Noise Impact Study

145 Loretta Avenue & 951 Gladstone Avenue, Ottawa

TIP Gladstone GP Inc.

12 January 2023

→ **The Power of Commitment**

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Executive Summary

GHD Limited (GHD) was retained by TIP Gladstone GP Inc. (Applicant) to prepare a Noise Impact Study for the proposed mixed-use residential development (Development) located at 145 Loretta Avenue North and 951 Gladstone Avenue in Ottawa, Ontario (Site). This Study has been prepared in support of the planning approvals for the Development, and includes the following revisions compared to the previous version dated February 9, 2022:

– Addition of figures showing distances and angles from transportation noise sources (included in Appendix E)
– Updated wording to reflect formal Class 4 area designation which has been granted for the Site by the City

The Development consists of three new residential towers (30, 33, and 35 storeys) above a common retail and office podium with two levels of below-grade parking, and the restoration and modernization of an existing heritage building, being the 3-storey Standard Bread building constructed in 1924.

The purpose of this Study is to assess the following potential impacts:

– Noise impacts at the Development due to future road traffic
– Noise impacts at the Development due to future rail traffic
– Stationary noise impacts from off-site industrial/commercial facilities

Ambient noise levels at the Development from road and rail traffic are significant and require noise mitigation in the form of upgraded building façade components, acoustic barriers, installation of air conditioning, and warning clauses.

Stationary noise from the adjacent CBN facility to the Development is a known issue, and TIP is working with CBN to establish an appropriate mitigation plan. A Class 4 designation is recommended as it would significantly facilitate the compatibility of the CBN operations with the Development.

Noise emissions from the Ottawa Traffic Operations facility to the south were also assessment, and based on assumptions provided by Ottawa Traffic Operations staff the noise emissions from this facility are within the applicable sound level limits.

This Study concludes that the Development is feasible provided that the recommendations of this study are followed.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.2 and the assumptions and qualifications contained throughout the Report.

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1. Introduction

1.1 Purpose of this Report

GHD Limited (GHD) was retained by TIP Gladstone GP Inc. (TIP) to prepare a Noise Impact Study (Study) for the proposed high rise residential Development located at 145 Loretta Ave N and 951 Gladstone Ave, Ottawa, Ontario (Development). This Study has been prepared in support of the planning applications for the Development, and includes the following key assessments:

– Noise impacts at the Development due to future road traffic
– Noise impacts at the Development due to future rail traffic
– Stationary noise impacts from off-site industrial/commercial facilities

Rail vibration was assessed previously by J.E. Coulter Associates Limited with results summarized in a report dated August 8, 2019 and determined to be insignificant. Therefore, rail vibration has not been assessed as part of this Study.

1.2 Scope and Limitations

This report: has been prepared by GHD for TIP and may only be used and relied on by TIP for the purpose agreed between GHD and TIP as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than TIP arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

2. Site and Development Design

The Site is bounded by Loretta Avenue North on the west side, the O-Train Trillium Line to the northeast, and Gladstone Avenue to the south. Figure 2.1 below identifies the location of the Site.

Figure 2.1 Site Location

Existing noise sources surrounding the Site are summarized as follows:

– **Road Traffic**: Highway 417 is located approximately 170 metres (m) south of the Site, and Gladstone Avenue is located immediately south of the Site.
– **Rail Traffic**: The O-Train Trillium Line is located approximately 25 m northeast of the Site.
– **Stationary**: A Canada Bank Note (CBN) facility is located approximately 20 m west of the Site, and an Ottawa Traffic Operations facility is located approximately 20 m south of the Site.

The Site is currently zoned as General Industrial (IG1). The lands surrounding the Site include properties zoned as General Industrial (IG1) to the west and south, and Mixed-Use Centre Zone (*_MC F [1.5]) to the east. A zoning map is included in Figure A.1 of Appendix A.

The area surrounding the Site includes some significant terrain elevation changes, including a deep cut to the O-Train Trillium Line, and there are some intervening structures that obstruct the line-of-sight to the roadways and rail line, particularly at the lower floors.

The Development consists of three new high-rise residential towers, with mixed uses at the lower levels. Towers 1 and 2 are 35 and 33 storeys tall, respectively, and sit atop a 5-storey retail and office podium. Tower 3 is 30 storeys tall, and includes live/work units and amenity spaces on the Ground floor. The exterior of the 3-storey Standard Bread building constructed in 1924 is to be maintained, with the interior to be renovated and used as workspace for artists. There are common outdoor amenity spaces located on the roof of the podium at the base of Towers 1 and 2. There are also pathways/courtyards at grade, which are proposed as privately-owned public spaces and are intended to be used for the purpose of public access to the mixed-use path to the east of the Development.

3. D-6 Screening Assessment

The MECP Guideline D-6 "Compatibility Between Industrial Facilities and Sensitive Land Uses" (Guideline D-6) provides recommended minimum separation distances (RMSD) and potential areas of influence (AOI) based on the class of the industrial facility. RMSDs are provided based on the industry size and operation type. The guideline provides direction for land use planning to maximize compatibility of industrial uses with adjacent land uses. The goal of Guideline D-6 is to minimize encroachment of sensitive land uses on industrial facilities and vice versa, in order to address potential incompatibility due to adverse effects such as noise, odour, and dust.

Guideline D-6 separates industry into three broad categories, depending on the nature of their operations and the types of potential impacts:

– **Class I industries** are small scale, self-contained plants or buildings, which produce and store products internally, and have low probability of fugitive emissions. They have daytime operations only, with infrequent movements of products and/or heavy trucks. Some examples include furniture repair and refinishing, electronics manufacturing, auto parts supply, distribution of dairy products, and beverages bottling.
– **Class II industries** perform medium scale processing, with occasional outputs of point source or fugitive emissions. Activities may include some outdoor storage of wastes and materials, frequent movement of products and/or heavy trucks during the daytime, and shift work. Some examples include paint spray booths, feed packing plant, dairy product manufacturing, and dry-cleaning services.
– **Class III industries** conduct large-scale manufacturing and are characterized by persistent and/or intense dust and/or odour, frequent outputs of major annoyances, and have a high probability of fugitive emissions. Activities may include continuous operations and movements of products, outside storage of raw and finished goods, and high levels of production. Some examples include manufacturing of paint and varnish, manufacturing of resins and coatings, solvent recovery plants, organic chemicals manufacturing, breweries, and metal manufacturing.

The following table summarizes the recommended minimum setback distances and areas of potential influence which represents the distance within which adverse effects could potentially occur.

Table 3.1 Guideline D-6 Industry Separation Distances

Industry Classification	RMSD (metres)	AOI (metres)
Class I	20	70
Class II	70	300
Class III	300	1,000

Guideline D-6 provides criteria for classifying industrial land uses, based on their outputs, scale of operations, processes, schedule, and intensity of operations. Often an industry will fall between two Classes. Guideline D-6 states that no incompatible development should occur within the recommended minimum separation distance as noted in Table 3.1. In cases where the recommended minimum separation distances are not met, further detailed assessment is warranted to ensure compatibility as stated in guideline D-6.

3.1 Classification of Industries

GHD has evaluated the size and operations of the commercial/industrial facilities in the general vicinity of the Site to apply the appropriate classification per Guideline D-6. GHD's evaluation and classification of these facilities is summarized as follows.

3.1.1 Canada Bank Note

Canada Bank Note (CBN) operates a manufacturing facility located approximately 20 metres west of the Site at 975 Gladstone Avenue. The CBN facility currently operates under MECP Environmental Compliance Approval (ECA) number 3835-A7QLZW, and is obligated to comply with the sound level limits of NPC-300.

Based on aerial imagery, the CBN facility includes heating, ventilating, and air conditioning (HVAC) units, cooling towers, etc. on its roof. There is a loading dock located on the east side of the facility.

It is assumed that the CBN facility may operate 24 hours per day, 7 days per week.

Under Guideline D-6, CBN's current operations could be conservatively described as Class III based on the applicability of the following criteria:

– Noise frequently audible off property
– Daily shift operations permitted

Class III industries have an RMDS of 300 metres and an AOI of 1000 metres under the D-6 compatibility guidelines. The CBN facility is within the 300-metre RMSD of the Site, and therefore warrants detailed noise impact assessment per Guideline D-6.

3.1.2 Ottawa Traffic Operations

There is an Ottawa Traffic Operations facility located approximately 20 metres south of the Site at 175 Loretta Avenue North. The facility currently operates under MECP Environmental Compliance Approval (ECA) number 3038-8SLKC7, and is obligated to comply with the sound level limits of NPC-205.

Based on correspondence with facility management, it is understood that the facility operates year round Monday to Friday from 7:00 am to 4:00 pm, with seasonal nighttime operations Monday to Thursday from 8:30 pm to 6:00 am.

The facility includes small rooftop HVAC units and exhausts, with outdoor yard for storage of utility vehicles and materials.

Under Guideline D-6, the assumed operations of the facility would be best described as Class II based on the applicability of the following criteria:

– Noise occasionally audible off property
– Shift operations permitted

Class II industries have an RMDS of 70 metres and an AOI of 300 metres under the D-6 compatibility guidelines. The Ottawa Traffic Operations facility is within the 70-metre RMSD of the Site, and therefore warrants detailed noise impact assessment per Guideline D-6.

3.1.3 Guideline D-6 Assessment Conclusions

3.1.3.1 Existing Industries

Based on the industry classifications noted above and their setbacks relative to the sensitive uses of the Development (see Figure 3.1), GHD has identified the following industries that have potential areas of influence and/or recommended minimum setback distances within which the Development is located:

– Canada Bank Note (975 Gladstone Ave)
– Ottawa Traffic Operations (175 Loretta Ave N)

Section 4.10.3 of the D-6 Guideline allows the proponent to provide a justifying impact assessment to support an application for a change in land use where the minimum distances are not met. Detailed stationary noise impact assessments are included in Section 5 to satisfy this requirement.

3.1.3.2 Potential Future Industries

The lands surrounding the Development do not include vacant lands that are zoned to permit significant industrial uses. There are vacant lands to the east, which are zoned Mixed-Use Centre Zone (MCF[1.5]). GHD has reviewed the conceptual site plan for a proposed development on these lands, which indicates that the development consists of primarily residential uses, which are generally compatible with the 145 Loretta Ave N & 951 Gladstone Ave Development provided appropriate noise controls are incorporated into the design of both developments.

4. Sound Level Criteria

4.1 City of Ottawa Environmental Noise Control Guidelines

The City of Ottawa Environmental Noise Control Guidelines (ENCG) include sound level criteria for transportation and stationary noise sources, which are adopted from the Ontario Ministry of the Environment, Conservation and Parks (MECP) guideline NPC-300.

The ENCG also contains requirements for information to be submitted with noise studies for proposed developments, as well as the City's preferred noise warning clauses. Due to the proximity of the Development to significant industrial uses, it is expected that a Phase 2 Noise Control Detailed Study will be required prior to final approval of the Development. This Study is based on the best information available at the time of writing; however, further information is required to satisfy all of the information requirements of a Phase 2 Noise Control Detailed Study, which is not currently available.

4.2 Road and Rail Traffic Criteria

Under NPC-300, road and rail traffic noise impacts are evaluated separately for exterior receptors and interior receptors based on the average day (07:00 to 23:00) and night (23:00 to 07:00) noise impacts. The sound levels are expressed in terms of A-weighted equivalent sound levels (Leq).

NPC-300 defines two categories of receivers for transportation noise:

– Plane of Window (POW): Point corresponding with the centre of a window of a sensitive space.
– Outdoor Living Area (OLA): Outdoor location intended and designed for quiet enjoyment of the outdoor environment that is readily accessible from the building (e.g., backyards, front yards, gardens, terraces, patios). Private balconies and terraces are only considered OLAs if they are greater than 4 metres in depth and if they are the only outdoor living area for the occupant(s).

NPC-300 specifies sound level limits for POW and OLA receivers as summarized in Table 4.1 below:

Table 4.1 Road and Rail Traffic – Outdoor Sound Level Limits

Receiver Category	Sound Level Limit (dBA)	
	Day (16-hour Leq)	Night (8-hour Leq)
Plane-of-Window (POW)	55	50
Outdoor Living Area (OLA)	55	N/A

For POWs, combined road and rail traffic sound levels exceeding the corresponding criteria above would require additional controls for MECP compliance. Depending on the magnitude of the exceedances, additional controls may include ventilation requirements, requirements for building envelope elements, and/or noise warning clauses.

For OLAs, road traffic sound levels exceeding the daytime limit indicated above would require design of noise barriers to achieve the target, and/or warning clauses. As per the ENCG, the City of Ottawa may, at their discretion, consider minor exceedances (up to 5 dBA) of the sound level criteria in OLAs, provided that it is demonstrated that it is not technically or economically feasible to achieve the criteria.

If POW sound levels from future road traffic exceed 65 dBA during the day or 60 dBA at night, or if sound levels from future rail traffic exceed 60 dBA during the day or 55 dBA at night, building envelope components must be designed to

achieve the indoor sound level limits of NPC-300. The indoor sound level limits for road and rail traffic are summarized in Table 4.2 below.

Table 4.2 Road and Rail Traffic – Indoor Sound Level Limits

Receiver Category	Road Sound Level Limits (dBA)		Rail Sound Level Limits (dBA)	
	Day (16-hour Leq)	Night (8-hour Leq)	Day (16-hour Leq)	Night (8-hour Leq)
Indoor living areas (excluding sleeping quarters)	45	45	40	40
Sleeping quarters	45	40	40	35

4.3 Stationary Noise Limits

4.3.1 MECP Standard Limits

NPC-300 defines stationary noise sources as sound from all sources that are normally operated within the property lines of a facility. The noise impact from stationary sources is evaluated based on operations during a predictable worst-case hour. Stationary noise assessment criteria are generally determined based on the MECP's minimum exclusionary sound level limits, as presented in NPC-300, in comparison to the background sound levels experienced in the area.

The Site is in what would generally be considered a Class 1 acoustic environment as defined by NPC-300, as the acoustic environment is dominated by human activities (i.e., road traffic). However, the City of Ottawa has granted a Class 4 area designation to the Site, applicable only to noise emissions from the Canada Bank Note facility located at 975 Gladstone Avenue. This is reflected in the City of Ottawa Noise By-Law No. 2017-055 section 24B “Exemption – 951 Gladstone and 145 Loretta Avenue North”. Nevertheless, other stationary sources are still required to comply with Class 1 sound level limits at the Development.

Table 4.3 below summarizes the MECP's minimum exclusionary sound level limits for Class 1 and Class 4 areas, which are expressed in terms of 1-hour equivalent sound levels (1-hour Leq):

Table 4.3 MECP Minimum Exclusionary Sound Level Limits for Steady Sound – Class 1 and 4 Areas

Point of Reception Type	Class 1 Sound Level Limits (dBA)		Class 4 Sound Level Limits (dBA)	
	Day (7am – 11pm)	Night (11pm – 7am)	Day (7am – 11pm)	Night (11pm – 7am)
Plane of window	50	45	60	55
Outdoor space	50	--	55	--

As seen above, the Class 4 sound level limits are 10 dBA higher at plane of window PORs and 5 dBA higher at outdoor PORs compared to Class 1 noise limits.

4.3.2 Background Sound Levels

GHD conducted a background sound level assessment to evaluate the existing background noise due to road traffic on Highway 417. Background noise was modelled with STAMSON, the MECP's computerized model of the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT). The applicable noise criteria at a point of reception are based on the higher of the background sound level and the MECP's minimum sound level limits, as noted in Section 4.3.2.

The computer model input parameters include, among other data, the number of road segments, number of house rows, the positional relationship of the receptor to a noise source or barrier in terms of distance, elevation and angle, the basic site topography, the ground surface type, traffic volumes, traffic composition, and speed limit.

Hourly traffic counts from 2019 for Highway 417 were obtained from the Ontario Ministry of Transportation, which are included in Appendix C. These counts were used to determine the minimum hourly traffic volumes during the daytime and nighttime periods, which are summarized as follows:

Table 4.4 Background Road Traffic Parameters

Road Segment	Minimum Hourly Daytime Vehicles	Minimum Hourly Nighttime Vehicles	Commercial Vehicle Rates (medium trucks / heavy trucks)
Highway 417	3,083	500	5% / 8%

The above road traffic data was used to calculate background sound levels at the façades and outdoor points of reception of the Development using the traffic noise model methodology described in Section 5.1 of this Study. Predicted noise levels exceed the minimum Class 1 exclusionary limits at the most exposed facades of the Development. The lowest background sound levels generally occur at the lower floors of the Development and increase with height.

Where the predicted background sound level due to road traffic exceeds the corresponding minimum exclusionary sound level limit of NPC-300 (see Table 4.3), the background sound level is instead used as the criteria for assessment of stationary noise impacts. The applicable site-specific sound level limits for the Development are summarized as follows:

Table 4.5 Applicable MECP Sound Level Limits for Steady Sound

POR ID	POR Description	Sound Level Limits (dBA)	
		Day (7am – 7pm)	Night (11pm – 7am)
POR-1	Plane of window on south façade of Tower 1, 6th floor (22.3 metres above grade [m AG])	**63**	**56**
POR-2	Plane of window on east façade Tower 1, 7th floor (25.3 m AG)	**60**	**52**
POR-3	Plane of window on south façade of Tower 2, 11th floor (40.3 m AG)	**63**	**56**

As seen above, predicted background sound levels at the identified worst-case PORs are significant. It is worth noting that background sound levels at other façades with less direct exposure to noise from Highway 417 would be lower. For example, background sound levels at the lowest floors at the west façade of Tower 3 are estimated to be below the Class 1 exclusionary sound level limits due to significantly reduced exposure to noise from Highway 417.

4.3.3 Emergency Equipment

Emergency operation of emergency equipment such as standby power generators is exempt from stationary assessment per NPC-300. However, regular scheduled testing of emergency equipment is considered a stationary source, evaluated separately from other sources, with sound level limits that are 5 dBA higher than the sound level limits otherwise applicable to stationary sources.

5. Transportation Noise Impact Assessment

5.1 Methodology

Future (2032) road and rail traffic sound levels at the Development were predicted using STAMSON v5.04, a computerized model which implements the MECP's ORNAMENT and STEAM algorithms. The computer model input parameters include, among other data, the number of road segments, number of house rows, the positional

relationship of the receptor to a noise source or barrier in terms of distance, elevation and angle, the basic site topography, the ground surface type, traffic volumes, traffic composition, and speed limit.

5.2 Traffic Input Parameters

5.2.1 Road Traffic Data

Future road traffic model parameters used in this Study is summarized as follows:

Table 5.1 Future (2032) Road Traffic Input Parameters

Road Segment	Future AADT	Speed Limit (km/h)	Day / Night Split	Commercial Vehicle Rates (medium trucks / heavy trucks)
Highway 417	241,617	100	92% / 8%	7% / 5%
Gladstone Avenue	15,000	40	92% / 8%	7% / 5%
Somerset Street West	15,000	50	92% / 8%	7% / 5%

Road traffic volumes for Highway 417 were obtained from data published by the Ontario Ministry of Transportation (MTO) in the form of Annual Average Daily Traffic (AADT) volumes from 1988 to 2016. The average AADT growth rate from 1988 to 2016 was 1.71% (compounded annually), which was used to estimate the future 2032 AADT. The estimated future AADT exceeds the default value recommended by the ENCG, and was therefore used to be conservative. The day / night split and commercial vehicle rates were assumed based on guidance from the ENCG.

Road traffic parameters for Gladstone Avenue and Somerset Street West were assumed based on guidance from the ENCG.

Figure 2.2 shows the location of the roadways noted above in relation to the Site. All road traffic data referenced in this Study is included in Appendix C.

5.2.2 Rail Traffic Data

Future rail traffic model parameters used in this Study is summarized as follows:

Table 5.2 Future (2032) Rail Traffic Input Parameters

Rail Source	Future Daytime Trains	Future Nighttime Trains	Locomotive Type	Locomotives per Train	Cars per Train	Speed (km/h)
O-Train Trillium Line	205	38	Diesel	1	3	35

The O-Train Trillium Line (Line 2) is served by high-efficiency diesel multiple unit (DMU) trains. The current fleet includes trains of two to four cars. Based on the train schedule published on the OC Transpo website, the current train schedule would result in approximately 160 train pass-bys during the day and 30 pass-bys at night. To estimate the future train traffic on the Trillium Line, GHD assumed a growth rate of 2.5% per year. Based on communications with OC Transpo staff, it was confirmed that the average speed of trains on the Trillium Line is 35 km/h.

GHD notes that the Corso Italia station is currently under construction immediately east of the Development, and is planned to open in 2023. As such, future trains would be expected to travel slower than assumed in this Study as they would typically stop at this station.

Figure 2.2 shows the location of the rail line noted above in relation to the Site. A copy of the O-Train Trillium Line schedule is included in Appendix C.

5.3 Results

5.3.1 Plane of Window Receivers

Predicted future road and rail traffic noise impacts at the worst-case POW receivers of the Development are summarized as follows:

Table 5.3 Future Road and Rail Noise Levels – Plane of Window

Building	Façade	Future Noise Levels (dBA)						Outdoor Criteria Exceeded?
		Road		Rail		Cumulative Road and Rail		
		Day	Night	Day	Night	Day	Night	
Sound Level Criteria		--	--	--	--	*55*	*50*	--
Tower 1 (35 Storeys)	North	52	45	62	58	62	58	Yes
	East	72	65	65	60	73	66	Yes
	South	76	68	60	56	76	69	Yes
	West	73	66	51	47	73	66	Yes
Tower 2 (33 Storeys)	North	54	46	66	62	66	62	Yes
	East	71	64	67	63	73	66	Yes
	South	73	66	63	58	74	66	Yes
	West	71	64	55	51	71	64	Yes
Tower 3 (30 Storeys)	North	55	48	66	61	66	61	Yes
	East	70	62	68	63	72	66	Yes
	South	72	65	63	58	73	66	Yes
	West	71	63	55	51	71	64	Yes

As seen above, future cumulative road and rail noise levels at the façades generally range from 62 dBA to 76 dBA during the day and 58 dBA to 69 dBA at night. These sound levels are sufficiently high that the Development must incorporate physical noise mitigation and noise warning clauses in accordance with NPC-300, which are described further in Section 5.4. POW receiver locations are shown on Figure 5.1.

5.3.2 Outdoor Living Areas

There is a common outdoor amenity space located on the roof of the podium at the base of Towers 1 and 2. All residents of the Development will have access to this amenity space, therefore private balconies and terraces are not considered OLAs per the definition in NPC-300.

There are also pathways/courtyards at grade, which are proposed as privately-owned public spaces and are intended to be used for the purpose of public access to the mixed-use path to the east of the Development. As such, these areas are not considered OLAs in this Study.

Predicted future road and rail traffic noise impacts at the worst-case OLA receivers of the Development are summarized as follows:

Table 5.4 Future Road and Rail Noise Levels – Outdoor Living Area

Receiver ID	Receiver Description	Future Daytime Noise Levels (dBA)			Limit Exceeded?
		Road	Rail	Cumulative Road and Rail	
Sound Level Criteria		--	--	*55*	--
OLA-01	Shared outdoor amenity space on podium roof (22.75 m AG), west of Tower 1	60	--	60	Yes
OLA-02	Shared outdoor amenity space on podium roof (22.75 m AG), between Towers 1 and 2	57	40	57	Yes

As seen above, the cumulative daytime road and rail noise levels at the OLAs range from 57 dBA to 60 dBA. These noise levels are sufficiently high that physical noise mitigation and/or noise warning clauses are required, which are described further in Section 5.4.3. OLA receiver locations are shown in Figure 5.1.

5.4 Transportation Noise Mitigation

5.4.1 Building Envelope Construction

Predicted future traffic noise levels are sufficiently high that the building envelope must be designed with sufficient sound insulation performance to achieve the sound level criteria of NPC-300 for indoor living spaces. Sound insulation performance for windows and walls are commonly specified in terms of Sound Transmission Class (STC) ratings. Higher STC ratings generally correspond to higher sound insulation performance.

STC rating requirements are dependent on the exterior noise levels, source type/spectrum, angles of incidence, sizes of façade components relative to the room size, and sound absorption characteristics of the subject indoor living space. Using these variables, STC rating requirements can be calculated using the methods described in the National Research Council Canada's "Controlling Sound Transmission into Buildings" (BPN 56) publication. In accordance with NPC-300, STC rating requirements are calculated separately for road, rail, and air traffic noise, and are then combined on a logarithmic energy sum basis.

Given the preliminary nature of the design of the Development, detailed floor plans and building elevations are not yet available. Therefore, minimum STC rating requirements have been calculated based on assumed window-to-floor area ratios (i.e., total window area for a room divided by its floor area) of up to 80% for living spaces at corners (i.e., with two exposed facades), and up to 40% for other living spaces. Note that if the actual window-to-floor area ratios are determined to exceed these values during detailed design, then window STC rating requirements would require an updated assessment to ensure acceptable indoor noise levels.

Based on the above assumptions, the worst-case minimum window STC rating requirement is **STC-39**. Other façades that have less direct exposure to road and rail traffic noise have lower STC rating requirements, as shown in Figure 5.2.

Examples of window assemblies capable of achieving the necessary performance are included in Table 5.5 below:

Table 5.5 Example Window Assemblies and STC Ratings

STC Requirement	Window Assembly Short Form	Window Assembly Description
STC-33	6-13AS-6	Two 6 mm thick monolithic glass panes separated by an air gap of 13 mm
STC-35	6L-13AS-6	One 6 mm thick laminated glass pane and one 6 mm monolithic glass pane separated by an air gap of 13 mm
STC-37	8L-25AS-6	One 8 mm thick laminated glass pane and one 6 mm monolithic glass pane separated by an air gap of 25 mm

STC ratings for windows are dependent on a variety of factors (e.g., frame design, quality of seals, etc.), and can vary significantly between manufacturers. Therefore, the final STC rating requirements for the windows should be included in the specifications, and window suppliers should be required to submit laboratory test data with their shop drawings to demonstrate that the STC requirements will be achieved.

In addition to the window STC rating requirements noted above, NPC-300 specifies that exterior wall assemblies should be brick veneer or masonry equivalent high-mass construction (e.g., concrete) from the foundation to the rafters due to the Site's proximity to the O-Train Trillium Line and high associated noise levels. GHD anticipates that the indoor sound level criteria can be achieved with other exterior wall assemblies with modest upgrades (e.g., glass spandrel exterior wall backed by insulated partition with two layers of 16 mm thick Type X gypsum board), which would be considered equivalent subject to further detailed assessment.

5.4.2 Ventilation

Predicted future traffic noise levels at the façades of the Development are sufficiently high that central air conditioning is required to be installed prior to occupancy for all residential dwellings. This will allow windows and doors to remain closed to help ensure that the indoor sound level limits of NPC-300 are met. A warning clause should also be used for all residential dwellings to advise them of potential audibility of transportation noise (wording included in Section 8.5).

5.4.3 Acoustic Barriers

Predicted future traffic noise levels at OLA-01 and OLA-02 are sufficiently high that acoustic barriers and/or warning clauses must be used. OLA-01 and -02 are located on the roof of the podium at the base of Towers 1 and 2. The podium is understood to include a solid parapet along its perimeter with a height of 1.1 m above the finished roof level, which has been considered in the unmitigated road and rail noise predictions presented in section 5.3.2. Predicted noise levels at these OLAs are dominated by noise from road traffic on Highway 417.

In order to mitigate noise levels throughout these amenity spaces, GHD analysed increases to the heights of the parapets. Extending the parapet up to 3.0 metres above the podium roof would reduce the cumulative road and rail traffic sound levels to 58 dBA in OLA-01 and 56 dBA in OLA-02, which are still slightly above the 55 dBA criteria. In a rooftop application, barriers taller than 3.0 metres in height present technical and economic challenges due to the significant associated structural requirements (e.g., wind and snow loading). Therefore, GHD recommends that the City utilize its discretion to permit exceedances up to 5 dBA at the rooftop OLAs. In this case, the solid parapet/barrier height of 1.1 m would be considered sufficient, and a warning clause should be used for all residential dwellings of the Development to advise occupants of the noise exceedance despite the inclusion of noise controls (see wording in section 8.5).

The parapets/acoustic barriers may vary in construction, provided they meet the following requirements:

– A minimum surface density of 20 kg/m^2 or meet compliance with requirement and certification CAN/CSA-Z107.9-00 (R2004) – Standard for Certification of Noise Barriers (Reaffirmed 2004).
– Be structurally sound and appropriately designed to withstand wind and snow loading as applicable.

– Constructed without any cracks or surface gaps at grade. If gaps are necessary for drainage purposes they should be minimized to mitigate the impact on the acoustical performance of the barrier.

6. Stationary Noise Impact Assessment

6.1 Canada Bank Note Facility

There is a known issue with respect to stationary noise emissions from the CBN facility to the Development, of which detailed assessment is outside of the scope of this Study. TIP is currently in negotiations with CBN to establish an appropriate noise mitigation plan to ensure compliance of the facility at the new sensitive receptors of the Development, and details of the noise mitigation are confidential and not yet finalized.

As mentioned above, the City of Ottawa has granted a Class 4 area designation for the Site, specifically with respect to noise emissions from the Canada Bank Note facility located at 975 Gladstone Ave.

6.2 Ottawa Traffic Operations Facility

There is an Ottawa Traffic Operations facility located to the south of the Development at 175 Loretta Avenue North. Based on the ECA for the facility, communications with facility management, and aerial imagery, GHD has modelled the worst-case hourly operations of the facility as follows:

– Heavy trucks: It is assumed that five heavy trucks could enter and exit the facility during the worst-case daytime and nighttime hours.
– Light trucks: It is assumed that 15 light trucks could enter and exit the facility during the worst-case daytime and nighttime hours.
– Forklift: It was assumed a forklift could operate outdoors continuously during the worst-case daytime hour.
– Rooftop HVAC Equipment: There appear to be three HVAC units located on the roof of the facility. These sources are each modelled with the source sound power level of a typical 15-ton HVAC unit and assumed to operate continuously during the day and on a 50% duty cycle at night (30 minutes per hour).

Source locations are shown in Figure D.1 of Appendix D, and source sound level data and operating conditions are summarized in Table D.1 of Appendix D.

6.2.1 Methodology

Detailed assessment of noise impacts from the Ottawa Traffic Operations facility has been carried out using CadnaA version 2021 MR 1 (CadnaA). CadnaA is the industry standard for noise modelling of industrial and commercial facilities, and is based on ISO standard 9613-2 "Acoustics – Attenuation of Sound during Propagation Outdoors". CadnaA modelling assumptions used in this Study include:

– Reflection Order: A maximum reflection order of 2 was used to evaluate indirect noise impact from reflecting surfaces.
– Ground Absorption: The model was set up with conservative ground absorption coefficients of 0.25 for asphalt surfaces, 0.5 for gravel, and 1.0 for absorptive areas of grass.
– Receptor Elevation: POR receptor heights were modelled appropriately based on an assumed storey height of 3 m.
– Building Surfaces: The buildings are modelled as reflective surfaces.

6.2.2 Results

Based on the assumptions stated herein, the stationary noise results from the Ottawa Traffic Operations facility at the worst-case PORs are summarized as follows:

Table 6.1 Stationary Noise Results – Ottawa Traffic Operations, Steady

POR ID	Predicted Noise Levels (dBA)		Class 1 Sound Level Limits (dBA)		Class 1 Limits Met?
	Day	Night	Day	Night	
POR-1	51	51	63	56	Yes
POR-2	51	51	60	52	Yes
POR-3	46	46	63	55	Yes

As seen above, predicted noise levels from the Ottawa Traffic Operations facility are within the applicable Class 1 sound level limits at the worst-case PORs of the Development. Provided the assumptions described herein are appropriate, noise mitigation will not be required to ensure compliance for the facility. A noise contour plot of noise emissions from this facility is included in Figure 6.1.

7. Noise Impacts from the Development

7.1.1 Outdoor Noise Impacts

Base building cooling and ventilation systems for the Development have the potential to result in outdoor noise impacts at noise sensitive spaces within the Development itself and at existing residential uses surrounding the Site. The specific equipment selections are not available at the time of writing; therefore, it is anticipated that noise emissions from rooftop equipment will be evaluated as part of the detailed design of the Development. GHD recommends that the Developer carry the necessary contingencies for the following noise controls, which may be necessary to achieve compliance with the sound level limits of NPC-300 and the ENCG at all worst-case points of reception both on-site and off-site:

– Acoustic louvers and/or barriers to surround large rooftop cooling equipment (e.g., cooling towers, chillers). Cost contingencies should account for structural requirements due to snow and wind loads associated with the barriers.
– Low-noise condenser fans for make-up air units.
– Acoustic enclosures for any standby emergency generator sets (Level 2 minimum).
– Silencers for parking exhaust shafts and make-up air unit intake openings.

Performance specifications of the above controls is dependent on equipment locations and sound power levels, which may vary. Therefore, the full scope and details of the required noise mitigation should be evaluated during detailed design.

7.1.2 Indoor Noise Impacts

Mechanical equipment and other building services also have the potential to cause annoyance due to noise and vibration transmission to residences. The American Society of Heating, Refrigerating, and Air conditioning Engineers (ASHRAE) guidelines specify acceptable noise levels from such equipment. Specification of noise controls (e.g., silencers, floating concrete slabs, acoustic ceilings, vibration isolators) to achieve these criteria is typically completed as part of the detailed building design, once equipment selections are made and floor layouts are more developed.

The Ontario Building Code stipulates minimum STC and apparent sound transmission class (ASTC) rating requirements for demising partitions separating residential suites from other spaces inside the building. For demising partitions separating suites from elevator shafts or garbage chutes, constructions meeting a minimum STC-55 rating must be used. For demising partitions separating suites from any other space in the building, constructions meeting a minimum STC-50 rating must be used. Suite demising partitions must also achieve a minimum rating of ASTC-47.

8. Recommendations

Recommendations described in the preceding sections of this report are summarized in the subsections that follow for clarity.

8.1 Building Envelope Construction

The windows and exterior walls of the Development must be designed appropriately to ensure that the indoor sound level criteria of the MECP are met. Based on preliminary assumptions, the worst-case windows must be rated at **STC-39** or higher, with lower STC requirements corresponding to other less exposed facades (see Figure 5.2). STC rating requirements should be updated once detailed floor plans and building elevations are available.

Exterior walls should be brick veneer or acoustical equivalent. GHD anticipates that glass spandrel backed by an insulated partition with two layers of 16 mm thick Type X gypsum board will be sufficient to achieve the indoor sound level criteria of the MECP, and would therefore be considered acceptable.

8.2 Ventilation

Central air conditioning is required to be installed prior to occupancy for all residential dwellings. This will allow windows and doors to remain closed to help ensure that the indoor sound level limits of NPC-300 are met.

Predicted future traffic noise levels at the façades of the Development are sufficiently high that, at a minimum, provisions must be made to enable installation of central air conditioning at the occupant's discretion (i.e., ductwork must be designed and installed to accommodate a future central air conditioning system installation). This will allow windows and doors to remain closed to help ensure that the indoor sound level limits of NPC-300 are met.

8.3 Acoustic Barriers

Noise levels at the outdoor amenity space on the podium roof are sufficiently high to require mitigation in the form of acoustic barriers. It is not considered technically feasible to achieve the 55 dBA sound level criteria of the City/MECP; therefore, GHD recommends that the City consider exceedances up to 5 dBA acceptable. Nevertheless, the solid parapets at the perimeter of the rooftop amenity space should be extended to 1.8 m above the finished roof level to ensure no direct line-of-sight exposure to noise from the surrounding roadways and O-Train line.

8.4 Class 4 Area Designation

A Class 4 area designation has been granted for the Site with respect to noise emissions from the CBN facility located at 975 Gladstone Ave. GHD notes that the following requirements apply to the Development since is designated as a Class 4 Area:

– **Central air conditioning systems** must be provided for all dwellings of the Development, as the less stringent sound level limits are based on the assumption that windows of dwellings can remain closed.
– A **warning clause** should be used to inform occupants of the fact that the adjacent CBN facility is required to comply with sound level limits based on the assumption that windows and exterior doors are closed (see wording in section 8.5).

8.5 Warning Clauses

Per the City of Ottawa's Environmental Noise Control Guidelines, the following warning clauses are recommended to be included in agreements of Offers of Purchase and Sale, lease/rental agreements, and condominium declarations for all residential dwellings of the Development:

> **Surface Transportation Noise**: "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/rail/Light Rail/transitway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment.
>
> To help address the need for sound attenuation this development includes:
>
> – Multi-pane glass; and
> – Acoustic barriers
>
> To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.
>
> The acoustic barriers shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original.
>
> This dwelling unit has also been provided with central air conditioning, which allows windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment.
>
> Additionally this development includes trees and shrubs to screen the source of noise from occupants."
>
> **Stationary Noise**: "Purchasers/tenants are advised that sound levels due to the adjacent industry (facility) (utility) may interfere with outdoor activities as the sound levels exceed the sound level limits of the City and the Ministry of the Environment.
>
> Purchasers/tenants are further advised that sound levels due to the adjacent industry (facility) (utility) are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed."

9. Conclusions

The Study concludes that the proposed development is feasible, provided that the proposed development adheres to the noise mitigation recommended in this Study. The recommended noise mitigation at the Development consists of enhanced building envelope construction requirements, installation of central air conditioning, noise warning clauses, and acoustic barriers.

TIP is currently in negotiations with CBN to establish an appropriate noise mitigation plan to ensure compliance with the NPC-300 sound level limits at the new sensitive receptors of the Development.

10. References

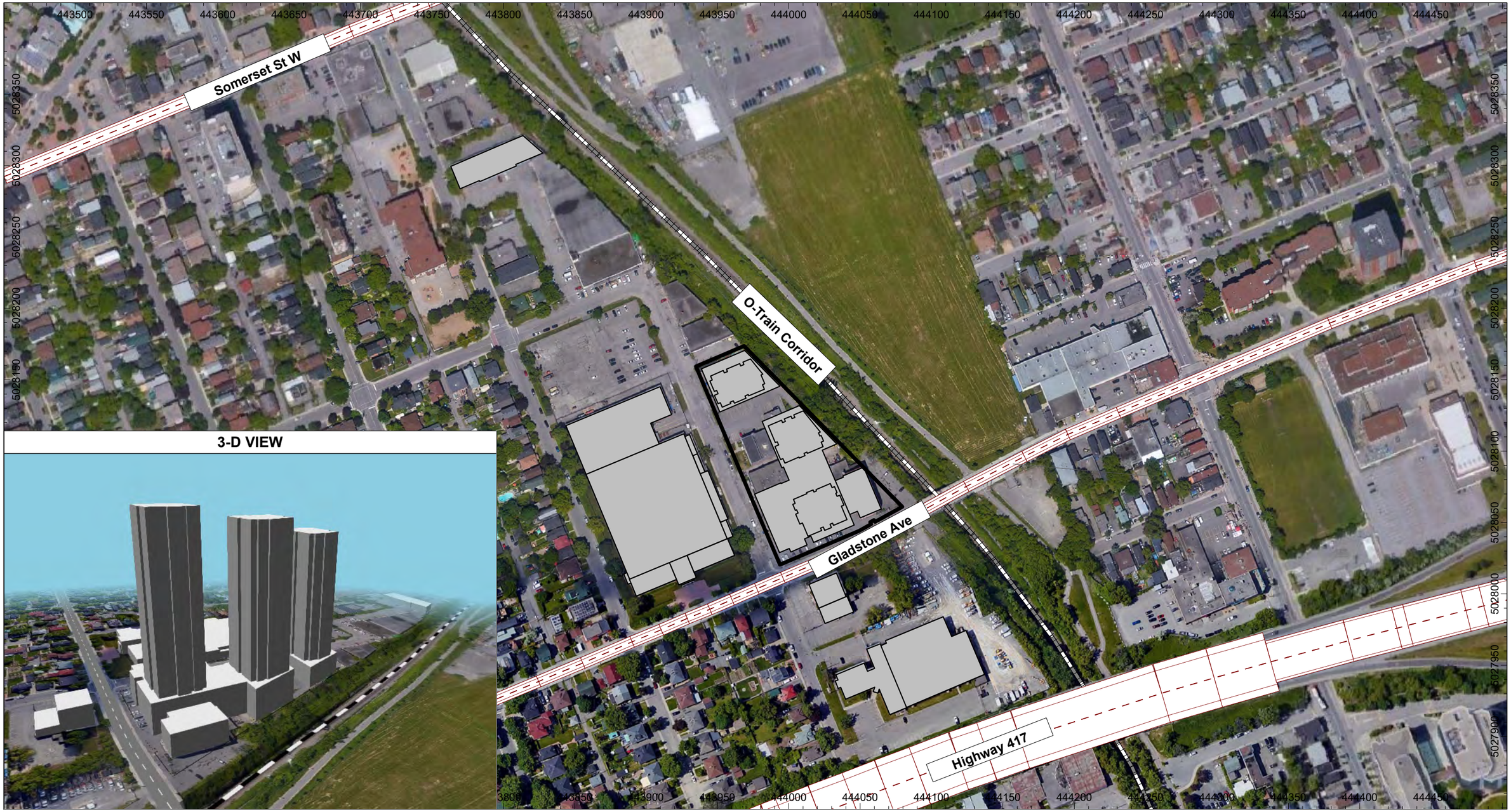
City of Ottawa (Ottawa, 2016), *Environmental Noise Control Guidelines*

Ontario Ministry of Environment, Conservation and Parks (MECP, 1995), Guideline D-6: *Compatibility Between Industrial Facilities and Sensitive Land Uses*

Ontario Ministry of Environment, Conservation and Parks (MECP), Publication NPC-104: *Sound Level Adjustments*

Ontario Ministry of Environment, Conservation and Parks (MECP, 2013), Publication NPC-300: *Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning*

National Research Council Canada (NRC, 1985), Building Practice Note 56: Controlling Sound Transmission into Buildings



3-D VIEW

Source: Google Satellite

N

GHD

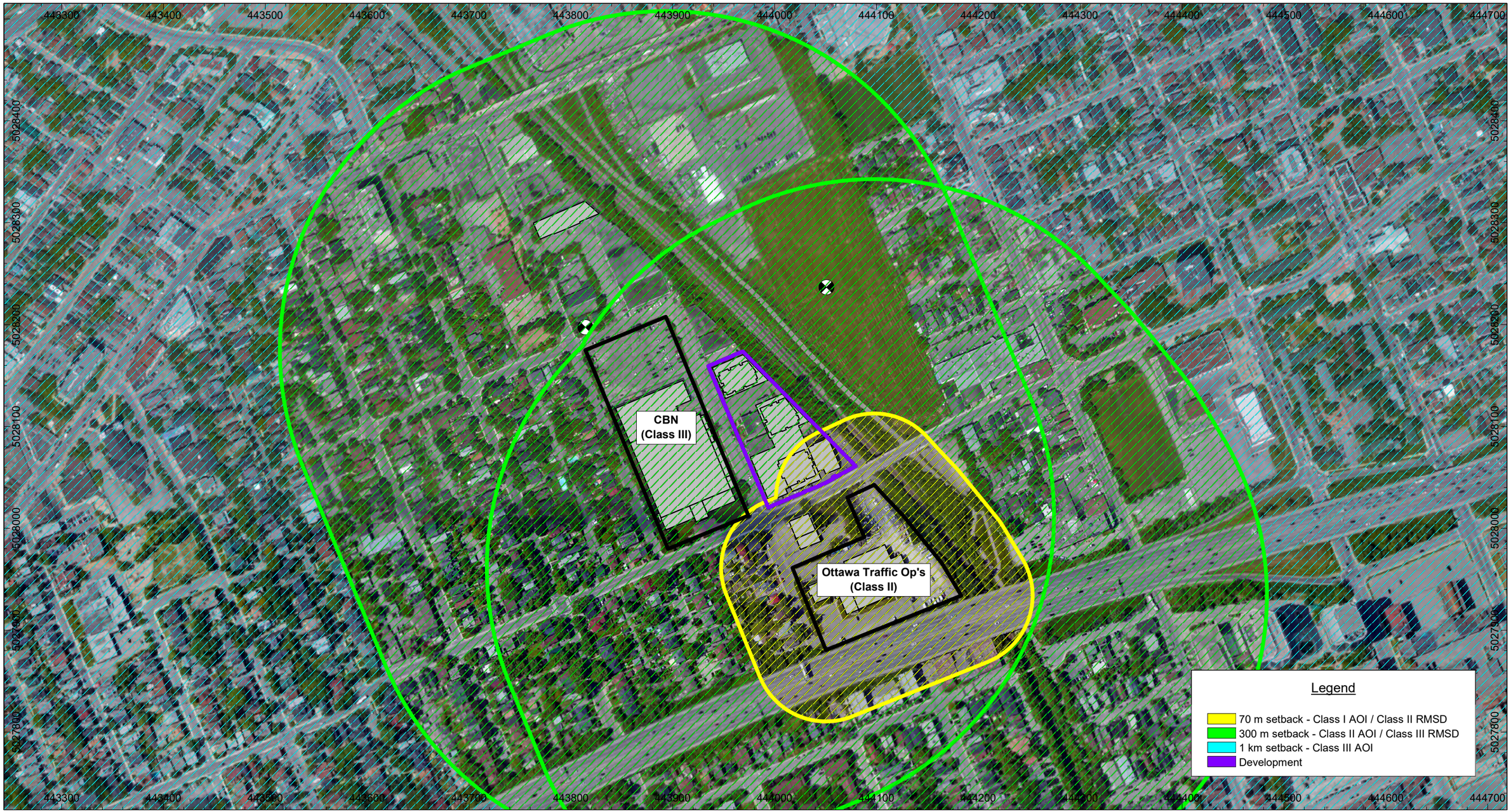
NOISE IMPACT STUDY
TIP GLADSTONE GP INC.
145 LORETTA AVE N & 951 GLADSTONE AVE

KEY PLAN

11223331
02.02.2022

FIGURE 2.2

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\11223331\Tech\Noise\01 CadnaA\11223331_Gladstone_NIS_v2022.00.cna



Source: Google Satellite

N

Notes:
RMSD = Recommended Minimum Separation Distance
AOI = Potential Area of Influence
Dashed lines represent setbacks from the property lines of the Development

GHD

NOISE IMPACT STUDY
TIP GLADSTONE GP INC.
145 LORETTA AVE N & 951 GLADSTONE AVE

GUIDELINE D-6 SETBACKS

11223331
02.02.2022

FIGURE 3.1

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\11223331\Tech\Noise\01 CadnaA\11223331_Gladstone_NIS_v2022.00.cna

Source: Google Satellite

N

GHD

NOISE IMPACT STUDY
TIP GLADSTONE GP INC.
145 LORETTA AVE N & 951 GLADSTONE AVE

11223331
02.02.2022

ROAD AND RAIL TRAFFIC NOISE - RECEIVER LOCATIONS

FIGURE 5.1

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\11223331\Tech\Noise\01 CadnaA\11223331_Gladstone_NIS_v2022.00.cna

Source: Google Satellite

N

Notes:
Minimum STC rating requirements shown above are based on window-to-floor area ratios described in this report. If the final design includes any window-to-floor area ratios greater than those described in this report, then the STC rating requirements should be re-evaluated to help ensure that the indoor sound level criteria of the MECP are met.

GHD

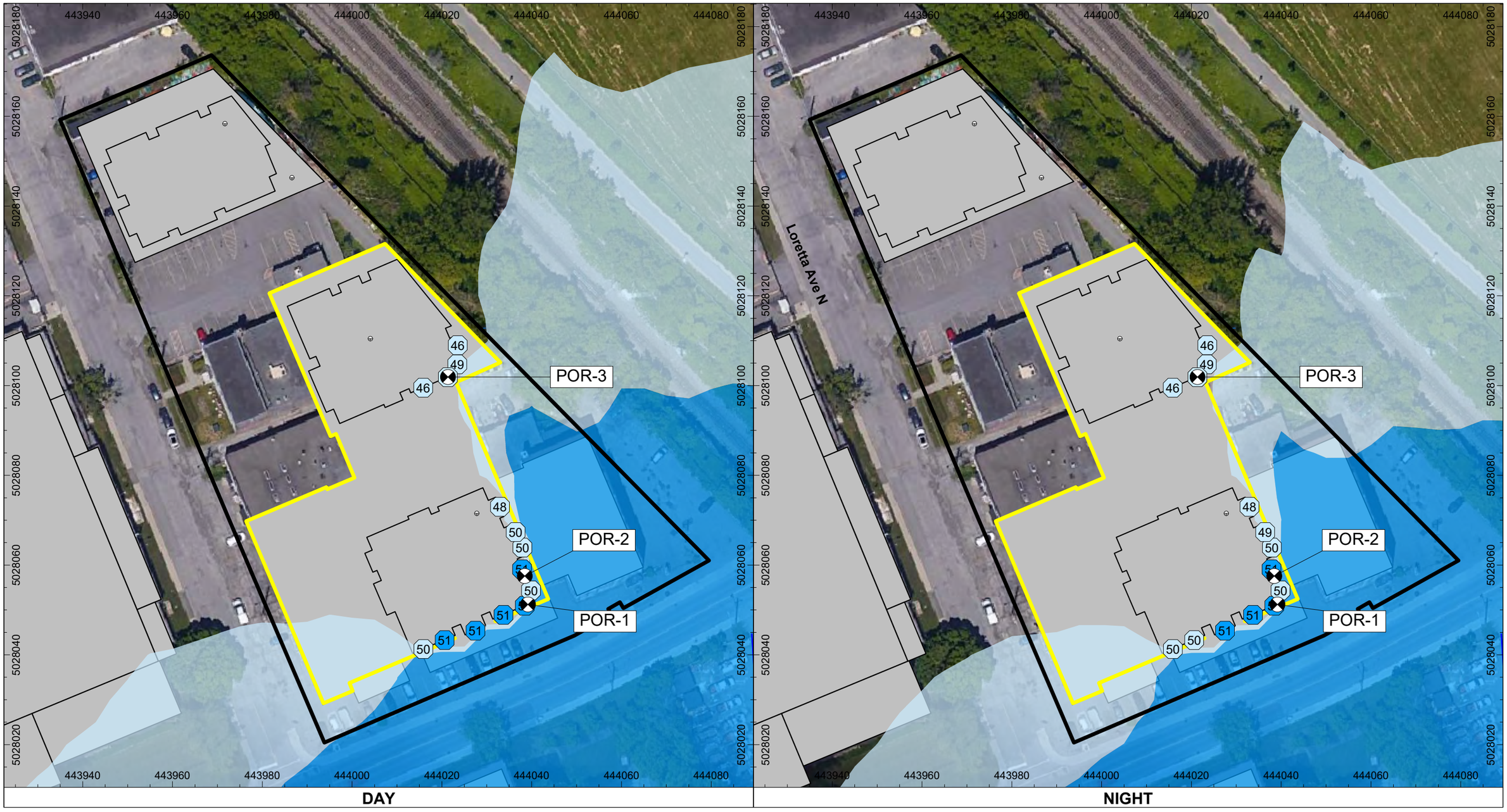
NOISE IMPACT STUDY
TIP GLADSTONE GP INC.
145 LORETTA AVE N & 951 GLADSTONE AVE

11223331
02.02.2022

MINIMUM FACADE SOUND TRANSMISSION CLASS REQUIREMENTS

FIGURE 5.2

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\11223331\Tech\Noise\01 CadnaA\11223331_Gladstone_NIS_v2022.00.cna



Source: Google Satellite

N

Legend

> 45 dBA

> 50 dBA

Noise contours predicted at a height of 22.25 metres above grade, which is the height of the worst-case POR.

NOISE IMPACT STUDY
TIP GLADSTONE GP INC.
145 LORETTA AVE N & 951 GLADSTONE AVE

ESTIMATED STATIONARY NOISE LEVELS FROM OTTAWA TRAFFIC OPERATIONS FACILITY

11223331
02.02.2022

FIGURE 6.1

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\11223331\Tech\Noise\01 CadnaA\11223331_Gladstone_NIS_v2022.00.cna

Appendices

Appendix A

Zoning Map and Site Plan

145 LORETTA AVE & 951 GLADSTONE AVE
OTTAWA, ONTARIO
NOISE IMPACT STUDY

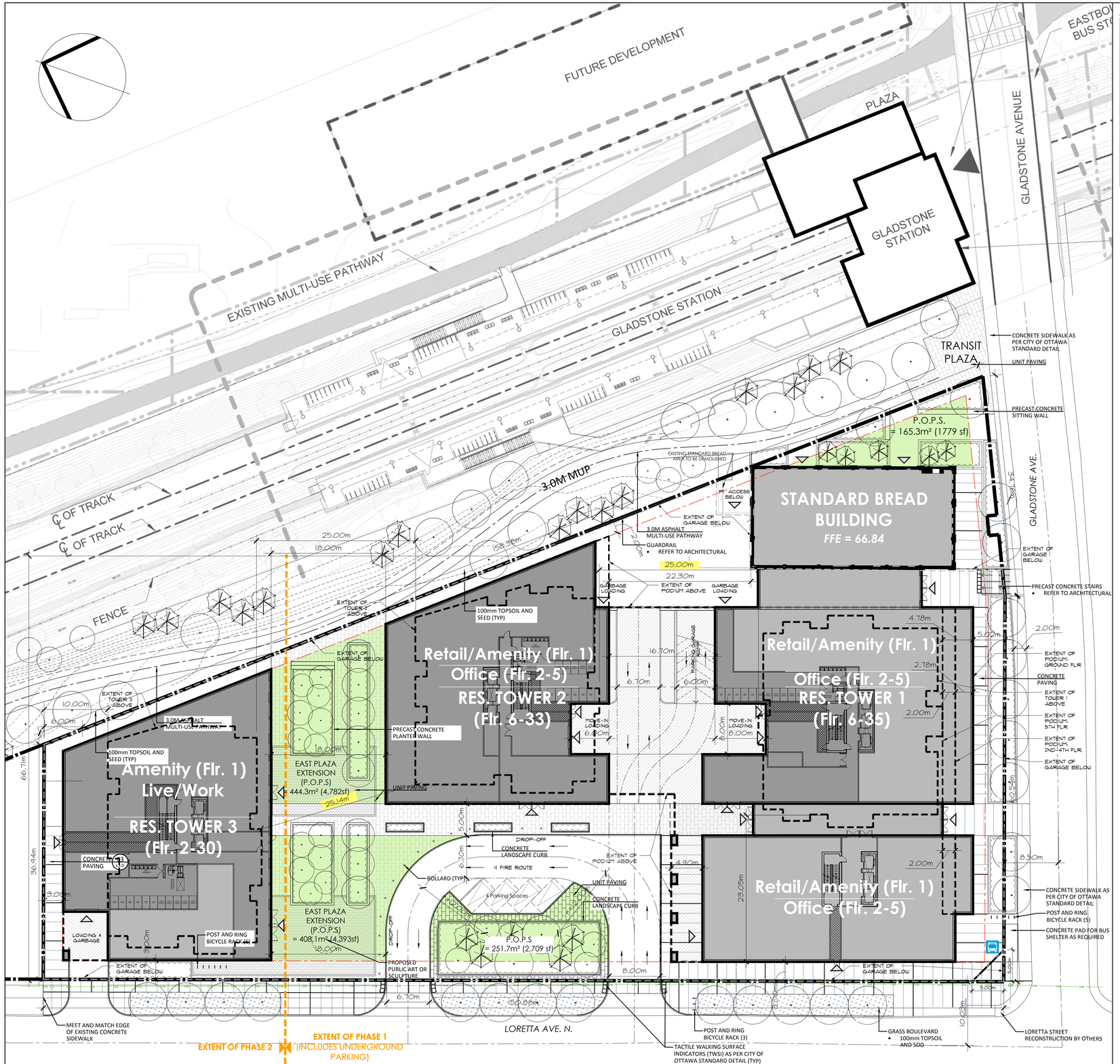
ZONING MAP

Project No. 11223331
Revision No. -
Date Jan 17, 2022

FIGURE A.1

Q:\GIS\PROJECTS\11223000s\11223331\Layouts\202201_RPT002\11223331_202201_RPT002_GIS001.mxd
Print date: 17 Jan 2022 - 16:24

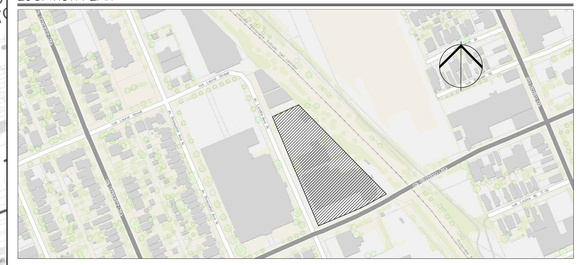
Data source: Google Earth Imagery, Date: 06/08/2018, City of Ottawa Zoning (By-law No. 2008-250), Accessed 2022



1 SITE PLAN
A0.01 1 :300

None

LOCATION PLAN



Gladstone and Loretta Mixed-Use Hub
Draft Zoning Table

MC[XXXX] SYYY-h	Requirement	Proposed
Minimum Lot Width (m)	No minimum	Complies
Minimum Lot Area (m²)	No minimum	Complies
Minimum Front Yard Setback (m)	5 metres; aside from Standard Bread Building (See S.YYY)	5m
Minimum Rear Yard Setback (m)	3 metres (See S.YYY)	3m
Interior Side Yard Setback (m)	2 metres, aside from Standard Bread Building (See S.YYY)	2m
Corner Side Yard Setback (m)	3 metres, (See S.YYY)	3m
Minimum Building Height (m)	6.7m (See S. YYY)	Complies
Maximum Building Height (m)	0m to 132m (See S. YYY)	Complies
Maximum Floor Space Index	No maximum	N/A
Minimum Width of Landscaped Area	No minimum, except that where a yard is provided and not used for required driveways, aisles, parking, loading spaces or outdoor commercial patio, the whole yard must be landscaped	Complies
Minimum Tower Separation Distance	23 metres	Complies
Minimum Tower Podium Stepback Distance	2 metres	2m at Gladstone
Parking Requirements (Sec. 101, 102, 106, 111)	**Requirement**	**Proposed**
Area Z of Schedule 1A 0 spaces/unit (resident) 0.1 spaces/unit, less first 12 units (visitor), but no more than 30	Resident: 0 Visitor: 30	Surface: 8 P1: 274 P2: 282 Total: 564
Vehicle Space Dimensions	- Must be 2.6m-3.1m by 5.2m - Up to 40% of required parking aside from visitors spaces may be 2.4m x 4.6m	Complies
Bicycle Parking Res: 0.5/unit Office, Retail, Studio: 1 space per 250m² GFA	0.5 x 846 units = 423 bicycles 79 bicycles Total Bicycle Spaces: 467	502 spaces proposed
Bicycle Space Dimensions	Horizontal: 0.6m by 1.8m	Complies
	Vertical: 0.5m by 1.5m (max 50% of required spaces)	
Drive Aisle Width (Double Traffic Lane) Parking Lot	Minimum: 6.7m	Complies
Parking Garage	Minimum: 6m Maximum: 6.7m	Complies
Amenity Space Requirements (Sec. 137)	**Requirement**	**Proposed**
Total: 6m² per unit **Communal: 50% of total required** **POPS [Privately Owned Public Space**	Total: 5,076 m² Communal: 2,538 m²	Rooftop Terrace: 1,441.9m² Indoor Communal Amenity: 2,006.8m² Balconies: 3,548.2m² POPS: 984m²

NOTE: ALL EXISTING SITE INFORMATION AS PER SITE SURVEY PLAN DATED ___, 2018 AND PREPARED BY STANTEC

LEGEND

BUS STOP		PROPERTY LINE	
OVERHEAD WIRE		SETBACK LINE	
FIRE HYDRANT		RETAINING WALL	
EXISTING HYDRO POLE		ROAD CENTRELINE	

0 m 10 m 25 m 50 m

no.	date	revision
04	DEC 17, 2021	SITE PLAN COMMENTS
03	APR 09, 2021	SITE PLAN
02	FEB 12, 2020	ZONING & OPA
01	DEC 04, 2019	CITY COMMENTS

Hobin Architecture Incorporated
63 Pamilla Street
Ottawa, Ontario
Canada K1S 3K7
T: 613-238-7200
F: 613-235-2005
E: mail@hobinarc.com
hobinarc.com

HOBIN ARCHITECTURE

PROJECT/LOCATION:
951 GLADSTONE AVE.
& 145 LORETTA AVE. NORTH

DRAWING TITLE:
SITE PLAN

DRAWN BY:	DATE:	SCALE:
TD	19/04/17	1:300

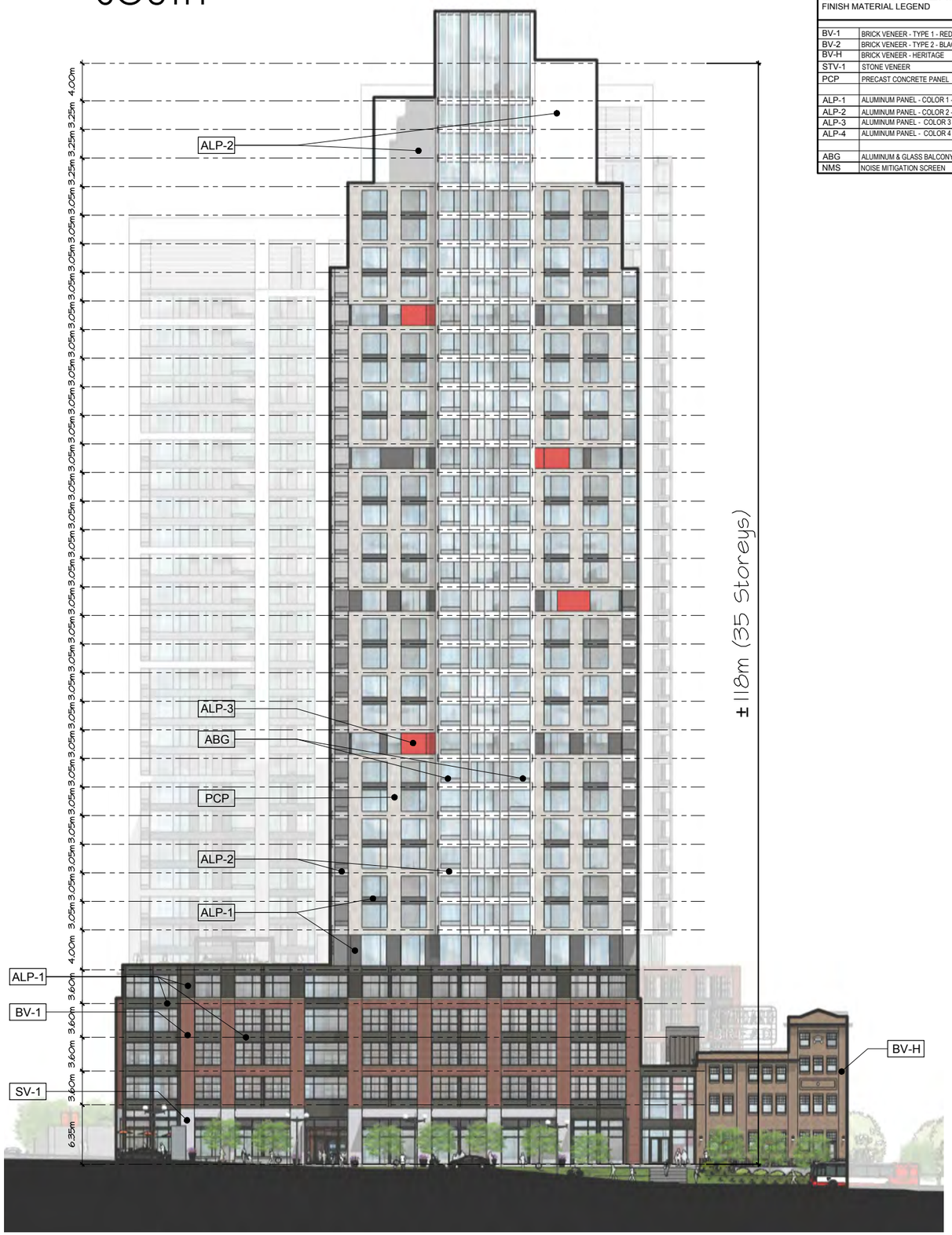
PROJECT: 1726

DRAWING NO.: A001

REVISION NO.:

FIGURE 2

SOUTH



EXTERIOR MATERIAL LIST

FINISH MATERIAL LEGEND

BV-1	BRICK VENEER - TYPE 1 - RED BRICK
BV-2	BRICK VENEER - TYPE 2 - BLACK BRICK
BV-H	BRICK VENEER - HERITAGE
STV-1	STONE VENEER
PCP	PRECAST CONCRETE PANEL
ALP-1	ALUMINUM PANEL - COLOR 1 - DARK GREY
ALP-2	ALUMINUM PANEL - COLOR 2 - WHITE
ALP-3	ALUMINUM PANEL - COLOR 3 - RED
ALP-4	ALUMINUM PANEL - COLOR 4 - LIGHT GREY
ABG	ALUMINUM & GLASS BALCONY GUARD
NMS	NOISE MITIGATION SCREEN

NORTH

CLV GROUP

PBCGROUP

GLADSTONE + LORETTA

Site Elevations

DECEMBER 17, 2021
scale 1:500

HOBIN

FIGURE 3

WEST

EXTERIOR MATERIAL LIST
FINISH MATERIAL LEGEND

BV-1	BRICK VENEER - TYPE 1 - RED BRICK
BV-2	BRICK VENEER - TYPE 2 - BLACK BRICK
BV-H	BRICK VENEER - HERITAGE
STV-1	STONE VENEER
PCP	PRECAST CONCRETE PANEL
ALP-1	ALUMINUM PANEL - COLOR 1 - DARK GREY
ALP-2	ALUMINUM PANEL - COLOR 2 - WHITE
ALP-3	ALUMINUM PANEL - COLOR 3 - RED
ALP-4	ALUMINUM PANEL - COLOR 4 - LIGHT GREY
ABG	ALUMINUM & GLASS BALCONY GUARD
NMS	NOISE MITIGATION SCREEN

CLV GROUP

PBCGROUP

GLADSTONE + LORETTA

Site Elevations

DECEMBER 17, 2021
scale 1:500

HOBIN

FIGURE 4

EAST

EXTERIOR MATERIAL LIST
FINISH MATERIAL LEGEND

BV-1	BRICK VENEER - TYPE 1 - RED BRICK
BV-2	BRICK VENEER - TYPE 2 - BLACK BRICK
BV-H	BRICK VENEER - HERITAGE
STV-1	STONE VENEER
PCP	PRECAST CONCRETE PANEL
ALP-1	ALUMINUM PANEL - COLOR 1 - DARK GREY
ALP-2	ALUMINUM PANEL - COLOR 2 - WHITE
ALP-3	ALUMINUM PANEL - COLOR 3 - RED
ALP-4	ALUMINUM PANEL - COLOR 4 - LIGHT GREY
ABG	ALUMINUM & GLASS BALCONY GUARD
NMS	NOISE MITIGATION SCREEN

CLV GROUP

PBCGROUP

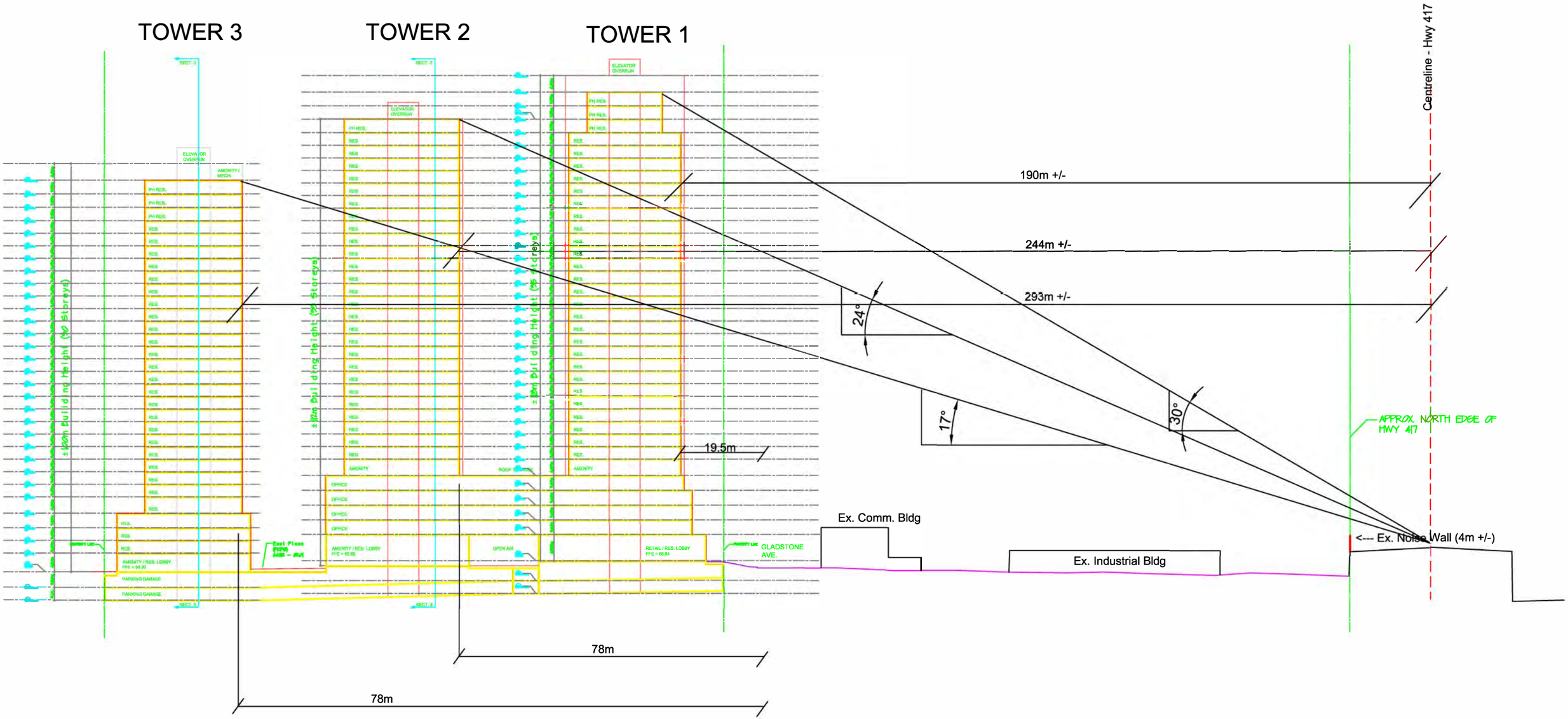
Site Elevations

DECEMBER 17, 2021
scale 1:500

GLADSTONE + LORETTA

HOBIN

FIGURE 5



CROSS-SECTION (LOOKING EAST) - ELEVATIONS, ANGLES & DISTANCES

FIGURE 6

Appendix B

STAMSON Calculations

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:34:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t1_n.te Time Period: Day/Night 16/8 hours
Description: North facade of Tower 1, 35th floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : -53.00 deg 25.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 49.00 / 49.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -53.00 deg Angle2 : 25.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	61.60	49.47	--	--	61.86 *
Total					61.86 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	57.29	45.16	--	--	57.55 *

Total 57.55 dBA

* Bright Zone !

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Somerset (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 : 421.00 / 421.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -40.00 deg Angle2 : 15.00 deg
Barrier height : 112.00 m
Barrier receiver distance : 54.00 / 54.00 m
Source elevation : 62.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Somerset	1.50	52.45	52.45

Total 52.45 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)

1.Somerset	1.50	44.85	44.85
Total			44.85 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.33
(NIGHT): 57.78

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:36:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t1_e.te Time Period: Day/Night 16/8 hours
Description: East facade of Tower 1, 35th floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : -60.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 50.00 / 50.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -60.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	64.35	52.22	--	--	64.61 *
Total					64.61 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	60.04	47.91	--	--	60.30 *

Total 60.30 dBA

* Bright Zone !

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (day/night)

Angle1 Angle2 : 3.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 200.00 / 200.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 3.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

Angle1 Angle2 : -3.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 33.00 / 33.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -3.00 deg Angle2 : 90.00 deg

Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Somerset (day/night)

Angle1 Angle2 : 7.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 435.00 / 435.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 7.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 62.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	72.17	72.17 *
2.Gladstone	1.50	60.39	60.39 *
3.Somerset	1.50	50.49	50.49 *
Total			72.48 dBA

* Bright Zone !

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	64.57	64.57 *
2.Gladstone	1.50	52.80	52.80 *
3.Somerset	1.50	42.90	42.90 *
Total			64.88 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 73.13
(NIGHT): 66.18

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:36:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t1_s.te Time Period: Day/Night 16/8 hours
Description: South facade of Tower 1, 35th floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : 22.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 62.00 / 62.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : 22.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	59.98	47.85	--	--	60.24 *
Total					60.24 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	55.67	43.54	--	--	55.93 *

Total 55.93 dBA

* Bright Zone !

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (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 : 186.00 / 186.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Gladstone (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 : 19.50 / 19.50 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg

Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	75.64	75.64 *
2.Gladstone	1.50	65.55	65.55 *
Total			76.05 dBA

* Bright Zone !

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	68.04	68.04 *
2.Gladstone	1.50	57.95	57.95 *
Total			68.45 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 76.16
(NIGHT): 68.68

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:37:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t1_w.te Time Period: Day/Night 16/8 hours
Description: West facade of Tower 1, 35th floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : 79.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 84.00 / 84.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : 79.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	50.75	38.62	--	--	51.01 *
Total					51.01 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	46.44	34.31	--	--	46.70 *

Total 46.70 dBA

* Bright Zone !

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (day/night)

Angle1 Angle2 : -4.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 186.00 / 186.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -4.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Gladstone (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 : 21.00 / 21.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 90.00 deg

Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Somerset (day/night)

Angle1 Angle2 : 12.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 448.00 / 448.00 m
Receiver height : 116.50 / 116.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 12.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 62.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	72.82	72.82 *
2.Gladstone	1.50	62.21	62.21 *
3.Somerset	1.50	50.10	50.10 *
Total			73.20 dBA

* Bright Zone !

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	65.22	65.22 *
2.Gladstone	1.50	54.62	54.62 *
3.Somerset	1.50	42.50	42.50 *
Total			65.60 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 73.23
(NIGHT): 65.66

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:37:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t2_n.te Time Period: Day/Night 16/8 hours
Description: North facade of Tower 2, 33rd floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains !	Speed !(km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : -90.00 deg 25.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 27.00 / 27.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -90.00 deg Angle2 : 25.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	65.87	53.74	--	--	66.13 *
Total					66.13 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	61.57	49.43	--	--	61.83 *

Total 61.83 dBA

* Bright Zone !

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Somerset (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 : 367.00 / 367.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 21.00 deg Angle2 : 64.00 deg
Barrier height : 100.00 m
Barrier receiver distance : 48.00 / 48.00 m
Source elevation : 62.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Somerset	1.50	53.56	53.56

Total 53.56 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)

1.Somerset	1.50	45.96	45.96
Total			45.96 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.36
(NIGHT): 61.94

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:38:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t2_e.te Time Period: Day/Night 16/8 hours
Description: East facade of Tower 2, 33rd floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : -65.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 31.00 / 31.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -65.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	66.57	54.44	--	--	66.83 *
Total					66.83 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	62.26	50.13	--	--	62.52 *

Total 62.52 dBA

* Bright Zone !

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (day/night)

Angle1 Angle2 : 3.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 244.00 / 244.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 3.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

Angle1 Angle2 : -3.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 77.00 / 77.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -3.00 deg Angle2 : 90.00 deg

Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Somerset (day/night)

Angle1 Angle2 : 4.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 391.00 / 391.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 4.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 62.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	71.30	71.30 *
2.Gladstone	1.50	56.71	56.71 *
3.Somerset	1.50	51.11	51.11 *
Total			71.49 dBA

* Bright Zone !

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	63.71	63.71 *
2.Gladstone	1.50	49.12	49.12 *
3.Somerset	1.50	43.51	43.51 *
Total			63.90 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 72.77
(NIGHT): 66.27

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:39:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t2_s.te Time Period: Day/Night 16/8 hours
Description: South facade of Tower 2, 33rd floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : 22.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.00 / 35.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : 22.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	62.47	50.33	--	--	62.73 *
Total					62.73 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	58.16	46.02	--	--	58.42 *

Total 58.42 dBA

* Bright Zone !

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (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 : 239.00 / 239.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 1.00 deg Angle2 : 49.00 deg
Barrier height : 118.00 m
Barrier receiver distance : 54.00 / 54.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Gladstone (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 : 76.00 / 76.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 7.00 deg Angle2 : 56.00 deg

Barrier height : 118.00 m
Barrier receiver distance : 54.00 / 54.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	73.22	73.22
2.Gladstone	1.50	58.27	58.27
Total			73.36 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	65.62	65.62
2.Gladstone	1.50	50.68	50.68
Total			65.76 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 73.72
(NIGHT): 66.49

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:45:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t2_w.te Time Period: Day/Night 16/8 hours
Description: West facade of Tower 2, 33rd floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : 70.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 61.00 / 61.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : 70.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	54.74	42.61	--	--	55.00 *
Total					55.00 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	50.43	38.30	--	--	50.69 *

Total 50.69 dBA

* Bright Zone !

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (day/night)

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 245.00 / 245.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 5.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

Angle1 Angle2 : 8.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 77.00 / 77.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 8.00 deg Angle2 : 90.00 deg

Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Somerset (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 : 391.00 / 391.00 m
Receiver height : 110.50 / 110.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 62.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	71.19	71.19 *
2.Gladstone	1.50	56.17	56.17 *
3.Somerset	1.50	51.31	51.31 *
Total			71.37 dBA

* Bright Zone !

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	63.59	63.59 *
2.Gladstone	1.50	48.57	48.57 *
3.Somerset	1.50	43.71	43.71 *
Total			63.77 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 71.47
(NIGHT): 63.98

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:48:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t3_n.te Time Period: Day/Night 16/8 hours
Description: North facade of Tower 3, 30th floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : -90.00 deg 22.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -90.00 deg Angle2 : 22.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	65.30	53.17	--	--	65.56 *
Total					65.56 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	60.99	48.86	--	--	61.25 *

Total 61.25 dBA

* Bright Zone !

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Somerset (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 : 319.00 / 319.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -43.00 deg Angle2 : 11.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 53.00 / 53.00 m
Source elevation : 62.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Somerset	1.50	55.20	55.20 *

Total 55.20 dBA

* Bright Zone !

Result summary (night)

	source height	Road Leq	Total Leq

	! (m)	! (dBA)	! (dBA)
1.Somerset	! 1.50 !	47.61 !	47.61 *
Total		47.61 dBA	

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 65.94
(NIGHT): 61.43

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:49:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t3_e.te Time Period: Day/Night 16/8 hours
Description: East facade of Tower 3, 30th floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (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 : 30.00 / 30.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	67.36	55.23	--	--	67.62 *
Total					67.62 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	63.05	50.92	--	--	63.31 *

Total 63.31 dBA

* Bright Zone !

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (day/night)

Angle1 Angle2 : 19.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 306.00 / 306.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 19.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

Angle1 Angle2 : 16.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 141.00 / 141.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 16.00 deg Angle2 : 90.00 deg

Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Somerset (day/night)

Angle1 Angle2 : -16.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 328.00 / 328.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -16.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 62.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	69.44	69.44 *
2.Gladstone	1.50	53.09	53.09 *
3.Somerset	1.50	52.78	52.78 *
Total			69.63 dBA

* Bright Zone !

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	61.84	61.84 *
2.Gladstone	1.50	45.50	45.50 *
3.Somerset	1.50	45.19	45.19 *
Total			62.03 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 71.75
(NIGHT): 65.73

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:49:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t3_s.te Time Period: Day/Night 16/8 hours
Description: South facade of Tower 3, 30th floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

```
Angle1   Angle2          :  21.00 deg   90.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      1       (Absorptive ground surface)
Receiver source distance :  37.00 / 37.00  m
Receiver height          :  98.50 / 98.50  m
Topography               :      2       (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1           :  21.00 deg   Angle2 : 90.00 deg
Barrier height           :   0.00 m
Barrier receiver distance :  10.00 / 10.00  m
Source elevation         :  57.00 m
Receiver elevation       :  65.00 m
Barrier elevation        :  65.00 m
Reference angle          :   0.00
```

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	62.29	50.16	--	--	62.55 *
Total					62.55 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	57.98	45.85	--	--	58.24 *

Total 58.24 dBA

* Bright Zone !

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (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 : 292.00 / 292.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -43.00 deg Angle2 : 11.00 deg
Barrier height : 112.00 m
Barrier receiver distance : 53.00 / 53.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Gladstone (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 : 126.00 / 126.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -40.00 deg Angle2 : 14.00 deg

Barrier height : 112.00 m
Barrier receiver distance : 53.00 / 53.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	72.15	72.15
2.Gladstone	1.50	55.91	55.91
Total			72.25 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	64.55	64.55
2.Gladstone	1.50	48.32	48.32
Total			64.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.69
(NIGHT): 65.55

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:50:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: t3_w.te Time Period: Day/Night 16/8 hours
Description: West facade of Tower 3, 30th floor

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : 68.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 66.00 / 66.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : 68.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 57.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	54.81	42.68	--	--	55.07 *
Total					55.07 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	50.50	38.37	--	--	50.76 *

Total 50.76 dBA

* Bright Zone !

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (day/night)

Angle1 Angle2 : -3.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 297.00 / 297.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -3.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Gladstone (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 : 133.00 / 133.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 90.00 deg

Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 65.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Somerset (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 : 336.00 / 336.00 m
Receiver height : 98.50 / 98.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 62.00 m
Receiver elevation : 65.00 m
Barrier elevation : 65.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	70.74	70.74 *
2.Gladstone	1.50	54.20	54.20 *
3.Somerset	1.50	51.97	51.97 *
Total			70.89 dBA

* Bright Zone !

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	63.14	63.14 *
2.Gladstone	1.50	46.60	46.60 *
3.Somerset	1.50	44.37	44.37 *
Total			63.29 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 71.00
(NIGHT): 63.53

STAMSON 5.0 SUMMARY REPORT Date: 24-01-2022 16:31:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ola1.te Time Period: Day/Night 16/8 hours
Description: OLA on podium roof, west of Tower 1

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (day/night)

Angle1 Angle2 : -34.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 204.00 / 204.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -34.00 deg Angle2 : 90.00 deg
Barrier height : 1.10 m
Barrier receiver distance : 21.00 / 21.00 m
Source elevation : 72.00 m
Receiver elevation : 85.00 m
Barrier elevation : 85.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

Angle1 Angle2 : -31.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 40.00 / 40.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -31.00 deg Angle2 : 90.00 deg

Barrier height : 1.10 m
Barrier receiver distance : 21.00 / 21.00 m
Source elevation : 65.00 m
Receiver elevation : 85.00 m
Barrier elevation : 85.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Somerset (day/night)

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 435.00 / 435.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 5.00 deg Angle2 : 90.00 deg
Barrier height : 1.10 m
Barrier receiver distance : 22.00 / 22.00 m
Source elevation : 62.00 m
Receiver elevation : 85.00 m
Barrier elevation : 85.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	60.09	60.09
2.Gladstone	1.50	42.90	42.90
3.Somerset	1.50	35.04	35.04
Total			60.19 dBA

Result summary (night)
---

	source height (m)	Road Leq	Total Leq

	! (m)	! (dBA)	! (dBA)
1.Highway 417	! 1.50	! 52.49	! 52.49
2.Gladstone	! 1.50	! 35.30	! 35.30
3.Somerset	! 1.50	! 27.44	! 27.44
Total		52.59 dBA	

TOTAL Leq FROM ALL SOURCES (DAY): 60.19
(NIGHT): 52.59

STAMSON 5.0 SUMMARY REPORT Date: 02-02-2022 14:32:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ola2.te Time Period: Day/Night 16/8 hours
Description: OLA on podium roof, between T1 and T2

Rail data, segment # 1: O-Train (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1.	205.0/38.0	35.0	1.0	3.0	Diesel	Yes

Data for Segment # 1: O-Train (day/night)

Angle1 Angle2 : -20.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 53.00 / 53.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
No Whistle
Barrier angle1 : -20.00 deg Angle2 : 70.00 deg
Barrier height : 1.10 m
Barrier receiver distance : 16.00 / 16.00 m
Source elevation : 57.00 m
Receiver elevation : 85.00 m
Barrier elevation : 85.00 m
Reference angle : 0.00

Result summary (day)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)
1.O-Train	39.48	26.24	--	--	39.68 *
Total					39.68 dBA

* Bright Zone !

Result summary (night)

	Loc Leq (dBA)	Wheel Leq (dBA)	Whistle Left Leq (dBA)	Whistle Right Leq (dBA)	Total Leq (dBA)

1.O-Train	35.17	21.93	--	--	35.37 *

Total 35.37 dBA

* Bright Zone !

Road data, segment # 1: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417 (day/night)

Angle1 Angle2 : 50.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 226.00 / 226.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 50.00 deg Angle2 : 90.00 deg
Barrier height : 1.10 m
Barrier receiver distance : 31.00 / 31.00 m
Source elevation : 72.00 m
Receiver elevation : 85.00 m
Barrier elevation : 85.00 m
Reference angle : 0.00

Road data, segment # 2: Highway 417 (day/night)

Car traffic volume : 195613/17010 veh/TimePeriod
Medium truck volume : 15560/1353 veh/TimePeriod
Heavy truck volume : 11114/966 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Highway 417 (day/night)

Angle1 Angle2 : -90.00 deg -43.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 226.00 / 226.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -43.00 deg

Barrier height : 1.10 m
Barrier receiver distance : 17.00 / 17.00 m
Source elevation : 72.00 m
Receiver elevation : 85.00 m
Barrier elevation : 85.00 m
Reference angle : 0.00

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

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: Gladstone (day/night)

Angle1 Angle2 : 53.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 60.00 / 60.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 53.00 deg Angle2 : 90.00 deg
Barrier height : 1.10 m
Barrier receiver distance : 31.00 / 31.00 m
Source elevation : 65.00 m
Receiver elevation : 85.00 m
Barrier elevation : 85.00 m
Reference angle : 0.00

Road data, segment # 4: Gladstone (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: Gladstone (day/night)

Angle1 Angle2 : -90.00 deg -40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 60.00 / 60.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -40.00 deg

Barrier height : 1.10 m
Barrier receiver distance : 17.00 / 17.00 m
Source elevation : 65.00 m
Receiver elevation : 85.00 m
Barrier elevation : 85.00 m
Reference angle : 0.00

Road data, segment # 5: Somerset (day/night)

Car traffic volume : 12144/1056 veh/TimePeriod
Medium truck volume : 966/84 veh/TimePeriod
Heavy truck volume : 690/60 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: Somerset (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 : 408.00 / 408.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 1.10 m
Barrier receiver distance : 12.00 / 12.00 m
Source elevation : 62.00 m
Receiver elevation : 85.00 m
Barrier elevation : 85.00 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	52.63	52.63
2.Highway 417	1.50	54.09	54.09
3.Gladstone	1.50	32.79	32.79
4.Gladstone	1.50	37.04	37.04
5.Somerset	1.50	49.03	49.03

Total 57.21 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	45.04	45.04
2.Highway 417	1.50	46.49	46.49
3.Gladstone	1.50	25.20	25.20
4.Gladstone	1.50	29.44	29.44
5.Somerset	1.50	41.43	41.43
Total			49.62 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.29
(NIGHT): 49.78

STAMSON 5.0 SUMMARY REPORT Date: 25-01-2022 21:25:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por1d.te Time Period: 1 hours
Description: Minimum day hour, south facade T1, 6th floor

Road data, segment # 1: Highway 417

Car traffic volume : 2713 veh/TimePeriod
Medium truck volume : 216 veh/TimePeriod
Heavy truck volume : 154 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 186.00 m
Receiver height : 22.25 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 4.00 m
Barrier receiver distance : 165.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

Result summary
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.49	63.36	63.36
Total			63.36 dBA

TOTAL Leq FROM ALL SOURCES: 63.36

STAMSON 5.0 SUMMARY REPORT Date: 25-01-2022 21:14:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por1n.te Time Period: 1 hours
Description: Minimum night hour, south facade T1, 6th floor

Road data, segment # 1: Highway 417

Car traffic volume : 440 veh/TimePeriod
Medium truck volume : 35 veh/TimePeriod
Heavy truck volume : 25 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 186.00 m
Receiver height : 22.25 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 4.00 m
Barrier receiver distance : 165.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

Result summary
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	55.47	55.47
Total			55.47 dBA

TOTAL Leq FROM ALL SOURCES: 55.47

STAMSON 5.0 SUMMARY REPORT Date: 28-01-2022 13:49:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por2d.te Time Period: 1 hours
Description: Minimum day hour, east facade T1, 7th floor

Road data, segment # 1: Highway 417

Car traffic volume : 2713 veh/TimePeriod
Medium truck volume : 216 veh/TimePeriod
Heavy truck volume : 154 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417

Angle1 Angle2 : 2.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 192.00 m
Receiver height : 22.25 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 2.00 deg Angle2 : 90.00 deg
Barrier height : 4.00 m
Barrier receiver distance : 172.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

Result summary
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.49	59.92	59.92
Total			59.92 dBA

TOTAL Leq FROM ALL SOURCES: 59.92

STAMSON 5.0 SUMMARY REPORT Date: 28-01-2022 13:47:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por2n.te Time Period: 1 hours
Description: Minimum night hour, east facade T1, 7th floor

Road data, segment # 1: Highway 417

Car traffic volume : 440 veh/TimePeriod
Medium truck volume : 35 veh/TimePeriod
Heavy truck volume : 25 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417

Angle1 Angle2 : 2.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 192.00 m
Receiver height : 22.25 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 2.00 deg Angle2 : 90.00 deg
Barrier height : 4.00 m
Barrier receiver distance : 172.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

Result summary
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	52.02	52.02
Total			52.02 dBA

TOTAL Leq FROM ALL SOURCES: 52.02

STAMSON 5.0 SUMMARY REPORT Date: 28-01-2022 14:13:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por3d.te Time Period: 1 hours
Description: Minimum dau hour, south facade T2, 11th floor

Road data, segment # 1: Highway 417

Car traffic volume : 2713 veh/TimePeriod
Medium truck volume : 216 veh/TimePeriod
Heavy truck volume : 154 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417

Angle1 Angle2 : -90.00 deg -48.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 239.00 m
Receiver height : 40.25 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -48.00 deg
Barrier height : 4.00 m
Barrier receiver distance : 219.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

Road data, segment # 2: Highway 417

Car traffic volume : 2713 veh/TimePeriod
Medium truck volume : 216 veh/TimePeriod
Heavy truck volume : 154 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Highway 417

Angle1 Angle2 : 2.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 239.00 m
Receiver height : 22.25 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 2.00 deg Angle2 : 90.00 deg

Barrier height : 4.00 m
Barrier receiver distance : 219.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

Result summary

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.49	61.69	61.69 *
2.Highway 417	1.49	58.53	58.53
Total			63.40 dBA

TOTAL Leq FROM ALL SOURCES: 63.40

STAMSON 5.0 SUMMARY REPORT Date: 28-01-2022 14:12:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por3n.te Time Period: 1 hours
Description: Minimum night hour, south facade T2, 11th floor

Road data, segment # 1: Highway 417

Car traffic volume : 440 veh/TimePeriod
Medium truck volume : 35 veh/TimePeriod
Heavy truck volume : 25 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Highway 417

Angle1 Angle2 : -90.00 deg -48.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 239.00 m
Receiver height : 40.25 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -48.00 deg
Barrier height : 4.00 m
Barrier receiver distance : 219.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

Road data, segment # 2: Highway 417

Car traffic volume : 440 veh/TimePeriod
Medium truck volume : 35 veh/TimePeriod
Heavy truck volume : 25 veh/TimePeriod
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Highway 417

Angle1 Angle2 : 2.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 239.00 m
Receiver height : 22.25 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 2.00 deg Angle2 : 90.00 deg

Barrier height : 4.00 m
Barrier receiver distance : 219.00 m
Source elevation : 72.00 m
Receiver elevation : 65.00 m
Barrier elevation : 72.00 m
Reference angle : 0.00

Result summary

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Highway 417	1.50	53.79	53.79 *
2.Highway 417	1.50	50.63	50.63
Total			55.50 dBA

TOTAL Leq FROM ALL SOURCES: 55.50

Appendix C

Road and Rail Traffic Data

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			1994	UC	124,300	131,800	144,200	113,100	0.6
			1995	UC	128,600	133,700	146,600	119,600	0.7
			1996	UC	132,900	141,400	155,500	126,300	0.2
			1997	UC	137,200	144,100	160,500	129,000	0.6
			1998	UC	141,500	150,600	165,600	134,400	0.4
			1999	UC	138,400	147,300	161,900	131,500	0.5
			2000	UC	140,500	149,500	165,500	132,100	0.4
			2001	UC	142,500	152,500	168,200	134,000	0.4
			2002	UC	144,600	154,100	170,100	135,400	0.4
			2003	UC	143,400	152,000	169,200	134,800	0.4
			2004	UC	145,000	153,200	169,900	137,000	0.5
			2005	UC	149,400	158,100	174,700	140,100	0.6
			2006	UC	151,300	160,000	176,800	142,400	0.3
			2007	UC	153,200	162,500	177,300	143,700	0.5
			2008	UC	155,100	163,800	153,800	145,100	0.5
			2009	UC	157,000	165,800	182,900	147,700	0.5
			2010	UC	158,900	168,000	184,900	149,400	0.4
			2011	UC	160,800	160,800	165,600	152,700	N/A
			2012	UC	162,600	162,600	174,000	154,500	N/A
			2013	UC	164,500	164,500	166,200	156,300	N/A
			2014	UC	166,400	166,400	159,800	158,100	N/A
			2015	UC	168,300	168,300	161,600	159,900	N/A
			2016	UC	170,200	170,200	163,400	161,700	N/A
417	BRONSON AV IC-121A-OTTAWA	0.5	1988	UC	105,600	110,800	119,300	99,200	1.2
			1989	UC	111,300	116,800	125,700	105,600	1.2
			1990	UC	117,900	126,100	136,700	112,000	0.7
			1991	UC	120,000	127,100	137,900	116,400	1.2
			1992	UC	121,100	128,300	139,200	116,200	1.3
			1993	UC	122,000	126,800	137,800	113,400	1.0
			1994	UC	131,900	139,800	153,000	120,000	1.1
			1995	UC	136,700	142,200	155,800	127,100	1.0
			1996	UC	141,500	150,600	165,600	134,400	0.7
			1997	UC	146,200	153,500	171,100	137,400	1.1

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			1998	UC	151,000	160,700	176,700	143,500	0.8
			1999	UC	145,700	155,000	170,500	138,400	0.9
			2000	UC	147,400	156,800	173,600	138,600	1.1
			2001	UC	149,100	159,500	175,900	140,200	0.9
			2002	UC	150,800	160,700	177,400	141,200	0.8
			2003	UC	148,100	157,000	174,800	139,200	1.4
			2004	UC	151,000	159,600	176,900	142,600	1.1
			2005	UC	154,700	163,700	180,900	145,100	1.0
			2006	UC	156,300	165,300	182,600	147,100	1.0
			2007	UC	157,800	167,400	182,600	148,000	0.8
			2008	UC	159,400	168,400	158,100	149,100	1.1
			2009	UC	160,900	169,900	187,500	151,400	1.1
			2010	UC	162,500	171,800	189,100	152,800	0.8
			2011	UC	164,000	164,000	169,000	155,800	N/A
			2012	UC	165,600	165,600	177,200	157,300	N/A
			2013	UC	167,200	167,200	168,800	158,800	N/A
			2014	UC	168,700	168,700	162,000	160,300	N/A
			2015	UC	170,300	170,300	163,500	161,800	N/A
			2016	UC	171,800	171,800	165,000	163,200	N/A
417	ROCHESTER ST IC-121B-OTTAWA	1.5	1988	UC	114,400	120,100	129,200	107,500	0.8
			1989	UC	120,600	126,500	136,200	114,500	1.2
			1990	UC	127,600	136,500	148,000	121,200	0.4
			1991	UC	130,000	137,700	149,400	126,100	0.9
			1992	UC	130,800	138,500	150,300	125,500	1.2
			1993	UC	131,000	136,200	148,000	121,800	1.4
			1994	UC	143,100	151,700	166,000	130,200	0.7
			1995	UC	148,500	154,400	169,300	138,100	0.7
			1996	UC	153,800	163,600	179,900	146,100	0.5
			1997	UC	159,200	167,200	186,300	149,600	0.8
			1998	UC	164,500	175,000	192,500	156,300	0.5
			1999	UC	158,200	168,300	185,100	150,300	0.5
			2000	UC	160,000	170,200	188,500	150,400	0.5
			2001	UC	161,800	173,100	190,900	152,100	0.5

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			2002	UC	163,500	174,200	192,300	153,100	0.5
			2003	UC	160,200	169,800	189,000	150,600	0.6
			2004	UC	162,000	171,200	189,800	153,000	0.6
			2005	UC	167,000	176,700	195,300	156,600	0.4
			2006	UC	168,600	178,300	197,000	158,700	0.4
			2007	UC	170,100	180,400	196,900	159,600	0.5
			2008	UC	171,700	181,400	170,300	160,600	0.6
			2009	UC	173,200	182,900	201,800	163,000	0.7
			2010	UC	174,800	184,800	203,400	164,400	0.5
			2011	UC	176,300	176,300	181,600	167,500	N/A
			2012	UC	177,900	177,900	190,300	169,000	N/A
			2013	UC	179,400	179,400	181,200	170,500	N/A
			2014	UC	181,000	181,000	173,800	171,900	N/A
			2015	UC	182,500	182,500	175,200	173,400	N/A
			2016	UC	184,100	184,100	176,700	174,900	N/A
417	PARKDALE AV IC-122-OTTAWA	0.9	1988	UC	110,600	116,000	124,900	103,900	1.2
			1989	UC	116,700	122,500	131,800	110,800	2.3
			1990	UC	120,600	128,900	139,800	114,500	1.1
			1991	UC	121,000	128,200	139,100	117,300	1.0
			1992	UC	125,400	132,800	144,100	120,300	1.7
			1993	UC	126,000	131,000	142,300	117,100	1.8
			1994	UC	135,900	144,100	157,600	123,700	1.4
			1995	UC	140,800	146,400	160,500	130,900	1.2
			1996	UC	145,700	155,000	170,500	138,400	1.2
			1997	UC	150,600	158,100	176,200	141,600	0.9
			1998	UC	155,500	165,500	181,900	147,700	0.9
			1999	UC	149,200	158,700	174,600	141,700	1.0
			2000	UC	150,700	160,300	177,500	141,700	1.1
			2001	UC	152,200	162,900	179,600	143,100	1.0
			2002	UC	153,700	163,800	180,800	143,900	0.8
			2003	UC	150,400	159,400	177,500	141,400	1.0
			2004	UC	152,000	160,600	178,100	143,600	0.8
			2005	UC	156,500	165,600	183,000	146,800	0.9

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			2006	UC	157,800	166,900	184,400	148,500	0.9
			2007	UC	159,100	168,700	184,100	149,300	1.3
			2008	UC	160,400	169,400	159,100	150,100	0.9
			2009	UC	161,700	170,700	188,400	152,100	0.9
			2010	UC	163,000	172,300	189,700	153,300	1.0
			2011	UC	164,300	164,300	169,200	156,000	N/A
			2012	UC	165,500	165,500	177,100	157,300	N/A
			2013	UC	166,800	166,800	168,500	158,500	N/A
			2014	UC	168,100	168,100	161,400	159,700	N/A
			2015	UC	169,400	169,400	162,600	160,900	N/A
			2016	UC	170,700	170,700	163,900	162,100	N/A
417	ISLAND PARK DR IC-123-OTTAWA	0.8	1988	UC	106,500	111,800	120,300	100,100	0.7
			1989	UC	112,800	118,300	127,400	107,100	1.3
			1990	UC	117,100	125,200	135,700	111,100	0.6
			1991	UC	119,000	126,100	136,800	115,400	0.7
			1992	UC	121,500	128,700	139,700	116,600	1.2
			1993	UC	122,000	126,800	137,800	113,400	1.1
			1994	UC	132,300	140,200	153,500	120,400	0.6
			1995	UC	137,100	142,600	156,300	127,500	0.8
			1996	UC	141,900	151,000	166,000	134,800	0.9
			1997	UC	146,700	154,000	171,600	137,900	0.8
			1998	UC	151,600	161,300	177,400	144,000	0.4
			1999	UC	145,500	154,800	170,200	138,200	0.4
			2000	UC	147,100	156,500	173,300	138,300	0.6
			2001	UC	148,600	159,000	175,300	139,700	0.5
			2002	UC	150,100	159,900	176,600	140,500	0.4
			2003	UC	146,900	155,700	173,300	138,100	0.6
			2004	UC	150,000	158,500	175,700	141,700	0.6
			2005	UC	153,500	162,400	179,500	144,000	0.7
			2006	UC	154,900	163,800	181,000	145,800	0.5
			2007	UC	156,300	165,800	180,900	146,600	0.6
			2008	UC	157,700	166,600	156,400	147,500	0.5
			2009	UC	159,000	167,900	185,200	149,600	0.8

Traffic Engineering Software

Weekly Volume Summary

Wed, Apr 03, 2019

Location: Hwy 417 - 0.5 km West of Parkdale Ave IC122

LHRS/Offset: 49460 / 0.0 **Region:** Eastern

Pattern Type: Urban Commuter **PCS#:** 34 **Hwy. TVIS#:** 417170

Count Direction: EB **Report Dates:** Sep 12, 2018 **to** Sep 18, 2018

Hour Interval	Wed 18/09/12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Wed 19
0:00- 1:00		574	624	1,119	1,272	548	457	527
1:00- 2:00		355	438	789	820	337	282	313
2:00- 3:00		271	287	606	658	245	237	220
3:00- 4:00		268	290	405	410	231	238	258
4:00- 5:00		490	542	335	281	501	469	504
5:00- 6:00		2,154	1,917	579	455	2,078	2,012	2,140
6:00- 7:00		6,203	5,410	1,494	1,072	5,775	4,952	5,433
7:00- 8:00		6,429	6,318	2,164	1,513	6,559	5,658	6,567
8:00- 9:00		6,350	6,256	3,530	2,298	6,202	5,764	6,327
9:00-10:00		6,075	5,972	4,548	3,716	5,819	5,655	6,121
10:00-11:00		5,140	5,694	5,193	4,654	5,030	5,593	4,949
11:00-12:00		4,070	5,628	5,816	4,826	5,075	5,168	5,063
AM Total	0	38,379	39,376	26,578	21,975	38,400	36,485	38,422
12:00-13:00	4,383	4,438	5,616	5,625	5,330	5,211	4,931	
13:00-14:00	4,503	5,244	5,010	5,696	5,511	5,111	5,114	
14:00-15:00	5,293	4,889	5,159	5,403	5,417	5,551	5,335	
15:00-16:00	5,167	5,046	5,213	4,742	5,269	5,897	5,975	
16:00-17:00	3,388	3,305	5,237	5,144	4,958	5,211	5,561	
17:00-18:00	4,819	4,457	5,421	5,067	4,928	4,883	5,941	
18:00-19:00	5,198	5,741	5,282	4,874	4,530	4,916	5,679	
19:00-20:00	4,161	4,411	4,339	4,010	3,792	3,694	4,028	
20:00-21:00	3,610	3,896	3,807	3,756	3,345	3,165	3,548	
21:00-22:00	2,758	3,002	3,211	3,259	2,434	2,569	2,872	
22:00-23:00	1,653	1,875	2,487	2,534	1,714	1,471	1,719	
23:00-24:00	1,071	1,265	1,824	1,950	1,036	948	1,049	
PM Total	46,004	47,569	52,606	52,060	48,264	48,627	51,752	0
24 Hr. Total	46,004	85,948	91,982	78,638	70,239	87,027	88,237	38,422
Noon - Noon		84,383	86,945	79,184	74,035	86,664	85,112	90,174

Traffic Engineering Software

Weekly Volume Summary

Wed, Apr 03, 2019

Location: Hwy 417 - 0.5 km West of Parkdale Ave IC122

LHRS/Offset: 49460 / 0.0 **Region:** Eastern

Pattern Type: Urban Commuter **PCS#:** 34 **Hwy. TVIS#:** 417170

Count Direction: WB **Report Dates:** Sep 12, 2018 **to** Sep 18, 2018

Hour Interval	Wed 18/09/12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Wed 19
0:00- 1:00		893	948	1,614	1,853	661	700	746
1:00- 2:00		508	554	1,103	1,270	396	375	428
2:00- 3:00		376	445	953	1,031	335	339	341
3:00- 4:00		283	350	626	696	269	286	293
4:00- 5:00		424	422	446	397	431	403	444
5:00- 6:00		1,526	1,354	570	467	1,474	1,548	1,527
6:00- 7:00		4,382	4,195	1,314	893	4,347	4,464	4,564
7:00- 8:00		5,971	6,014	2,258	1,570	5,949	6,102	6,242
8:00- 9:00		5,988	6,013	3,608	2,485	5,897	6,090	6,161
9:00-10:00		5,615	5,653	4,857	3,854	5,223	5,564	5,363
10:00-11:00		5,111	5,319	5,439	4,774	3,506	5,016	4,953
11:00-12:00		5,519	5,922	5,714	5,312	3,443	5,279	5,332
AM Total	0	36,596	37,189	28,502	24,602	31,931	36,166	36,394
12:00-13:00	5,458	5,866	6,080	6,267	5,947	3,598	5,457	
13:00-14:00	5,612	5,985	5,640	5,959	3,982	4,904	5,491	
14:00-15:00	6,287	5,913	5,556	5,910	5,466	5,834	6,113	
15:00-16:00	5,543	5,018	5,146	5,707	5,479	5,569	5,422	
16:00-17:00	4,859	4,512	3,953	5,714	5,233	4,937	4,773	
17:00-18:00	4,847	4,388	4,267	5,152	4,667	4,991	4,951	
18:00-19:00	5,266	5,385	5,135	4,291	4,178	5,035	5,383	
19:00-20:00	4,746	4,812	5,144	3,936	4,000	4,543	4,706	
20:00-21:00	4,073	4,212	4,149	3,624	3,474	3,818	3,935	
21:00-22:00	3,651	3,933	3,747	3,195	2,824	3,231	3,541	
22:00-23:00	2,589	2,698	2,993	2,942	2,187	2,211	2,336	
23:00-24:00	1,787	1,960	2,431	2,486	1,357	1,332	1,395	
PM Total	54,718	54,682	54,241	55,183	48,794	50,003	53,503	0
24 Hr. Total	54,718	91,278	91,430	83,685	73,396	81,934	89,669	36,394
Noon - Noon		91,314	91,871	82,743	79,785	80,725	86,169	89,897

Traffic Engineering Software

Weekly Volume Summary

Wed, Apr 03, 2019

Location: Hwy 417 - 0.5 km West of Parkdale Ave IC122

LHRS/Offset: 49460 / 0.0 **Region:** Eastern

Pattern Type: Urban Commuter **PCS#:** 34 **Hwy. TVIS#:** 417170

Count Direction: EB/WB **Report Dates:** Sep 12, 2018 **to** Sep 18, 2018

Hour Interval	Wed 18/09/12	Thu 13	Fri 14	Sat 15	Sun 16	Mon 17	Tue 18	Wed 19
0:00- 1:00		1,467	1,572	2,733	3,125	1,209	1,157	1,273
1:00- 2:00		863	992	1,892	2,090	733	657	741
2:00- 3:00		647	732	1,559	1,689	580	576	561
3:00- 4:00		551	640	1,031	1,106	500	524	551
4:00- 5:00		914	964	781	678	932	872	948
5:00- 6:00		3,680	3,271	1,149	922	3,552	3,560	3,667
6:00- 7:00		10,585	9,605	2,808	1,965	10,122	9,416	9,997
7:00- 8:00		12,400	12,332	4,422	3,083	12,508	11,760	12,809
8:00- 9:00		12,338	12,269	7,138	4,783	12,099	11,854	12,488
9:00-10:00		11,690	11,625	9,405	7,570	11,042	11,219	11,484
10:00-11:00		10,251	11,013	10,632	9,428	8,536	10,609	9,902
11:00-12:00		9,589	11,550	11,530	10,138	8,518	10,447	10,395
AM Total	0	74,975	76,565	55,080	46,577	70,331	72,651	74,816
12:00-13:00	9,841	10,304	11,696	11,892	11,277	8,809	10,388	
13:00-14:00	10,115	11,229	10,650	11,655	9,493	10,015	10,605	
14:00-15:00	11,580	10,802	10,715	11,313	10,883	11,385	11,448	
15:00-16:00	10,710	10,064	10,359	10,449	10,748	11,466	11,397	
16:00-17:00	8,247	7,817	9,190	10,858	10,191	10,148	10,334	
17:00-18:00	9,666	8,845	9,688	10,219	9,595	9,874	10,892	
18:00-19:00	10,464	11,126	10,417	9,165	8,708	9,951	11,062	
19:00-20:00	8,907	9,223	9,483	7,946	7,792	8,237	8,734	
20:00-21:00	7,683	8,108	7,956	7,380	6,819	6,983	7,483	
21:00-22:00	6,409	6,935	6,958	6,454	5,258	5,800	6,413	
22:00-23:00	4,242	4,573	5,480	5,476	3,901	3,682	4,055	
23:00-24:00	2,858	3,225	4,255	4,436	2,393	2,280	2,444	
PM Total	100,722	102,251	106,847	107,243	97,058	98,630	105,255	0
24 Hr. Total	100,722	177,226	183,412	162,323	143,635	168,961	177,906	74,816
Noon - Noon		175,697	178,816	161,927	153,820	167,389	171,281	180,071

ADT	AWD	AADT	AAWD	SADT	SAWDT	WADT	DHV
169,857	176,466						

O-Train Line 2

The full-length of O-Train Line 2 is currently closed for Stage 2 construction. Line 2 buses are operating in place of the train. View closure details.

The O-Train Line 2 (the Trillium Line) is an eight-kilometre diesel light-rail service. Line 2 runs from Greenboro Station in the south to Bayview Station just west of downtown.

Line 2 stations

Station	Stop #
Greenboro	3037
Mooney's Bay	3063
Carleton	3062
Carling	3061
Bayview	3060

Choose your station for a map and service information:

Select a Line 2 station

Frequent service

The Trillium Line is in service 7 days a week, until midnight Monday to Saturday and until 11 pm. Sunday. Trains arrive about every 12 minutes on weekdays and Saturdays and between every 12 and 15 minutes on Sundays.

Use the Travel Planner for Trillium Line schedules and next departures:

You can also find out the current schedule by texting 560560 or calling 613-560-1000 plus the 4-digit stop number (listed above) for your station.

Line 2 trains

The Trillium Line is served by six Alstom Coradia Lint trains.

- High-efficiency, diesel engines
- Advanced technology makes them quiet and fuel efficient
- Low greenhouse gas emissions
- Low operating costs
- Two platform-level double doors per train
- Fully-accessible cars
- Large windows
- Smooth, comfortable ride
- Space for 260 passengers

Train names

In 2017, the City of Ottawa ran a Name the Trains Contest. Children and youth aged 16 and under were invited to name O-Train Line 1 and Line 2 trains.

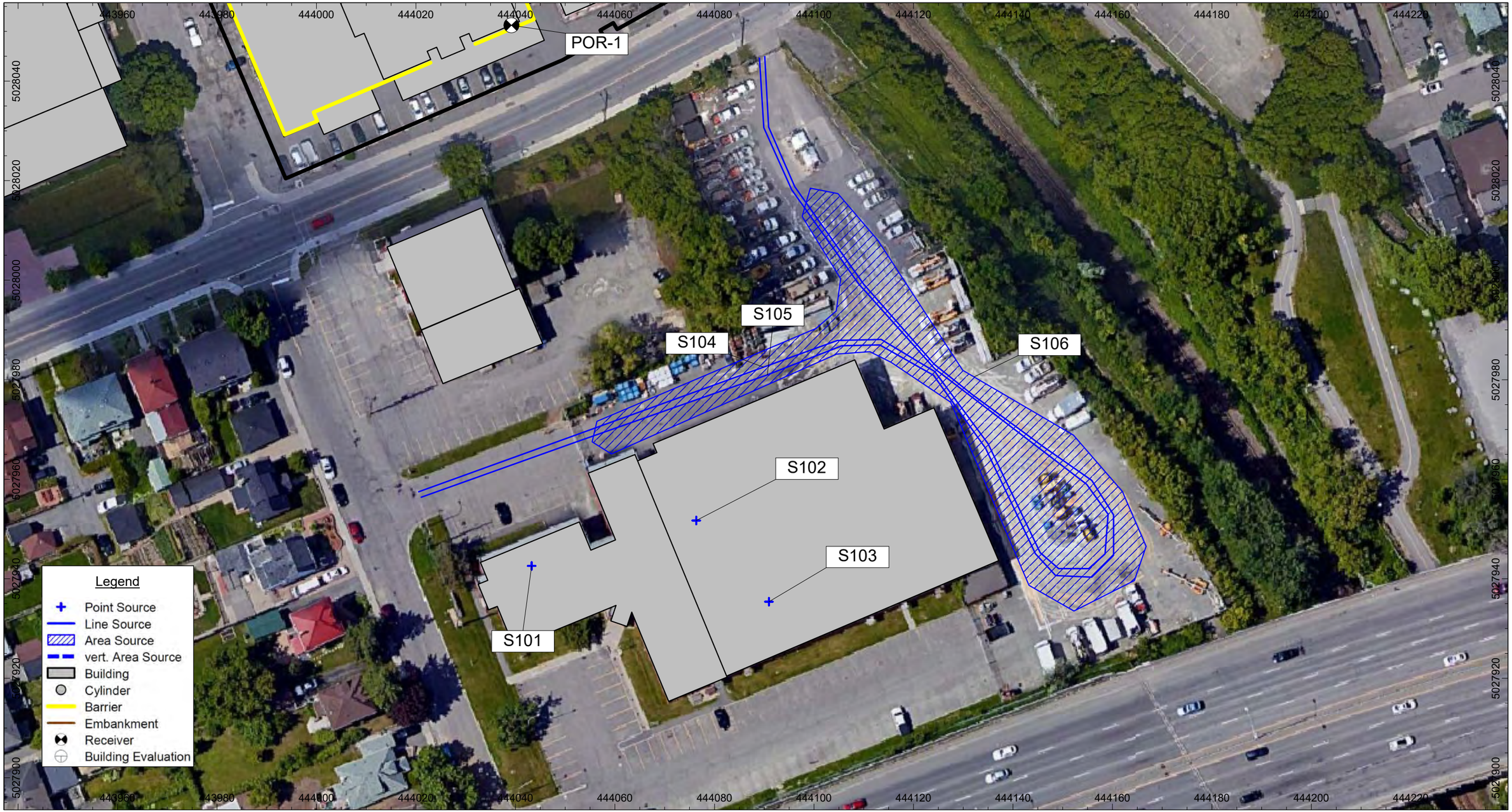
- Line 1 train names

The chosen names for Line 2 are:

- Emily Murphy
- Nanuq • Polar Bear
- Portage
- Dreamcatcher
- Northern Lights
- Rocket Richard

Appendix D

Stationary Noise Model Information



Source: Google Satellite

N

NOISE IMPACT STUDY
TIP GLADSTONE GP INC.
145 LORETTA AVE N & 951 GLADSTONE AVE

INDUSTRY NOISE SOURCE LOCATIONS

11223331
02.02.2022

FIGURE D.1

CadnaA File: \\ghdnet\ghd\CA\Waterloo\Projects\662\11223331\Tech\Noise\01 CadnaA\11223331_Gladstone_NIS_v2022.00.cna

Table D.1

Noise Source Sound Level Summary
TIP Gladstone GP Inc.
145 Loretta Ave N & 951 Gladstone Ave, Ottawa, Ontario

Cadna A ID	Noise Source Description		1/1 Octave Band Data									Unadjusted Total Sound Power Level	Tonal Penalty Assessment		Height Absolute	Operating Time Day/Eve/Night	Vehicle Volumes Day/Eve/Night	Speed	Reference/Comments
			32	63	125	250	500	1000	2000	4000	8000	(dBA)		(dBA)	(m)	(min)	(veh/hr)	(km/hr)	
S101	Ottawa Traffic Operations - HVAC Unit	PWL (dB)	—	87.1	89.9	86.4	84.0	82.7	79.0	73.9	68.6	93.9							
		A-weighted correction	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1								
		PWL (dBA)	—	60.9	73.8	77.8	80.8	82.7	80.2	74.9	67.5	**87.3**	No	0	75.5	60/60/30	—	—	GHD Reference Spectra
S102	Ottawa Traffic Operations - HVAC Unit	PWL (dB)	—	87.1	89.9	86.4	84.0	82.7	79.0	73.9	68.6	93.9							
		A-weighted correction	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1								
		PWL (dBA)	—	60.9	73.8	77.8	80.8	82.7	80.2	74.9	67.5	**87.3**	No	0	72.6	60/60/30	—	—	GHD Reference Spectra
S103	Ottawa Traffic Operations - HVAC Unit	PWL (dB)	—	87.1	89.9	86.4	84.0	82.7	79.0	73.9	68.6	93.9							
		A-weighted correction	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1								
		PWL (dBA)	—	60.9	73.8	77.8	80.8	82.7	80.2	74.9	67.5	**87.3**	No	0	72.6	60/60/30	—	—	GHD Reference Spectra
S104	Ottawa Traffic Operations - Truck Movements	PWL (dB)	—	104.4	99.4	92.4	94.4	91.4	90.4	87.4	78.4	106.4							
		A-weighted correction	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1								
		PWL (dBA)	—	78.2	83.3	83.8	91.2	91.4	91.6	88.4	77.3	**97.3**	No	0	70.8	—	15/15/15	20	GHD Reference Spectra
S105	Ottawa Traffic Operations - Deliveries (Tractor Trailers)	PWL (dB)	31.0	117.0	112.0	105.0	107.0	104.0	103.0	100.0	91.0	119.0							Referenced from UK Department for Environment, Food and Rural Affairs (Defra)
		A-weighted correction	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1								Noise Database for Construction Noise document
		PWL (dBA)	—	90.8	95.9	96.4	103.8	104.0	104.2	101.0	89.9	**109.9**	No	0	69.1	—	5/5/5	20	Transport Truck Route - 26ton 235kw - DEFRA Table 1(c)#16
S106	Ottawa Traffic Operations - Forklift	PWL (dB)	—	—	—	—	93.0	—	—	—	—	93.0							
		A-weighted correction	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1								
		PWL (dBA)	—	—	—	—	89.8	—	—	—	—	**89.8**	No	0	68.6	60/60/60	—	—	GHD Reference Spectra

Appendix E

Distances and Angles from Transportation Noise Sources

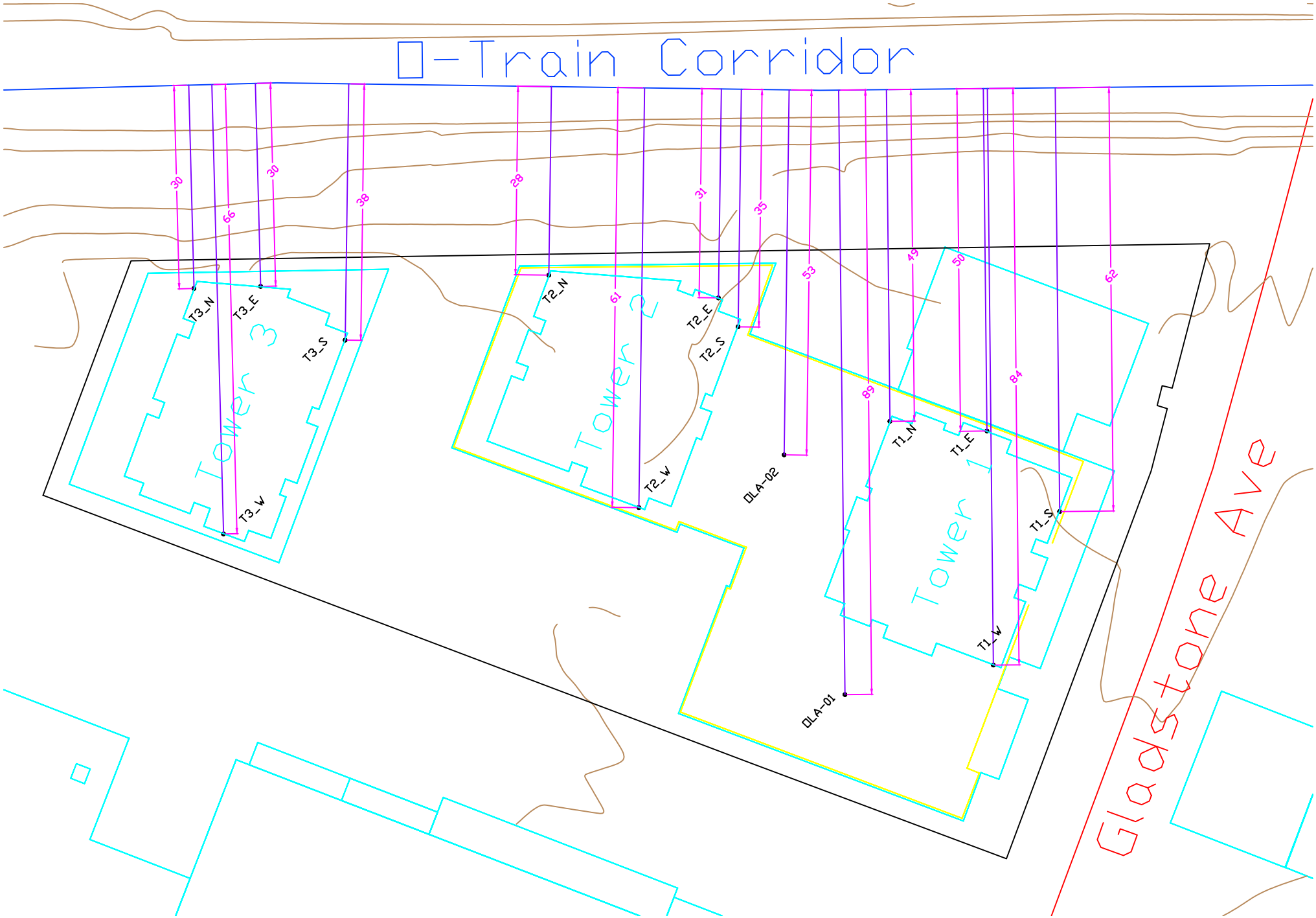


FIGURE E.1 - RECEIVER DISTANCES FROM O-TRAIN CORRIDOR
NOISE IMPACT STUDY - 145 LORETTA AVE N & 951 GLADSTONE AVE, OTTAWA

11223331
2022/10/26

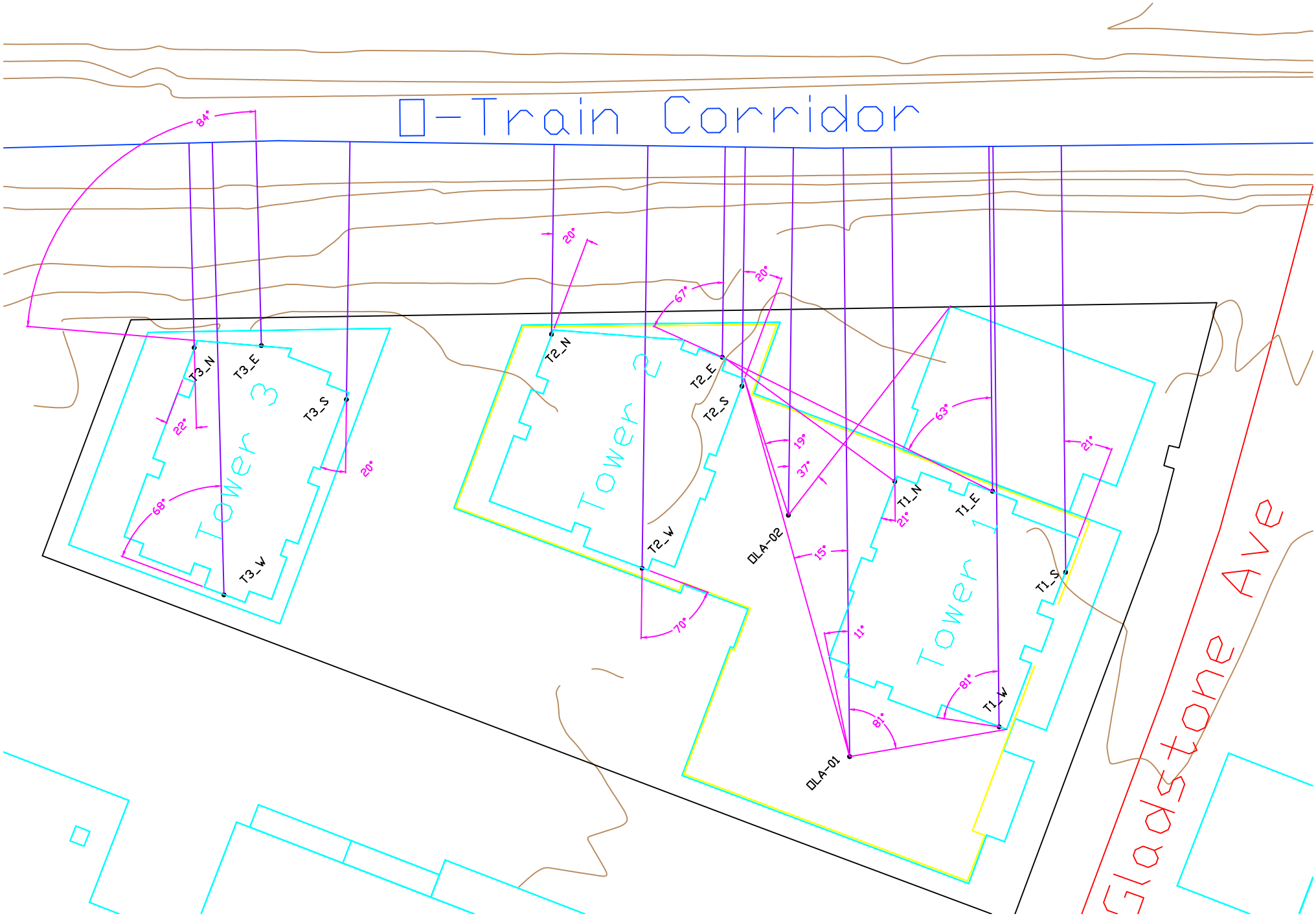


FIGURE E.2 - RECEIVER EXPOSURE ANGLES TO O-TRAIN CORRIDOR
NOISE IMPACT STUDY - 145 LORETTA AVE N & 951 GLADSTONE AVE, OTTAWA

11223331
2022/10/26

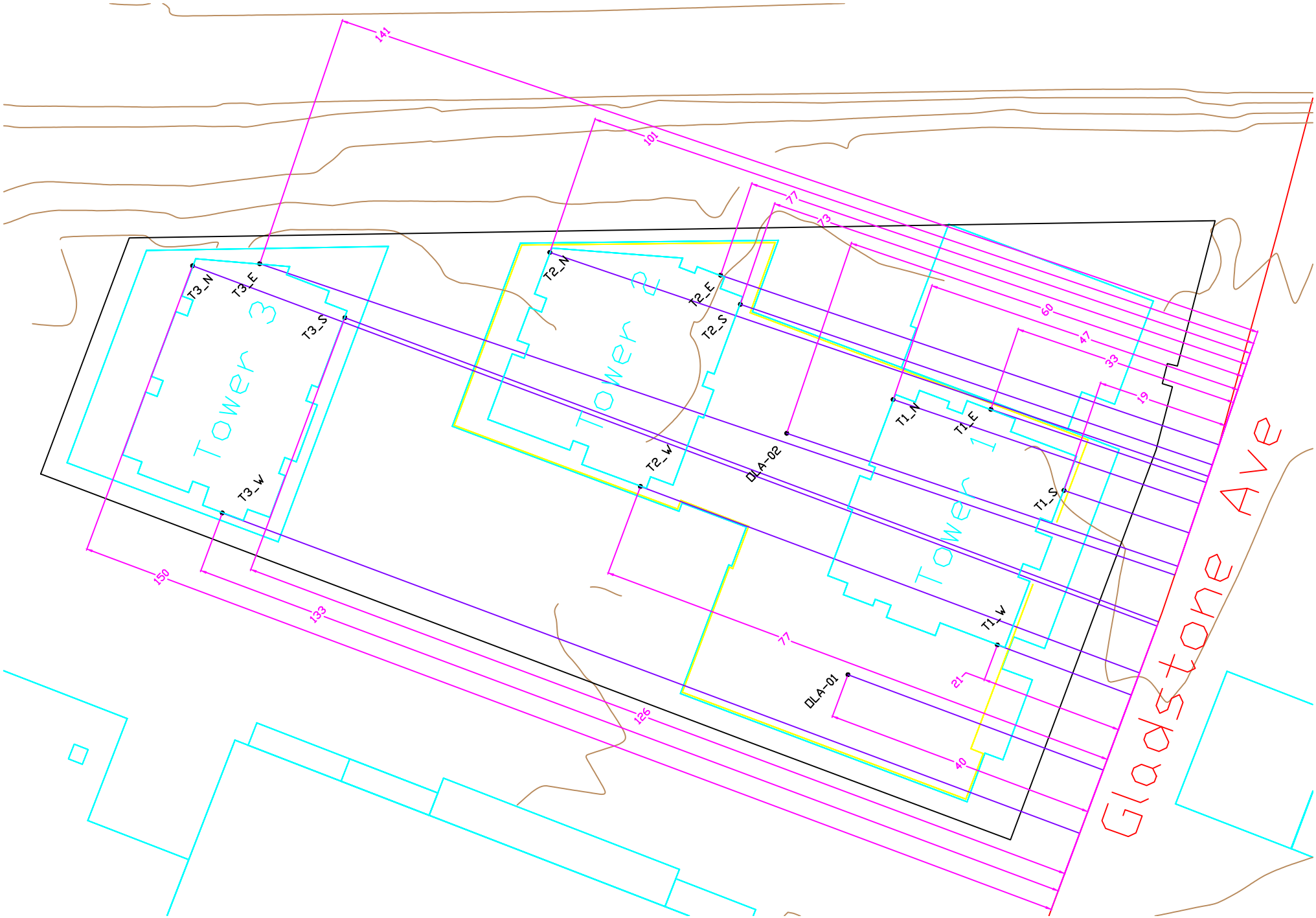


FIGURE E.3 – RECEIVER DISTANCES FROM GLADSTONE AVE
NOISE IMPACT STUDY – 145 LORETTA AVE N & 951 GLADSTONE AVE, OTTAWA

11223331
2022/10/26

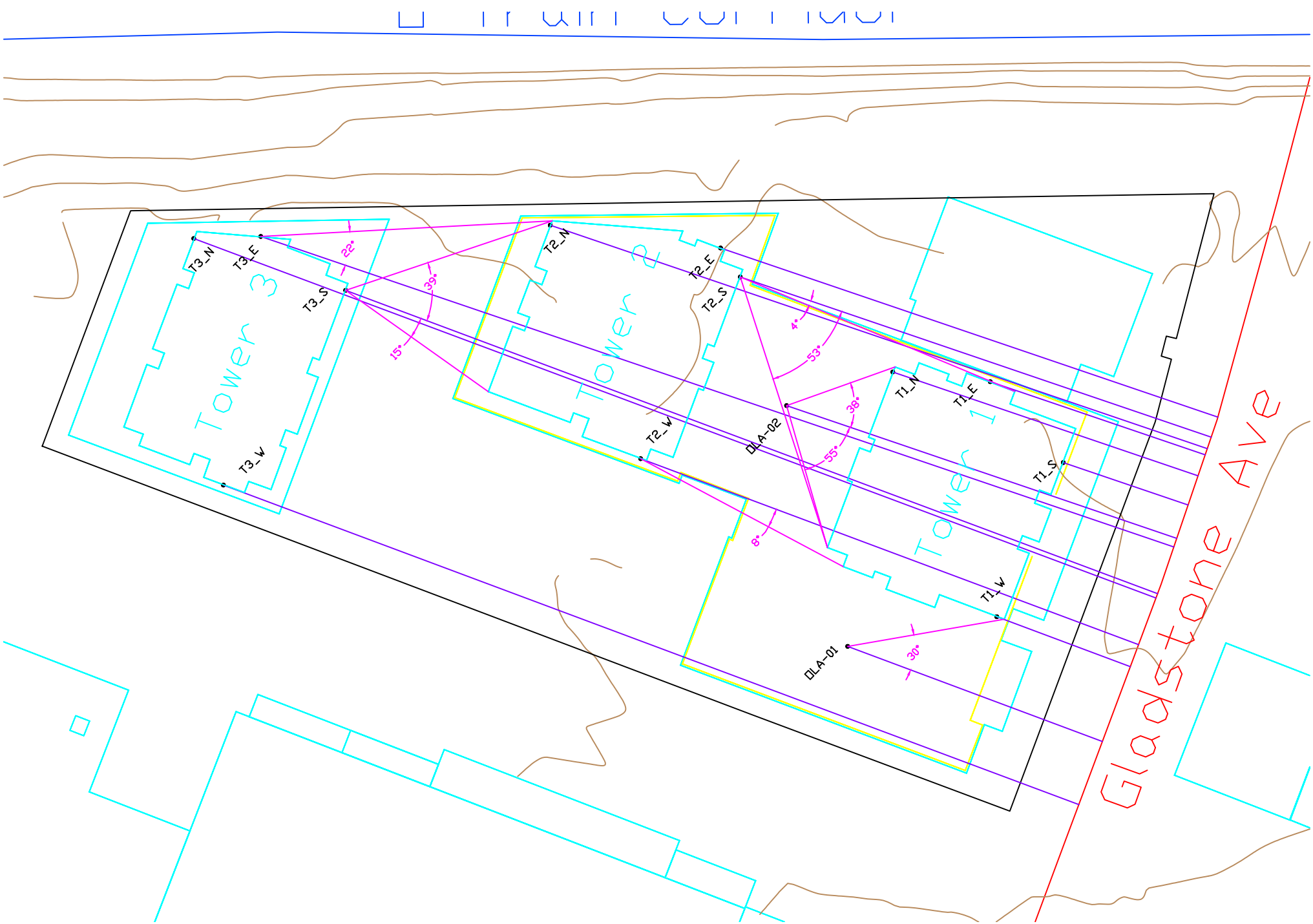


FIGURE E.4 - RECEIVER EXPOSURE ANGLES TO GLADSTONE AVE
NOISE IMPACT STUDY - 145 LORETTA AVE N & 951 GLADSTONE AVE, OTTAWA

11223331
2022/10/26

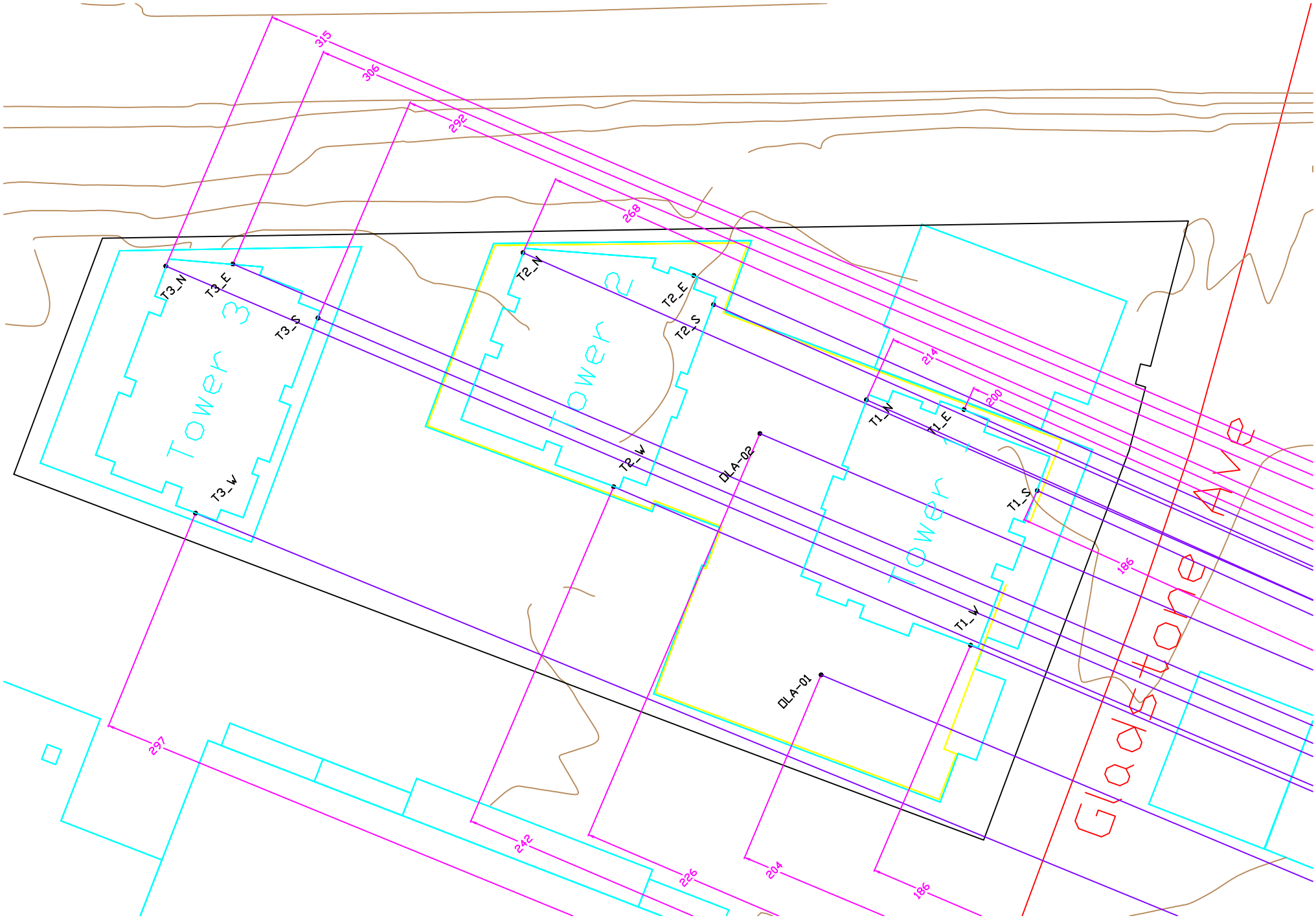


FIGURE E.5 - RECEIVER DISTANCES FROM HIGHWAY 417

NOISE IMPACT STUDY - 145 LORETTA AVE N & 951 GLADSTONE AVE, OTTAWA

11223331

2022/10/26

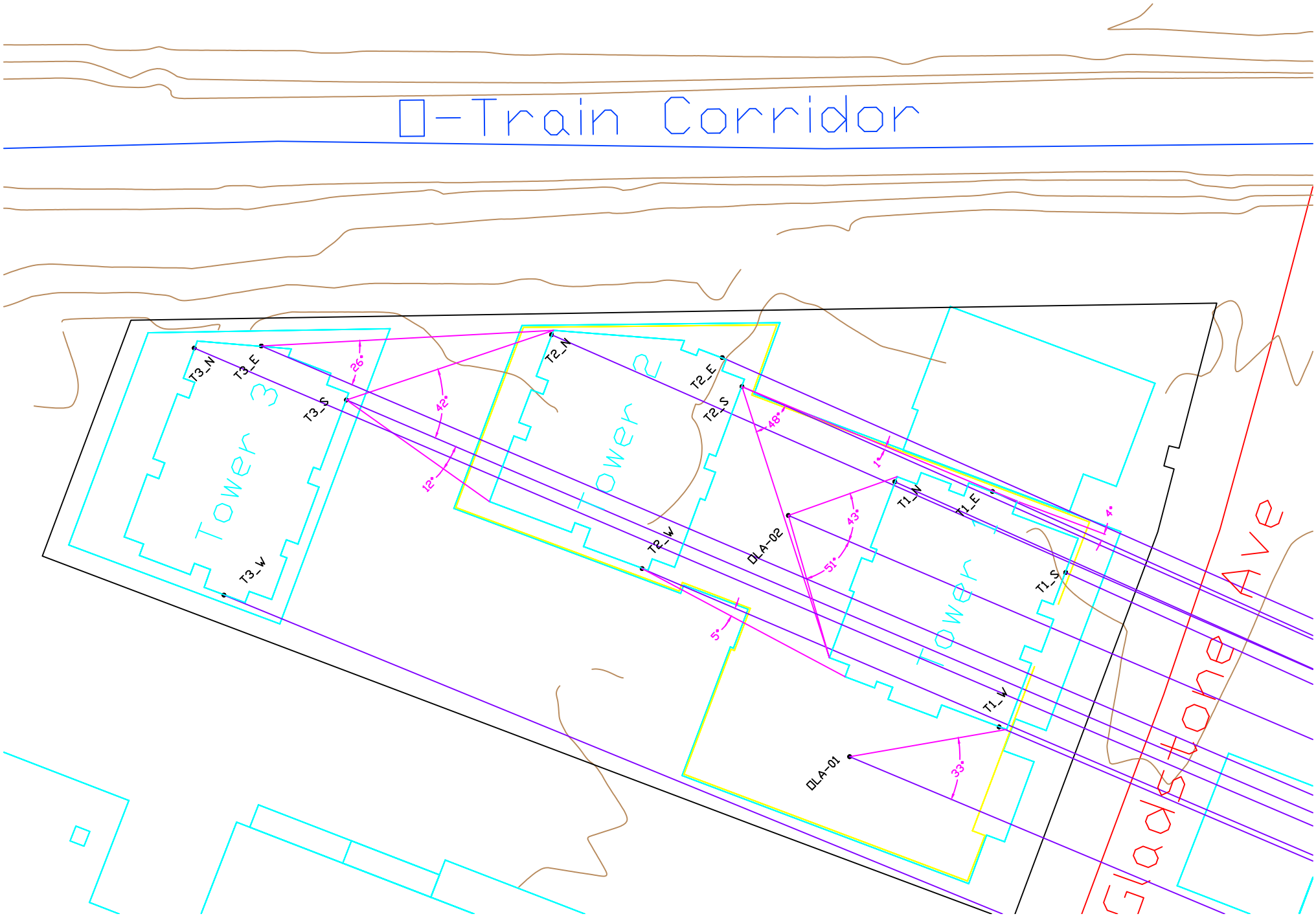


FIGURE E.6 - RECEIVER EXPOSURE ANGLES TO HIGHWAY 417
NOISE IMPACT STUDY - 145 LORETTA AVE N & 951 GLADSTONE AVE, OTTAWA

11223331
2022/10/26

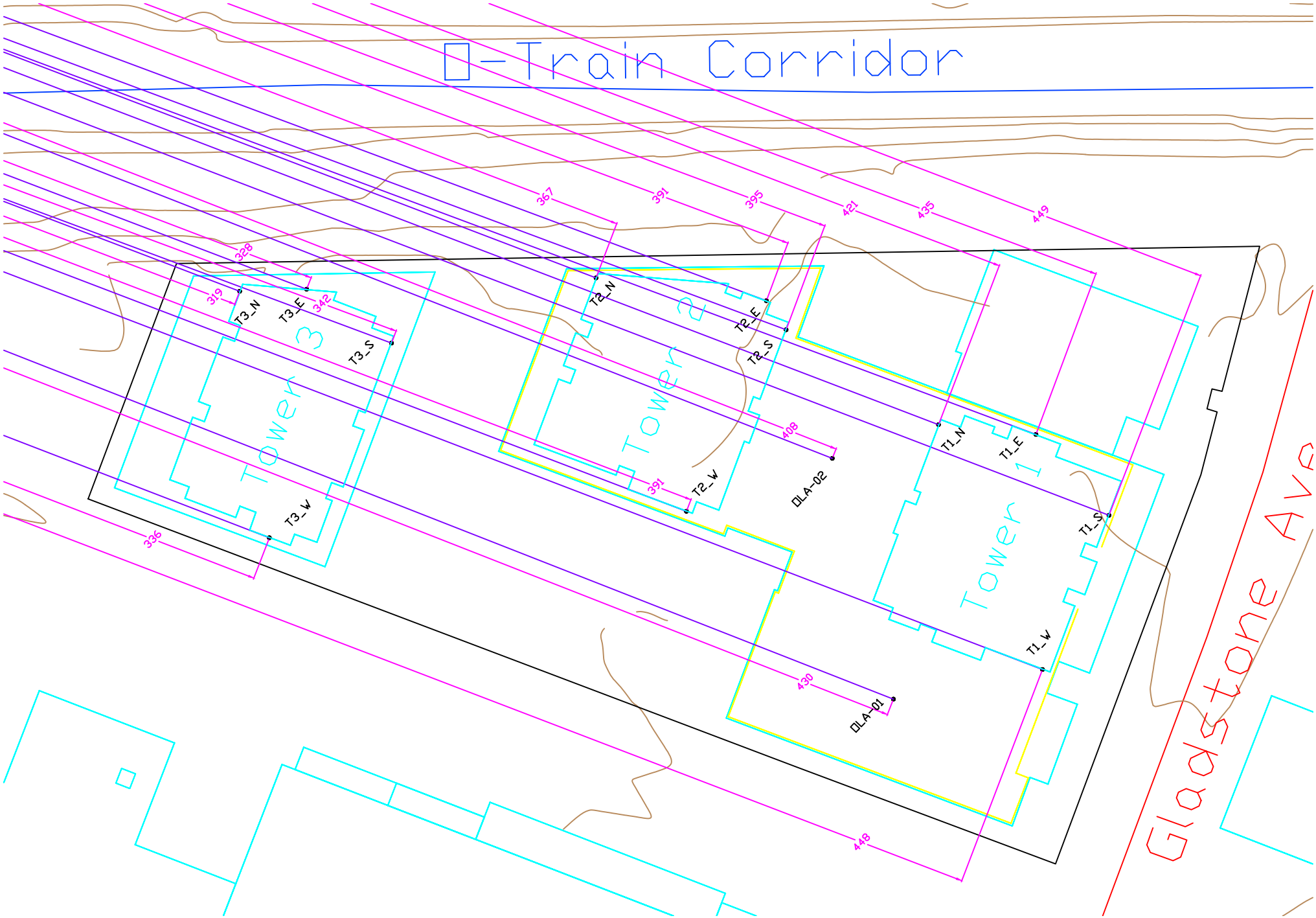


FIGURE E.7 – RECEIVER DISTANCES FROM SOMERSET ST W
NOISE IMPACT STUDY – 145 LORETTA AVE N & 951 GLADSTONE AVE, OTTAWA

11223331
2022/10/26

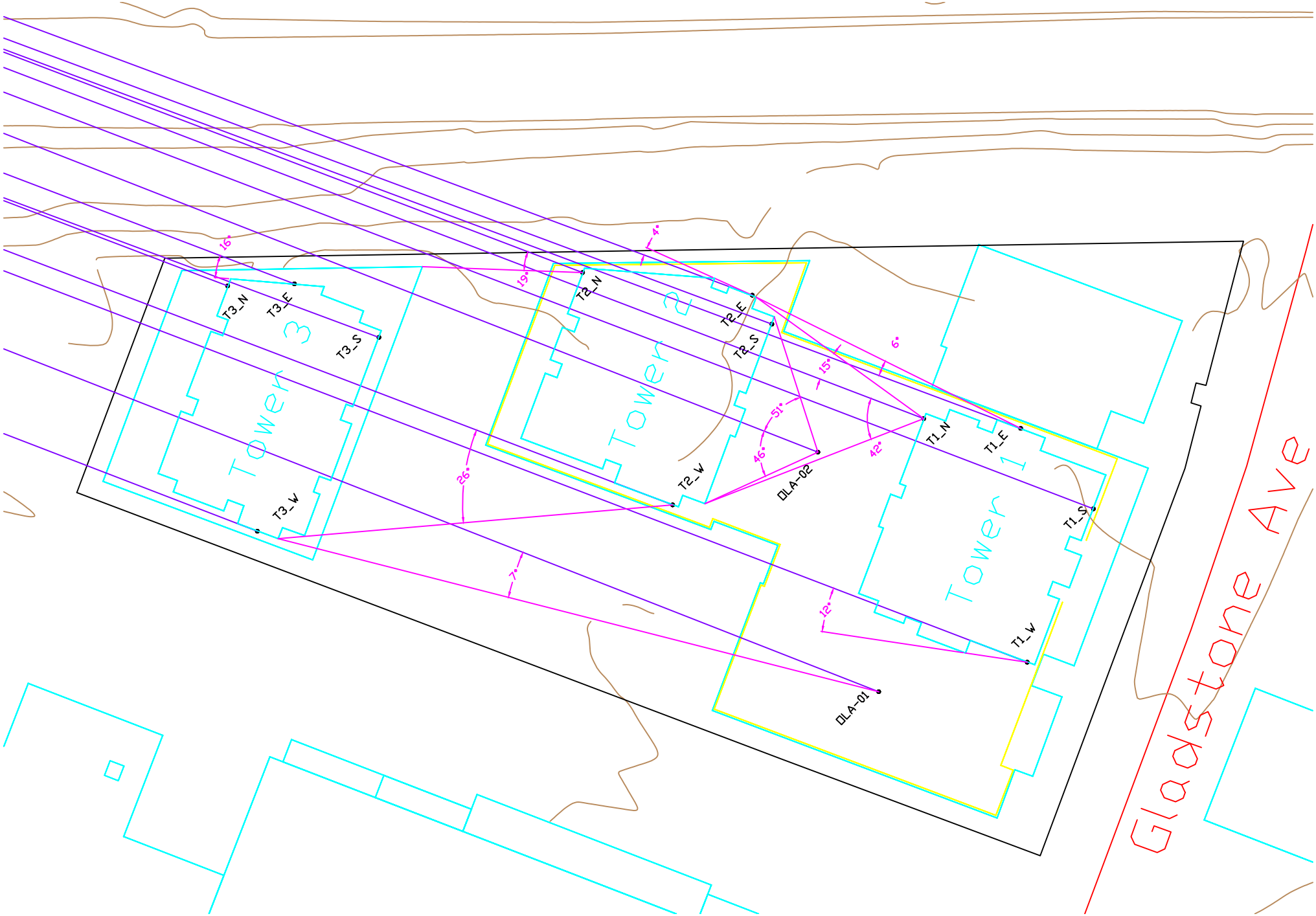


FIGURE E.8 - RECEIVER EXPOSURE ANGLES TO SOMERSET ST W
NOISE IMPACT STUDY - 145 LORETTA AVE N & 951 GLADSTONE AVE, OTTAWA

11223331
2022/10/26

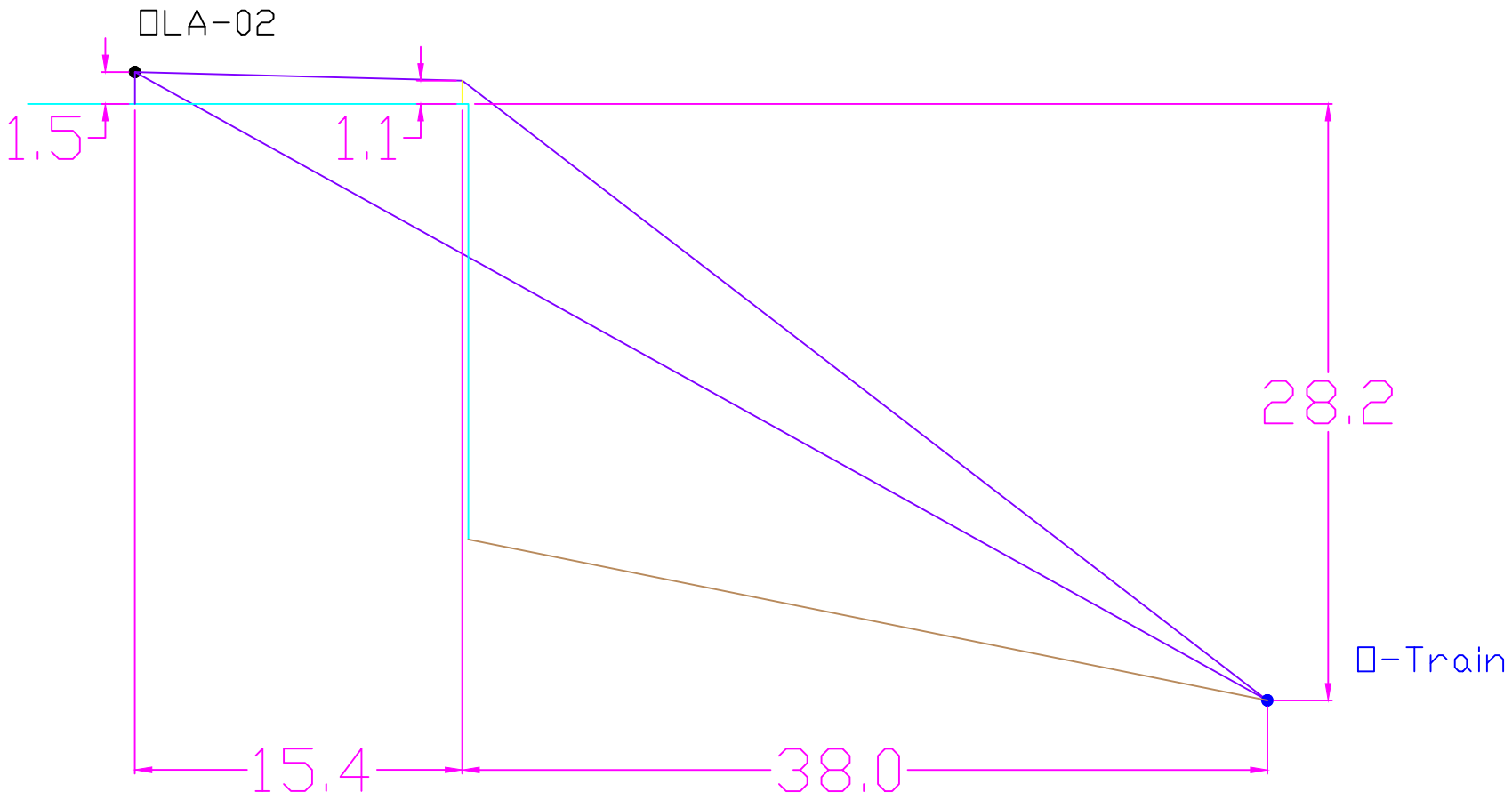


FIGURE E.9 - LA-02 SECTION VIEW (PERPENDICULAR TO O-TRAIN TRACKS)
NOISE IMPACT STUDY - 145 LORETTA AVE N & 951 GLADSTONE AVE, OTTAWA

11223331
2022/10/26

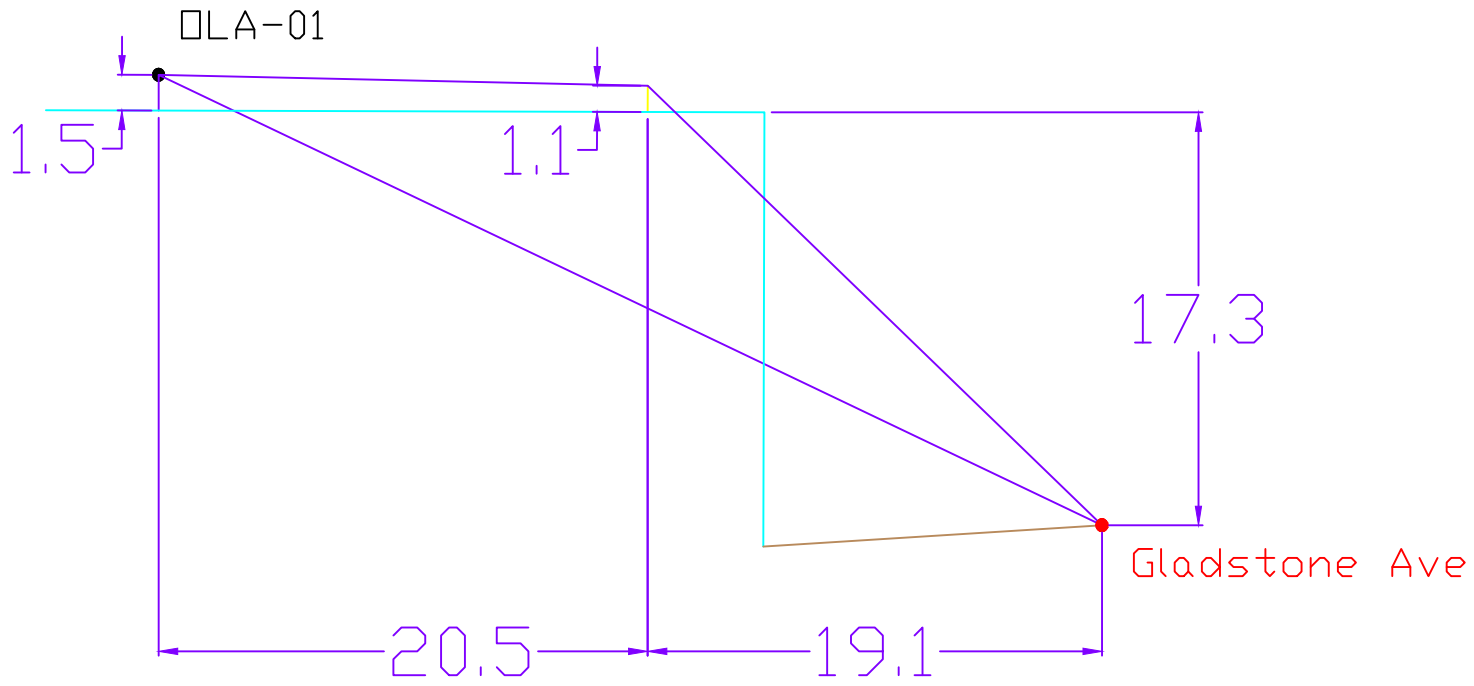


FIGURE E.10 - LA-01 SECTION VIEW (PERPENDICULAR TO GLADSTONE AVE)
NOISE IMPACT STUDY - 145 LORETTA AVE N & 951 GLADSTONE AVE, OTTAWA

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