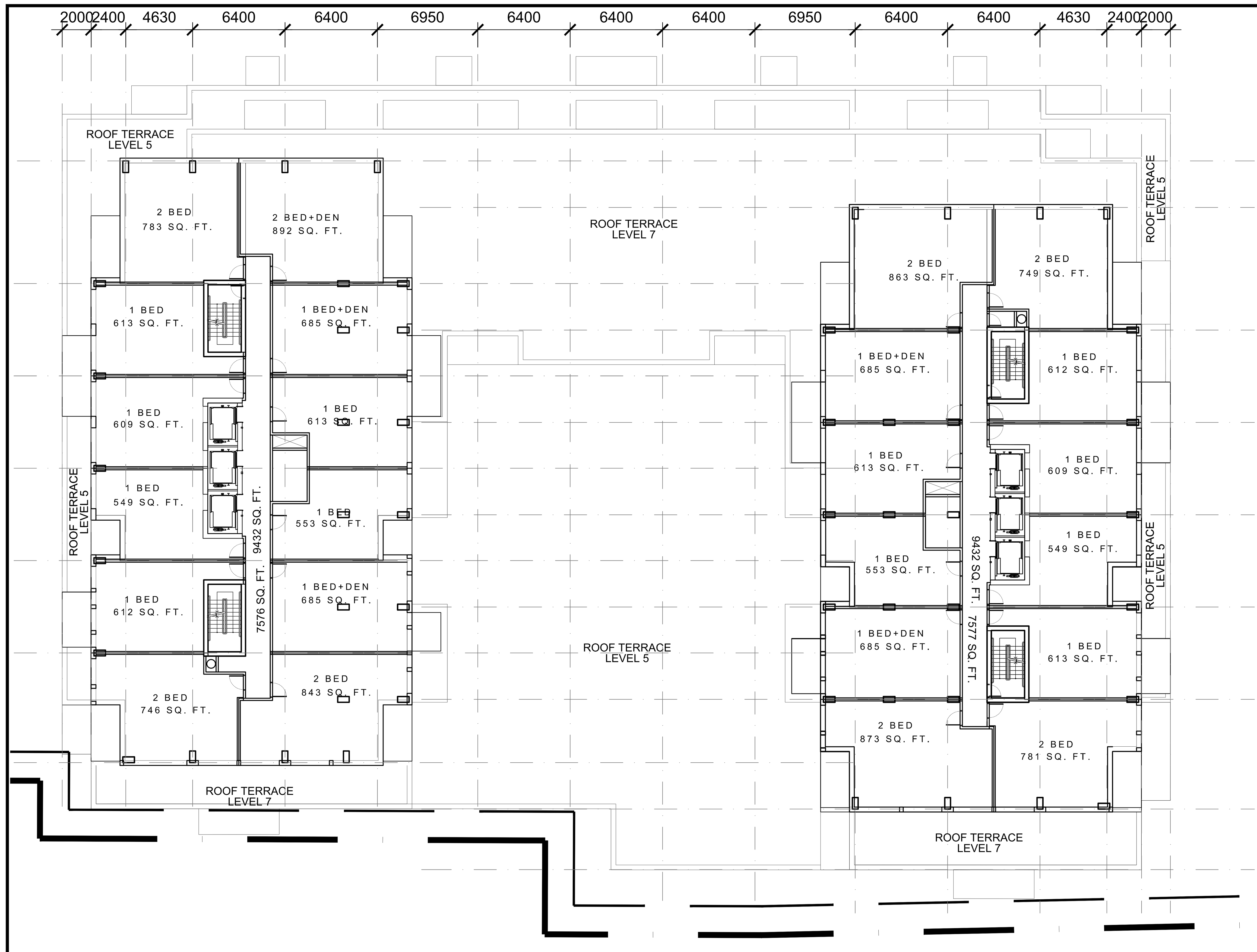
CHECKED: R.V.

SCALE: 1:20

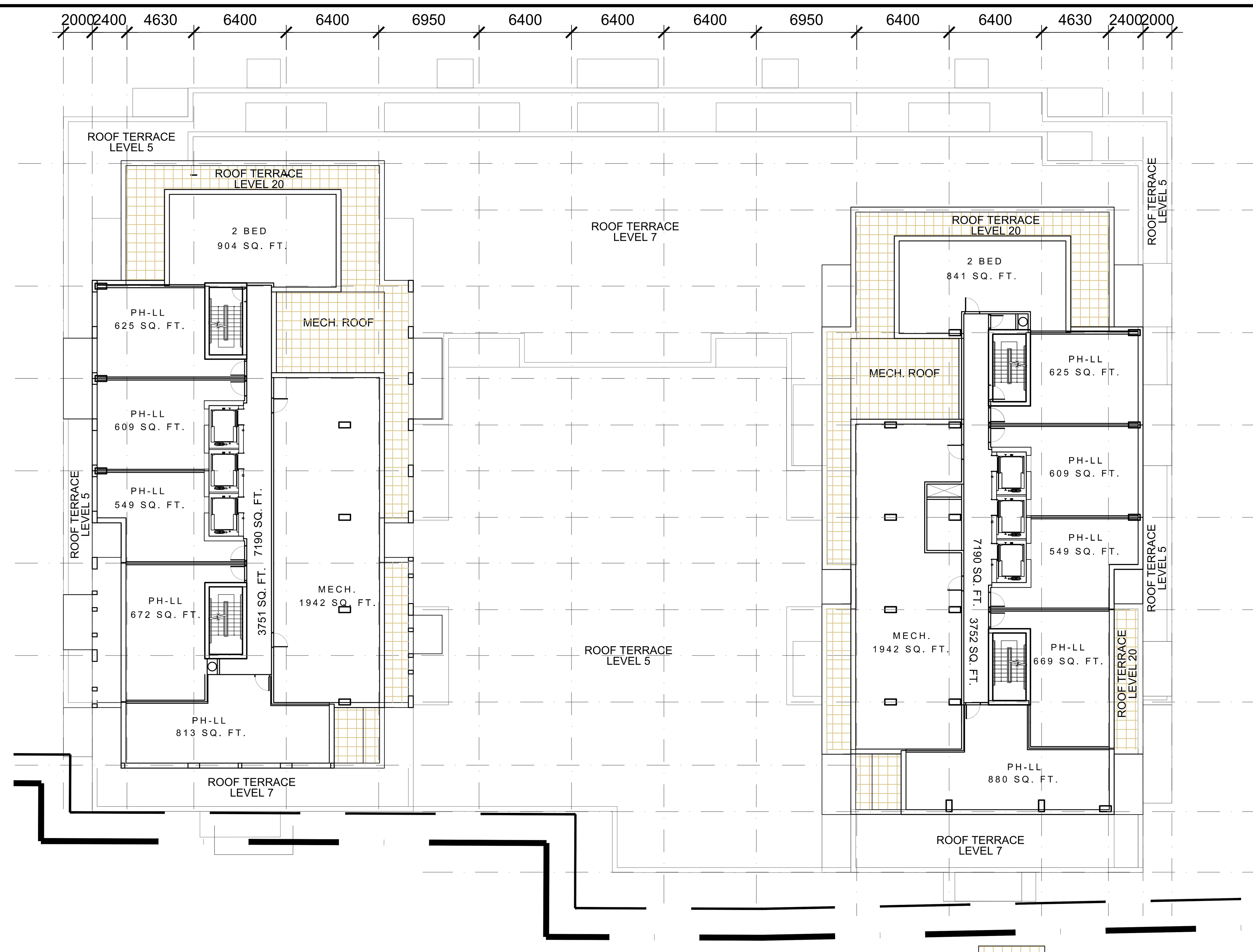
SHEET No. A-04

PROJECT No. 2030

PAPER SIZE: ISO Full Bleed B1 (1000.00 X 707.00 MM) PLOT DATE: Monday, October 25, 2021 PLOT SCALE: 1:1 PEN STYLE: 0-RLA-MASTER-100%.ctb

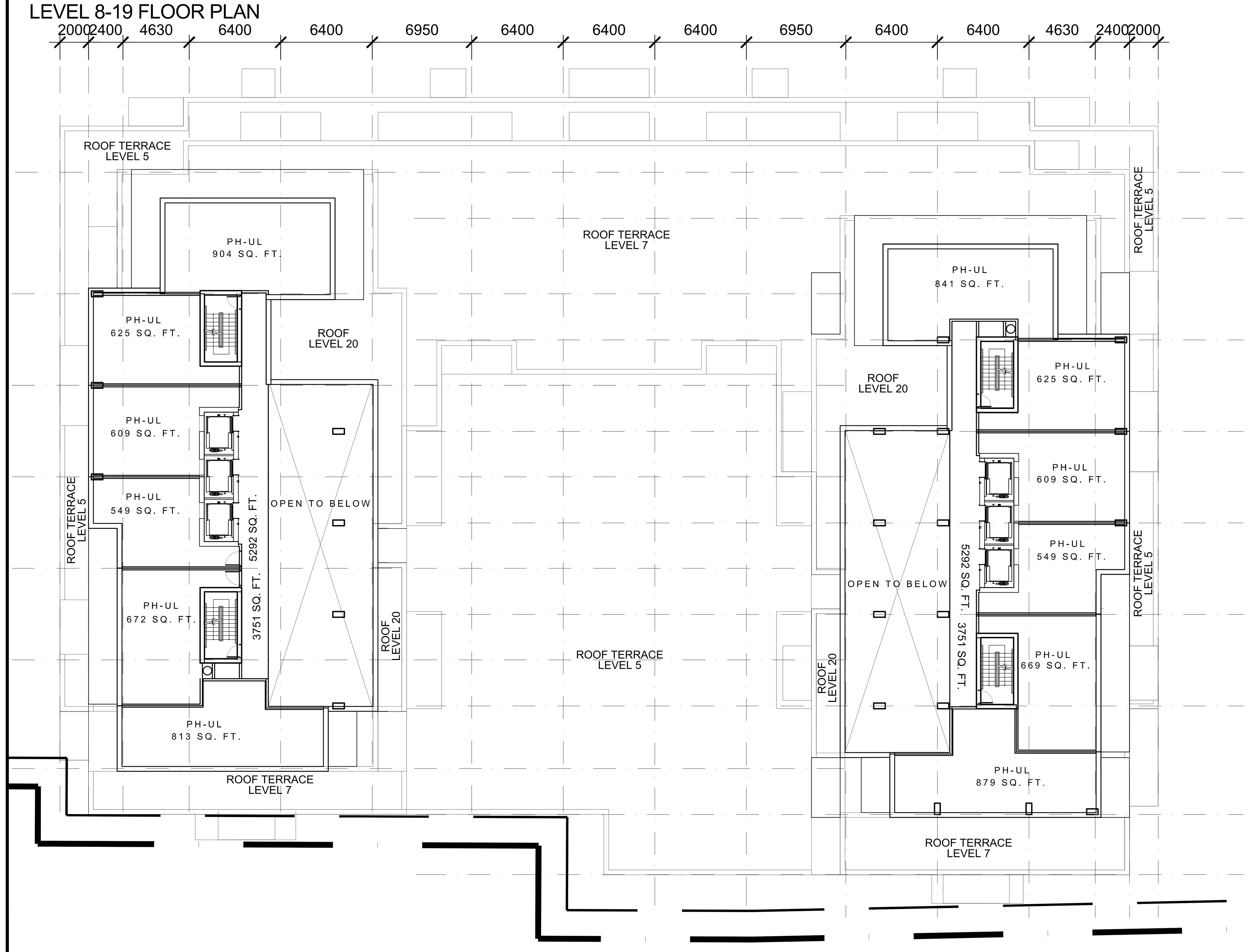


LEVEL 8-19 FLOOR PLAN

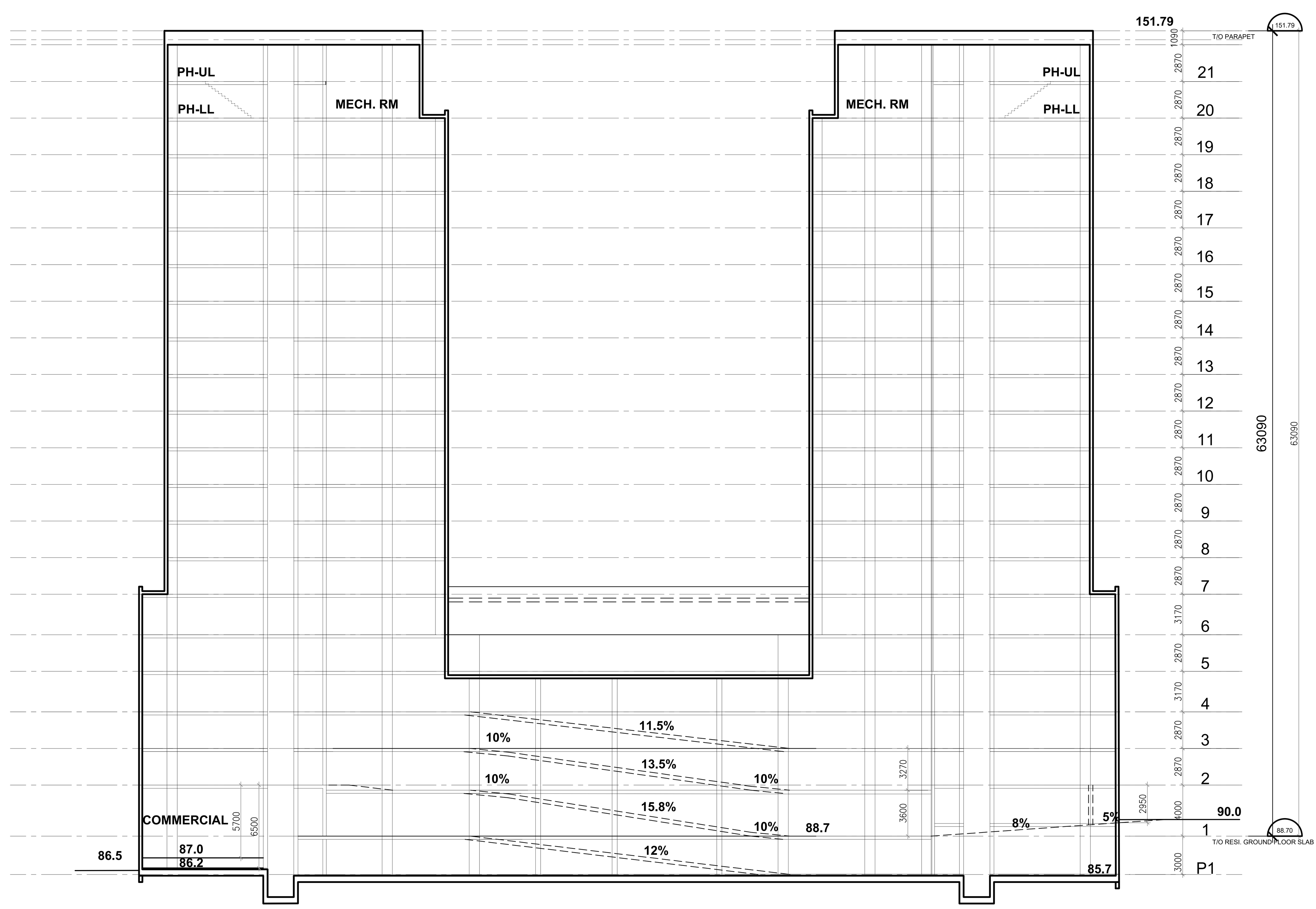


LEVEL 20 FLOOR PLAN

OUTDOOR AMENITY SPACE (TERRACE)



LEVEL 21 FLOOR PLAN



BUILDING SECTION SCALE: 1:250

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT.

ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS.

THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION UNTIL SIGNED BY THE ARCHITECT.

DO NOT SCALE DRAWINGS.

NOTATION SYMBOLS:

INDICATES DRAWING NOTES, LISTED ON EACH SHEET.

INDICATES ASSEMBLIE TYPE; REFER TO TYPICAL ASSEMBLIES SCHEDUAL.

INDICATES WINDOW TYPE; REFER TO WINDOW ELEVATIONS AND DETAILS ON A900 SERIES.

INDICATES DOOR TYPE; REFER TO DOOR SCHEDULE AND DETAILS ON A900 SERIES.

DETAIL NUMBER

TITLE SCALE

DETAIL REFERENCE PAGE

DETAIL CROSS REFERENCE PAGE

No.	DESCRIPTION	DATE
6		
5		
4		
3		
2	ISSUED FOR SPC APPLICATION	2021 10 27
1	ISSUED FOR REVIEW	2021 09 23

REVISIONS:

ARCHITECT SEAL: ONTARIO ASSOCIATION OF ARCHITECTS RODERICK LAHEY LICENCE 4375

SEAL DATE: STAMP DATE

NORTH ARROW:

SMARTCENTRES REAL ESTATE INVESTMENT TRUST

ARCHITECT:

RODERICKLAHEY ARCHITECT INC

56 Beech Street, Ottawa, Ontario K1S 3J6
t.613.724.9932 f.613.724.1209 www.rodericklahey.ca

PROJECT TITLE:

SOUTH KEYS SMART CENTER PHASE 1

OTTAWA ONTARIO

SHEET TITLE:

FLOOR PLANS & BUILDING SECTION

DRAWN: T.Z.	CHECKED: R.V.
SCALE: 1:200	SHEET No. A-03
PROJECT No. 2030	

PAPER SIZE: ISO Full Bleed B1 (1000.00 X 707.00 MM) PLOT DATE: Tuesday, October 26, 2021 PLOT SCALE: 1:1 PEN STYLE: 0-RLA-MASTER-100%.ctb

Appendix D –
Sound Transmission Class (STC) Calculations

Living/Dining Room - West Façade Loft Style Unit (20th Floor - Tower 'B')

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

1.0	Free field sound level	64.98	dBA	Noise source	Rail
	Correction for reflections	3	dBA		
	Outdoor sound level	67.98	dBA	Indoor Quarters	Living
	Indoor sound level (Daytime)	40	dBA		
	Required Noise Reduction (NR)	27.98	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	27.98 dB

	Component:	Wall	STC	50 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	81.8 m^2 — 9.290954 % of floor area		
	Component Area	7.6 m^2		
	Room absorption category	Intermediate	C_3 from Table 7.9	-5 dB
			Correction	5 dB
5.0	Noise reduction if only this component transmits sound			48 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			20 dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy			5 %

	Component:	Window	After step 2	27.98 dB
9.0	Transmits	95 % of total sound energy	C_2 from Table 7.8	0 dB
10.0	Room floor area	81.8 m^2 — 29.9511 % of floor area		
	Component Area	24.5 m^2		
	Room absorption category	Intermediate	C_3 from Table 7.9	-5 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	30

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

Master Bedroom - West Façade Loft Style Unit (Tower 'B' - 21st Storey)

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

1.0	Free field sound level		61.1	dBA	Noise source: Rail
	Correction for reflections		3	dBA	
	Outdoor sound level		64.1	dBA	Indoor Quarters: Sleeping
	Indoor sound level	(Night time)	35	dBA	
	Required Noise Reduction (NR)		29.1	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: 29.1 dB

	Component:	Wall	STC	50 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	81.8 m^2 (9.290954 % of floor area)		
	Component Area	7.6 m^2		
	Room absorption category	Intermediate	C_3 from Table 7.9	-5 dB
			Correction	5 dB
5.0	Noise reduction if only this component transmits sound			48 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			19 dB
8.0	Determine from Table 7.8 the corresponding value of total transmitted sound energy			5 %

	Component:	Window	After step 2	29.1 dB
9.0	Transmits	95 % of total sound energy	C_2 from Table 7.8	0 dB
10.0	Room floor area	81.8 m^2 (29.9511 % of floor area)		
	Component Area	24.5 m^2		
	Room absorption category	Intermediate	C_3 from Table 7.9	-5 dB
11.0	Noise spectrum type	D - Mixed Road Traffic, Distant Aircraft		
	Component category	d. Sealed thick window, or exterior wall, or roof/ceili	C_4 from Table 7.10	7 dB
		$STC=NR+C_1+C_2+C_3+C_4$	Required STC	31

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