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36 Years

1053, 1075 and 1145 March Road
CU Developments Inc.

Noise Control Feasibility Study

1053, 1075 and 1145 March Road
Noise Control Feasibility Study

Prepared for:

CU Developments Inc.

Prepared by:

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K2M 1P6

Issued: July 23, 2018

Ref: R-2018-080
Novatech File No. 116132

NOVATECH
Engineers, Planners & Landscape Architects

July 23, 2018

Planning, Infrastructure, and Economic Development Department
City of Ottawa
110 Laurier Ave. West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: **Stream Shen**

Reference: **1053, 1075 and 1145 March Road - CU Developments Inc.**
Noise Control Feasibility Study
Novatech File No.: 116132

Novatech is pleased to submit the following Noise Control Feasibility Study on behalf of CU Developments Inc. in support of Draft Plan of Subdivision and Zoning By-law Amendment applications for 1053, 1075 and 1145 March Road in Kanata North.

CU Developments Inc. intends to develop a residential subdivision with a total of 825 units including 295 single detached dwellings, 314 townhouse dwellings, and 216 multi-unit residential dwellings. The subdivision is located in the northwest quadrant of the Kanata North Community Design Plan and incorporates a portion of the north tributary of Shirley's Brook, as well as a number of institutional blocks, a neighbourhood park, and a stormwater management pond. The subdivision will develop in multiple phases.

The attached Noise Control Feasibility Study will address the environmental impact of noise from traffic on outdoor amenity areas and the indoor environment, and assess the feasibility of mitigation measures to attenuate noise to acceptable levels.

Should you have any questions or comments, please do not hesitate to contact us.

Sincerely,

NOVATECH

Marc St. Pierre
Senior Project Manager

Copy: Annibale Ferro – Uniform Urban Developments
Jim Burghout – Claridge Homes

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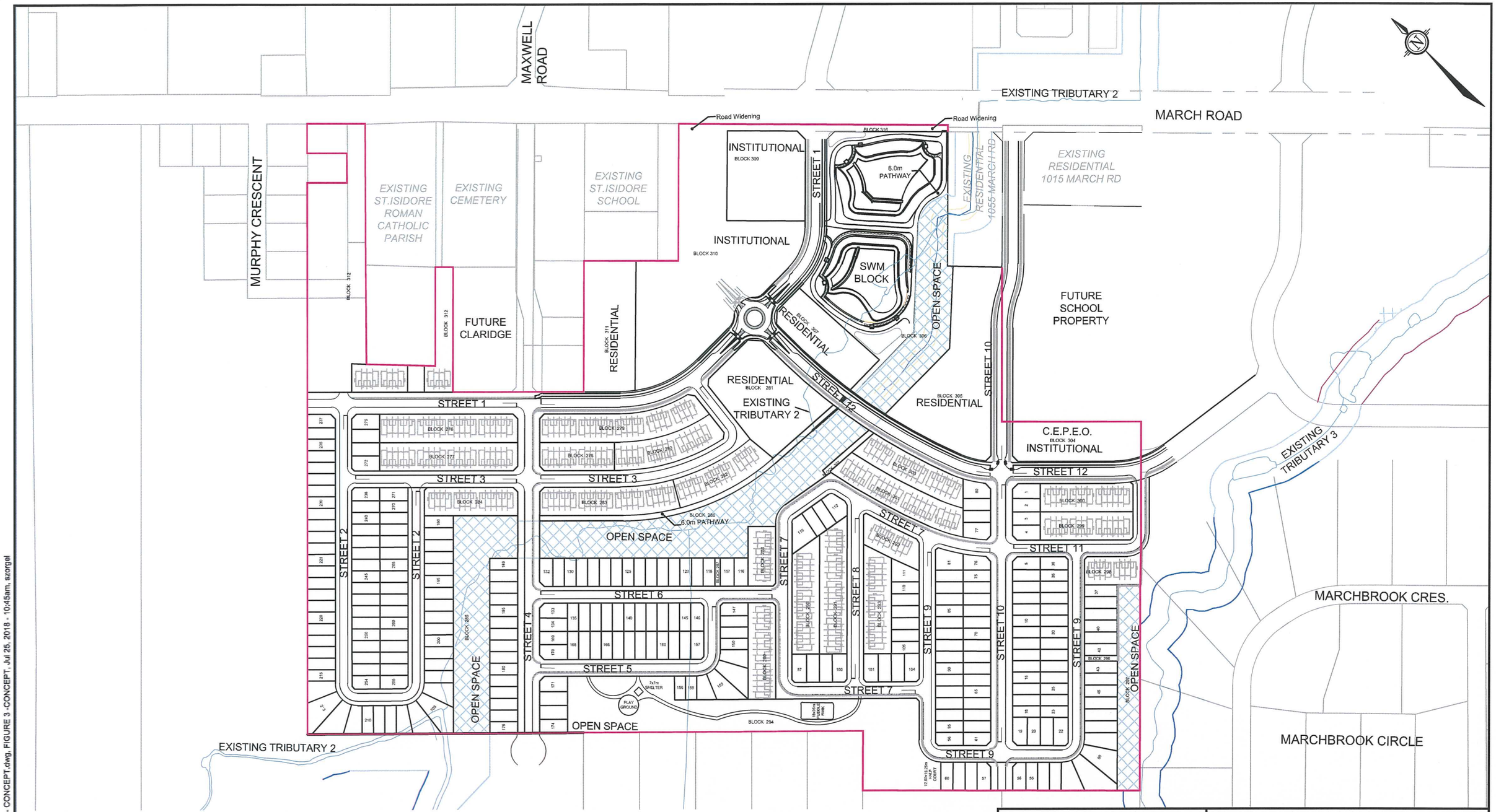

LEGEND

PROPOSED DEVELOPMENT

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CITY OF OTTAWA
CU DEVELOPMENTS INC.
1053, 1075 and 1145 MARCH ROAD

CONCEPT PLAN

SCALE 1 : 4000 (0, 40, 80, 120, 160)
DATE JUNE 2018
JOB 116132
FIGURE FIGURE 1

M:\2016\116132\CAD\Design\Figures\Noise\FIG 1 - CONCEPT.dwg, FIGURE 3 -CONCEPT, Jul 25, 2018 - 10:45am, szorgel

1.0 INTRODUCTION

Novatech has been retained by CU Developments Inc. to prepare a Noise Control Feasibility Study in support of a Draft Plan of Subdivision and Zoning By-Law Amendment (ZBLA) to allow for the development of lands known as 1053, 1075 and 1145 March Road in Kanata North (the "Subject Lands"). The Subject Lands are located in the northwest quadrant of the Kanata North Urban Expansion Area (KNUEA) which is subject to the Kanata North Community Design Plan (CDP), approved by Council on July 13, 2016.

The proposed development consists of 825 units including 295 single detached dwellings, 314 townhouse dwellings, and 216 multi-unit residential dwellings to be developed in multiple phases. This subdivision will be the first stage in building out the community envisioned in the Kanata North CDP. Refer to **Figure 1 – Concept Plan**.

This study will assess the environmental impact of noise from traffic on outdoor amenity areas and the indoor environment and review the feasibility of mitigation methods. Mitigation of in-door noise levels will not be discussed in this report since floor areas, window/door areas and building sections are not yet available. These components will be reviewed as part of a Noise Control Detailed Study at the detailed design phase.

1.1 Site Location and Context

The Subject Lands are owned by CU Developments Inc. and encompass approximately 48.05 hectares including several properties under the municipal addresses 1053, 1075 and 1145 March Road. The lands are legally described as Part of Lot 13 and 14, Concession 3, Township of March.

For the purposes of this report, March Road will be taken to be the north-south axis. Specifically, the site is located immediately west of March Road and south of Murphy Court as shown on **Figure 2 – Site Location**. The subject site is currently used for passive agricultural activities. The site has a moderate slope from the western boundary towards March Road.

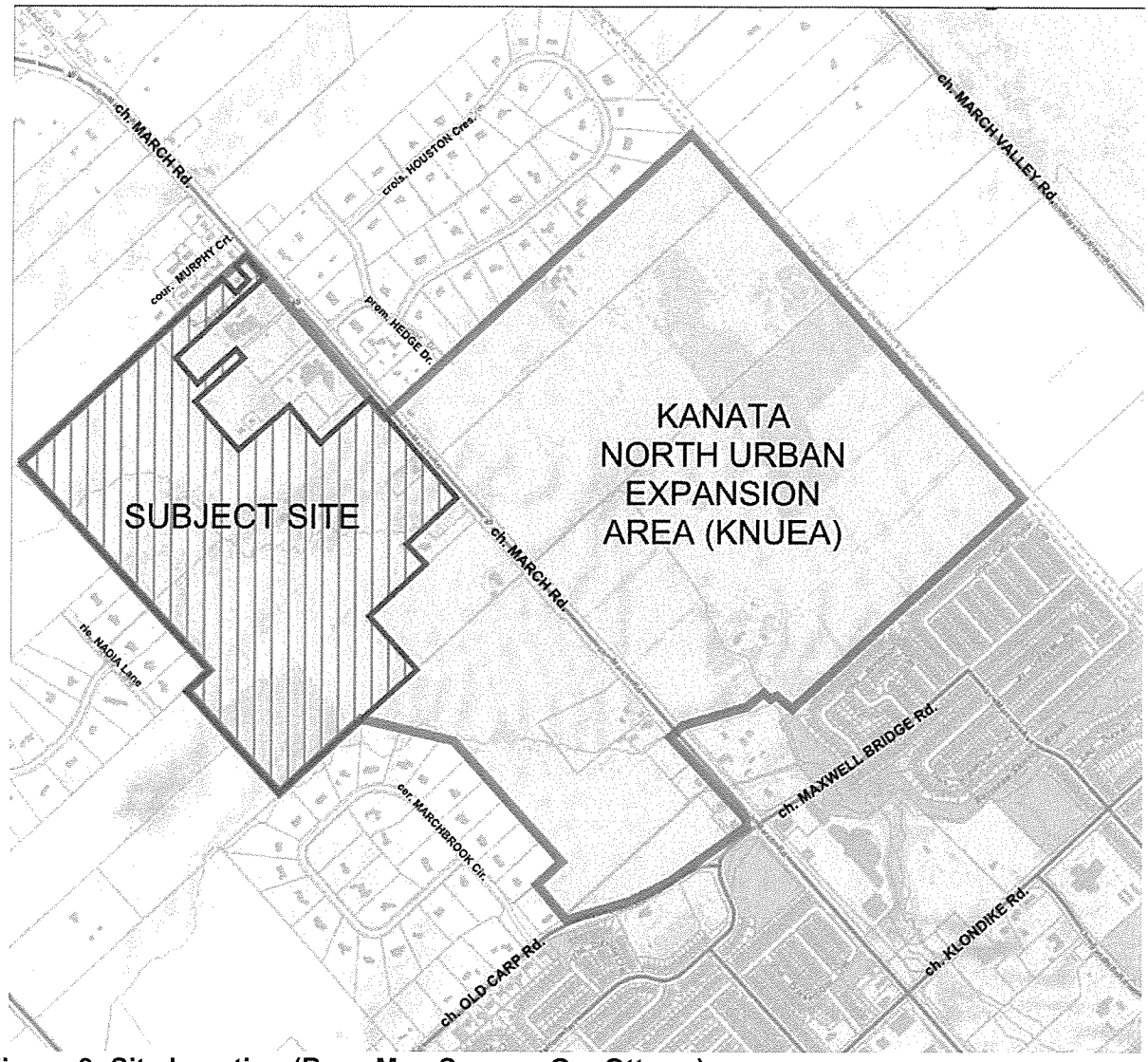

Figure 2: Site Location (Base Map Source: GeoOttawa)

The following describes the existing and planned land uses adjacent to the subject site:

North: Lands to the north are comprised of existing rural lands and several rural residential properties. These lands fall outside the existing urban boundary.

East: Lands east of the subject site contain a mixture of existing institutional lands (Saint Isidore Roman Catholic Parish and cemetery, and St. Isidore Catholic School), rural residential properties and rural lands. March Road forms the eastern boundary of the site. The rural lands to the east of March Road have been identified for residential development in the Kanata North Community Design Plan.

South: Lands to the south are comprised of existing rural lands and rural residential properties. The rural lands have been identified for residential development in the Kanata North Community Design Plan.

West: Lands to the west are comprised of existing rural lands and rural residential properties.

2.0 BACKGROUND AND REPORT ASSUMPTIONS AND LIMITATIONS

The City of Ottawa's Official Plan (OP) and Environmental Noise Control Guidelines (ENCG) stipulates that a noise study shall be prepared when a residential development is located in close proximity to surface transportation, stationary noise sources and aircraft noise sources. This report considers noise from traffic on March Road and future urban collector streets: Street 1, Street 4, Street 10 and Street 12. All other sources of noise are located beyond the limits of consideration as outlined in Section 2.1 of the ENCG. March Road is identified in the Kanata North Community Design Plan - Transportation Master Plan (TMP) as being expanded to a four-lane divided urban arterial road to Dunrobin Road in the future. The proposed Bus Rapid Transit has not been identified for expansion past the proposed Park and Ride facility at the March Road and Street 1 intersection. Street 1, Street 4, Street 10 and Street 12 have been identified in the TMP as future collector roads as shown in the Preferred Land Use Plan (**Appendix C, Figure 23**). Preliminary cross sections were developed in the TMP for the internal collector roads and for March Road (**Appendix C, Figure 24-Figure 29**). As the section of March Road adjacent to the proposed residential area is located in a transitional area, the March Road – Interim Cross Section (**Appendix C, Figure 24**) was also considered, with the roadway centered on the existing right of way (ROW).

March Road has an assumed classification of 4-Lane Urban Arterial-Divided with an AADT of 35,000veh/day. The design speed considered is 60kph, as per the TMP (**Appendix C**).

Street 1, Street 4, Street 10 and Street 12 have an assumed classification of 2-Lane Urban Collector roadway (8,000 veh/day) with a posted speed of 40kph, as per the TMP (**Appendix C**).

The checklist of required information for a Noise Control Feasibility Study includes an evaluation of alternative site designs and recommendations for alternative site plan design. However, unlike other greenfield subdivisions where the street pattern is not yet established, the Kanata North Urban Expansion Area has a fixed Collector street pattern that does not permit significant modifications. The street pattern was deliberately designed through the Kanata North Community Design Plan process to provide the basis for the development of the lands. Significant analysis of design alternatives was undertaken during the Community Design Plan process.

Street oriented housing has been used as means of mitigating any road related noise impact on new residents in the community. As shown in the Preferred Land Use Plan (**Appendix C, Figure 23**), primarily non-residential land uses are recommended along either side of March Road to further buffer the residential development from road-related noise. The recommended land uses adjacent to March Road include community mixed use, service mixed use, neighbourhood mixed use, stormwater management ponds, a community park, a fire station and the park and ride.

The majority of single lots and townhouse blocks on this site have been oriented to provide significant shielding for Outdoor Living Areas (OLA's) from the collector roads within the site.

Block 312, 311 and 305 are the only proposed noise sensitive land use (residential) in close proximity to March Road as most of the properties are existing institutional or residential properties. Block 312, 311 and 305 will be subject to a separate site plan or plan of subdivision application in the future and will require a noise feasibility study at that time. No other proposed residential lots or blocks are located within 250m of March Road, therefore for the purposes of this report, March Road was not considered in the noise analysis for the remainder of the site.

No rail or aircraft noise is considered to affect this site.

3.0 CITY OF OTTAWA NOISE CONTROL GUIDELINES

3.1 Sound Level Criteria

The City of Ottawa is concerned with noise from aircraft, roads, transitways, and railways, as expressed in Tables 2.2a: Sound Level Limit for Outdoor Living Areas – Road and Rail, Table 2.2b: Sound Level Limit for Indoor Living Areas Road and Rail, and Table 2.2c: Supplementary Sound Level Limits for Indoor Spaces – Road and Rail of the ENCG. The maximum suggested sound levels for outdoor and indoor living areas between 7am and 11pm are 55 dBA and 45 dBA, respectively. The maximum suggested sound level for indoor bedrooms is 40dBA between 11pm and 7am. For reference, Tables 2.2a, 2.2b and 2.2c of the ENCG are included in **Appendix A**.

Outdoor Living Area and Plane of Window receivers are defined as:

- **Outdoor Living Area (OLA):** The outdoor amenity area provided for quiet enjoyment of the outdoor environment during the daytime period (i.e., backyards, terraces and patios). OLA noise levels are considered 3.0m from the building façade, 1.5m above grade.

- **Plane of Window (POW):** The indoor living space where the sound levels will affect the living room area during daytime hours and bedrooms during nighttime hours. POW noise levels are considered inside the building, 1.5m above the finished floor.

3.2 Alternative Methods for Noise Attenuation

When OLA sound levels are predicted to be approximately equal to or less than 55 dBA, attenuation measures are not required. If the predicted noise levels are found to exceed 55 dBA, physical forms of mitigation are suggested and which may also include the provision of warning clauses to inform purchasers of the expected noise levels and specific mitigation measures.

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

- Distance setback with soft ground;
- Insertion of noise insensitive land uses between the source and sensitive receptor;
- Orientation of building to provide sheltered zones;
- Construction of sound or acoustic barriers;
- Installation of air conditioning and ventilation; and
- Enhanced construction techniques and construction quality.

3.3 Noise Barrier

When the noise attenuation measures listed above do not reduce noise levels below 55 dBA in the Outdoor Living Area, control measures (barriers) are required to reduce the Leq below or as close to 55 dBA as technically, economically and administratively feasible.

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

- Minimum height of 2.2m;
- Situated 0.30m inside the private property line;
- A surface mass density not less than 20kg/sq.m; and
- No holes or gaps.

3.4 Ventilation Requirements

A forced air heating system with provision for a central air conditioning system is required if the plane of window daytime noise levels are between 55 dBA and 65 dBA and/or the nighttime noise levels are between 50 dBA and 60 dBA.

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

3.5 Building Component Assessment

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

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

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

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

Where, N = Number of components (walls, windows and roof);

L = Sound Level expressed on a common decibel scale.

3.6 Warning Clauses

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

Typical warning clauses should be as per Section 4.2 of this report. Warning clauses are extracted from Part 4, Appendix A the City of Ottawa ENCG and excerpts of have been provided in **Appendix A** of this report**.** As stated in the City of Ottawa ENCG, due to the variation of noise impact for any given site, it may be necessary to amend the example warning clauses to recognize the site conditions in each development.

3.7 Summary of Noise Attenuation Requirements

Table 1 summarizes the required noise attenuation measures and warning clauses should sound criteria be exceeded. Excerpts from the City of Ottawa ENCG documents are included in **Appendix A** for reference.

Table 1: Noise Attenuation Measure Requirements

Assessment Location	L_{eq} (dBA)	Outdoor Control Measures	Indoor Control Measures		Warning Clause
			Ventilation Requirements	Building Components	
Outdoor Living Area (OLA)	Less than 55	None required	N/A	N/A	None required
	Between 55 and 60	Control measures (barriers) may not be required but should be considered	N/A	N/A	Required if resultant L_{eq} exceeds 55 dBA Type 1* or Type 2**
	More than 60	Barriers required	N/A	N/A	Required if resultant L_{eq} exceeds 55 dBA Type 1* or Type 2*
Plane of Living Room Window (POW)	Less than 55	N/A	None Required	None Required	None Required
	Between 55 and 65	N/A	Forced air heating with provision for central air conditioning	None Required	Required Type 3
	More Than 65	N/A	Central Air Conditioning	Acoustical performance of the windows and walls should be specified	Required Type 4
Plane of Bedroom Window (POW)	Less than 50	N/A	None Required	None Required	None Required
	Between 50 and 60	N/A	Forced air heating with provision for central air conditioning	None Required	Required Type 3
	More than 60	N/A	Central Air Conditioning	Acoustical performance of the windows and walls should be specified	Required Type 4

*Type 1 warning clause refers to units requiring a noise barrier that mitigates noise below 55dBA.
**Type 2 warning clause refers to units requiring a noise barrier, but is technically or economically not feasible to reduce levels below 55dBA and a tolerance of up to 5dBA can be granted by the City.

4.0 PREDICTION AND MITIGATION OF NOISE LEVELS

4.1 Road Traffic

Table 2 outlines the traffic parameters used to predict the noise levels for the site.

Table 2: Traffic Parameters

Road	Implied Roadway Class	AADT	Traffic Split (%)		
			Day Night	Medium Trucks	Heavy Trucks
Street 1	2 Lane Urban Collector	8,000	92/8	7	5
Street 4	2 Lane Urban Collector	8,000	92/8	7	5
Street 10	2 Lane Urban Collector	8,000	92/8	7	5
Street 12	2 Lane Urban Collector	8,000	92/8	7	5
March Road	4 Lane Urban Arterial-Divided	35,000	92/8	7	5

4.2 Noise Level Analysis

The noise levels for the site were analyzed using version 5.03 of the STAMSON computer noise modelling program. For the most part, due to the planned orientation of the outdoor living areas, noise levels will be below the new OLA guideline of 55 dBA. There are localized areas in which single homes and townhomes fronting local streets are exposed to the internal collector streets that require physical mitigation.

For OLAs exposed to internal collector streets it is proposed to install 2.2m noise walls along the side yards which will reduce the noise levels to below 55 dBA. **Table 3** shows predicted noise levels at various locations within the development.

The Noise Control Plan (Drawing Number 116132-NC) in **Appendix D** shows the receiver locations, receiver elevations, and receiver distances to noise sources. The noise levels for all receiver locations generated from STAMSON are listed in **Tables 3** and **4** with detailed modeling results and figures in **Appendix B.**

Table 3: Predicted Noise Levels - OLA

Receiver	File	Calculated Noise Level, L_{eq} (dBa)			Mitigation Method
		Daytime Un-attenuated (OLA)	Daytime Attenuated (OLA)	Nighttime (POW)	
R5	r5unmit.te	45.20	-	40.24	N/A
R6	r6bar22.te	57.55	51.53	50.40	-2.2m Noise Wall -Warning Clauses as per Section 4.3 – Type 1
R7	r7unmit.te	48.56	-	42.64	N/A
R8	r8bar22.te	59.67	54.77	52.53	-2.2m Noise Wall -Warning Clauses as per Section 4.3 – Type 1
R9	r9unmit.te	50.18	-	43.41	N/A
R10	r10unmit.te	52.74	-	46.30	N/A
R11	r11unmit.te	46.69	-	40.35	N/A
R12	r12unmit.te	55.65	-	48.74	TBD during Site Plan Approval
R13	r13unmit.te	57.08	-	50.09	TBD during Site Plan Approval
R14	r14unmit.te	56.97	-	49.89	TBD during Site Plan Approval
R15	r15unmit.te	51.49	-	44.79	N/A
R16	r16unmit.te	55.95	-	49.03	TBD during Site Plan Approval
R17	r17unmit.te	52.26	-	45.37	TBD during Site Plan Approval
R18	r18bar22.te	56.20	52.45	50.45	-2.2m Noise Wall -Warning Clauses as per Section 4.3 – Type 1
R19	r19bar22.te	59.36	54.03	52.19	-2.2m Noise Wall -Warning Clauses as per Section 4.3 – Type 1
R20	r20unmit.te	50.19	-	43.84	N/A
R21	r21unmit.te	51.31	-	44.76	N/A
R22	r22unmit.te	50.91	-	44.61	N/A
R24	r24unmit.te	50.55	-	44.00	N/A
R25	r25bar22.te	57.63	52.53	50.51	-2.2m Noise Wall -Warning Clauses as per Section 4.3 – Type 1
R26	r26unmit.te	49.13	-	42.29	N/A
R27	r27bar22.te	59.09	50.86	51.77	-2.2m Noise Wall

					-Warning Clauses as per Section 4.3 – Type 1
R28	r28unmit.te	52.31	-	47.39	N/A
R29	r29unmit.te	50.76	-	44.09	N/A
R30	r30unmit.te	47.01	-	40.41	N/A
R31	r31bar22.te	59.61	54.31	54.12	-2.2m Noise Wall -Warning Clauses as per Section 4.3 – Type 1
R32	r32unmit.te	51.36	-	46.06	N/A
R33	r33unmit.te	49.93	-	43.32	N/A
R34	r34bar22.te	60.09	52.29	52.77	-2.2m Noise Wall -Warning Clauses as per Section 4.3 – Type 1
R35	r35unmit.te	51.56	-	45.10	N/A
R36	r36unmit.te	50.06	-	43.43	N/A

*Noise Barrier refers to any combination of noise wall, berm and/or retaining wall

The maximum predicted un-attenuated outdoor amenity area noise level for the development is located within Block 283 and is 60.09 dBA. When attenuated, the maximum predicted outdoor amenity area noise level is reduced to 52.29 dBA.

Table 4: Predicted Noise Levels - POW

Receiver	File	Calculated Noise Level, L_{eq} (dBa)		Mitigation Method
		Daytime Un-attenuated (POW)	Nighttime Un-attenuated (POW)	
R23	r23unmit.te	62.98	55.68	-Provide Forced Air Ventilation with Provision of Air Conditioning - Warning Clauses as per Section 4.3 – Type 3
R37	r37unmit.te	61.18	53.82	-Provide Forced Air Ventilation with Provision of Air Conditioning - Warning Clauses as per Section 4.3 – Type 3
R38	r38unmit.te	64.05	56.69	-Provide Forced Air Ventilation with Provision of Air Conditioning - Warning Clauses as per Section 4.3 – Type 3

The maximum predicted daytime plane of window noise levels for the low-density development is located within Block 304 and is 64.05dBA and the nighttime level is 56.69dBa. Units fronting the internal collector streets can be represented by receiver points R23 (Block 307, fronting two collectors at roundabout), R37 (Block 311, fronting one collector street) and R38 (Block 304, fronting two collector streets). The units requiring mitigation measures are shown on Noise Control Plan (Drawing Number 116132-NC) in **Appendix D**.

An analysis of the proposed multi-unit residential blocks was also conducted. There are three typical noise scenarios at the minimum setbacks for the different block locations. The first is for residential blocks fronting on one collector street (R37). The maximum daytime noise level is 61.18dBA and the maximum nighttime noise level is 53.82dBA. The second is for residential blocks fronting two collector streets at a roundabout (R23). The maximum daytime noise level is 62.98dBA and the maximum nighttime noise level is 55.68dBA. The third scenario is for the residential/institutional blocks fronting two collector streets (R38). The maximum daytime noise level is 64.05dBA and the maximum nighttime noise level is 56.69dBA.

Based on these results, AIF calculations are not anticipated to be required for the multi unit residential blocks. However, the requirement for indoor and outdoor noise attenuation measures will be determined during detailed design based on the type and orientation of the proposed units and the location of the outdoor amenity areas for the multi-unit residential blocks.

4.3 Warning Clauses

It is recommended that the following noise clauses be registered on title and incorporated into the agreement of purchase and sale as noted in **Tables 3** and **5**:

Type 1

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and Ministry of the Environment."

"To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area and indoor environment that is within provincial guidelines. Measures for sound attenuation include:

- An acoustic barrier"

"To ensure that provincial sound level limits are not exceeded it is important to maintain sound attenuation features."

"The acoustic barrier 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."

Type 2

"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 by up to 5 dBA."

"To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area and indoor environment that is within provincial guidelines. Measures for sound attenuation include:

- An acoustic barrier"

"To ensure that provincial sound level limits are not exceeded it is important to maintain sound attenuation features."

"The acoustic barrier 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."

Type 3

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and Ministry of the Environment."

"To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area and indoor environment that is within provincial guidelines. Measures for sound attenuation may include:

- Multi-pane glass
- Double brick veneer"

"To ensure that provincial sound level limits are not exceeded it is important to maintain sound attenuation features."

"This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning will allow 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"

Type 4

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and Ministry of the Environment."

"To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area and indoor environment that is within provincial guidelines. Measures for sound attenuation may include:

- Multi-pane glass
- Double brick veneer
- High sound transmission class walls"

"To ensure that provincial sound level limits are not exceeded it is important to maintain sound attenuation features."

"This dwelling unit has also been supplied with a central air conditioning system and other measures which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment"

Exact wording of the warning clauses will be adjusted based on the findings of the Noise Control Detailed Study. For units with multiple types of warning clauses, similar/identical wording can be combined as to not duplicate wording/information. Refer to drawing 116132-NC for details.

5.0 CONCLUSIONS

This report confirms the predicted noise levels for the proposed residential development from Street 1, Street 4, Street 10 and Street 12 are in excess of the City of Ottawa and the Ministry of the Environment guidelines as seen in Table 3, 4 and 5. To mitigate the noise levels and inform potential buyers/tenants, the following noise attenuation measures are proposed:

Lots 1, 19, 80, 132, 275 and Blocks 276, 277, 278, 279, 283, 284:

- A noise wall with a total height of 2.2m is required along the adjacent collector road;
- Forced air ventilation and noise warning clauses required.

Lots 2-18, 56-57, 61-79, 133-134, 169-189, 237 and Blocks 276, 279, 300, 303:

- Forced air ventilation and noise warning clauses required.

Forced air ventilation and noise warning clauses will be required for all units fronting one or two collector roads (as per R23, R37, and R38).

The proposed attenuation measures are based on preliminary concept and grading plans. A Noise Control Detailed Study will be completed once the design details are finalized.

This report is respectfully submitted for City of Ottawa approval.

NOVATECH

Prepared by:

Reviewed by:

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Steve Zorgel, P.Eng.
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Reviewed by:

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Appendix A
Environmental Noise Control Guidelines Excerpts

Table 2.2a: Sound Level Limit for Outdoor Living Areas - Road and Rail
(from NPC-300, 2013 Table C-1)

Time Period	Required L_{eq} (16) (dBA)
16-hour, 07:00 – 23:00	55

Table 2.2b: Sound Level Limit for Indoor Living Areas Road and Rail
(from NPC-300, 2013 Table C-2)

Type of Space	Time Period	Required L_{eq} (dBA) Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
	23:00 – 07:00	40	35

The Province also provides for supplementary indoor sound level limits for land uses not generally considered noise sensitive (see Table 2.2c below). These good practice design objectives should be addressed in any noise study prepared for the City. These supplementary sound level limits are based on the windows and doors to an indoor space being closed.

Table 2.2c: Supplementary Sound Level Limits for Indoor Spaces - Road and Rail (adapted from NPC-300 Table C-9)

Type of Space	Time Period	Required L_{eq} (dBA) Road	Rail
General offices, reception areas, retail stores, etc.	16 hours between 07:00 – 23:00	50	45
Theatres, places of worship, libraries, individual or semi- private offices, conference rooms, reading rooms, etc.	16 hours between 07:00 – 23:00	45	40
Sleeping quarters of hotels/motels	8 hours between 23:00 – 07:00	45	40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc.	8 hours between 23:00 – 07:00	40	35

Appendix A: Warning Clauses

Under the Official Plan and this guideline warning clauses may be required to be incorporated into development through development agreements, registration on title and inclusion in Agreements of Purchase and Sale. This requirement may be included in any development, regardless of whether it is considered a noise sensitive land use.

A warning clause provides recognition for the City, Province landowner or tenants that noise may be a concern, that noise may be audible at times or even quite loud, and, depending on the type of development, provincial guidelines for noise may be exceeded. Warning clauses also recognize that environmental noise is a potential health hazard that does impact people and neighbourhoods. It is for this reason that, unless a non-noise sensitive land use is established, a warning clause should also include noise mitigation.

A warning clause is not considered a form of noise mitigation. It is not acceptable therefore to use warning clauses in place of physical noise control measures to identify an excess over the MOE or City noise limits. The reason for a warning clause on all development is twofold. Firstly, it is important to note that a land use that although the development may not be considered noise sensitive it may include employees or tenants that are personally sensitive to noise. A warning clause provides protection against complaints to the ministry of Environment should provincial guidelines be exceeded. Secondly, a warning clause on title could obviate the need for a new noise study in the future. In a redevelopment scenario the warning clause would provide recognition of the extent noise conditions.

Given the variation in potential intensity and impact of noise it will often be necessary to amend warning clauses to recognize the site specific conditions in each development. Final wording of any warning clause is to be approved by the City.

The following subsections provide example text to be adapted into warning clauses.

Surface Transportation Warning Clauses

Table A1 Surface Transportation Warning Clauses

Type	Example	Notes
Generic	*Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and the Ministry of the Environment.* *To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area and indoor environment that is within provincial guidelines. Measures for sound attenuation include:* • *A setback of buildings from the noise source,* • *A acoustic barrier owned and maintained in the City right of way (or condominium right of way)* *Additionally this development includes trees and shrubs to screen the source of noise from occupants.*	The generic warning clause outlines that MOE sound levels may be exceeded but the indoor environment and outdoor amenity areas are within guidelines. Mitigation measures are described including urban design features. Mention is also made of landscaping to screen the development visually from the source of noise.
Extensive mitigation of indoor and outdoor amenity area	*"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*	The warning clause makes reference to MOE sound levels being exceeded from time to time and that there are sound attenuation features and landscaping within the development that should be maintained.

Table A1 Surface Transportation Warning Clauses

Type	Example	Notes
	attenuation this development includes: • *multi-pane glass;* • *double brick veneer;* • *an earth berm; and* • *a acoustic barrier which is owned and maintained by the City (condominium corporation).* *To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.* *This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning will allow 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.*	An option for air conditioning is noted as well as landscaping to screen the source of noise.
No outdoor amenity area	*Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic will interfere with outdoor activities 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;* • *double brick veneer;* • *high sound transmission class walls.*	This warning clause notes that only an indoor environment is being provided for.

Table A1 Surface Transportation Warning Clauses

Type	Example	Notes
	To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features. *This dwelling unit has been supplied with a central air conditioning system and other measures which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment*	

Stationary Source Warning Clauses

The Province notes that it is not acceptable to use warning clauses in place of physical noise control measures to identify an excess over the MOE sound level limits for stationary sources. The generic warning clause for stationary sources (called Type E in NPC-300) may identify a potential concern due to the proximity of the facility but it is not possible to justify exceeding the sound level limits.
The wording of the generic stationary noise warning clause may also be used as the basis for new development adjacent to areas licensed for mineral aggregate extraction.

Table A2 Stationary Source Warning Clauses

Type	Example	Notes
Generic – urban design features for outdoor amenity and shelter of indoor environment	*Purchasers/tenants are advised that due to the proximity of the adjacent industry (facility) (utility), noise from the industry (facility) (utility) may at times interfere with outdoor activities.* *To address potential impacts of noise from the adjacent industry (facility) (utility) this development has been designed to provide for specific outdoor amenity areas and a quieter indoor environment. Landscaping has also been provided to screen the source of noise.*	This stationary source warning clause is intended for new development in proximity to existing stationary noise sources where urban design features (blank walls, specifically located outdoor amenity areas) have been provided. The warning clause is based on the MOE Type

Table A2 Stationary Source Warning Clauses

Type	Example	Notes
		E warning clause.
Extensive mitigation of indoor and outdoor amenity area	*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.*	This clause is suitable for areas where extensive mitigation is necessary as well as Class 4 areas.

Aircraft Noise Warning Clauses

Aircraft warning clauses are required for all development within the Airport Vicinity Development Zone and in the Carp and Rockcliffe Airport areas. In addition the City may consider addition of a warning clause to any other lands in the city where recommended by the Airport Authority.

Table A3 Aircraft Noise Warning Clauses

Area	Example
Noise Sensitive Development outside of NEP 25 and within Airport Vicinity Development Zone And Non-noise sensitive development within the Airport Vicinity Development	*Purchasers/tenants are advised that due to the proximity of the airport, noise from the airport and individual aircraft may at times interfere with outdoor or indoor activities.*

Table A3 Aircraft Noise Warning Clauses

Area Zone	Example
Noise Sensitive Development: outside the AOIZ but within NEP 25; or within the Carp or Rockcliffe Airport areas and outside of the AOIZ boundary	*Purchasers/building occupants are forewarned that this property/dwelling unit is located in a noise sensitive area due to its proximity to Ottawa Macdonald-Cartier International Airport / Carp / Rockcliffe Airport. In order to reduce the impact of aircraft noise in the indoor spaces, the unit has been designed and built to meet provincial standards for noise control by the use of components and building systems that provide sound attenuation. In addition to the building components (i.e. walls, windows, doors, ceiling-roof), since the benefit of sound attenuation is lost when windows or doors are left open, this unit has been fitted with a forced air heating system, all components of which are sized to accommodate the future installation of central air conditioning-by the owner/occupant.* *Despite the inclusion of noise control features within the dwelling unit, noise due to aircraft operations may continue to interfere with some indoor activities and with outdoor activities, particularly during the summer months. The purchaser/building occupant is further advised that the Airport is open and operates 24 hours a day, and that changes to operations or expansion of the airport facilities, including the construction of new runways, may affect the living environment of the residents of this property/area.* *The Ottawa Macdonald-Cartier International Airport Authority, its acoustical consultants and the City of Ottawa are not responsible if, regardless of the implementation of noise control features, the purchaser/occupant of this dwelling finds that the noise levels due to aircraft operations continue to be of concern or are offensive.*

Table A3 Aircraft Noise Warning Clauses

Area	Example
Noise Sensitive Development between AOIZ boundary and NEP 35 contour (only limited development permitted)	*Purchasers/building occupants are forewarned that this property/dwelling unit is located in a noise sensitive area due to its proximity to Ottawa Macdonald-Cartier International Airport / Carp / Rockcliffe Airport. In order to reduce the impact of aircraft noise in the indoor spaces, the unit has been designed and built to meet provincial standards for noise control by the use of components and building systems that provide sound attenuation. In addition to the building components (i.e. walls, windows, doors, ceiling-roof), since the benefit of sound attenuation is lost when windows or doors are left open, this unit has been fitted with a forced air heating system, all components of which are sized to accommodate the future installation of central air conditioning-by the owner/occupant.* *Despite the inclusion of noise control features within the dwelling unit, noise due to aircraft operations may continue to interfere with some indoor activities and with outdoor activities, particularly during the summer months. The purchaser/building occupant is further advised that the Airport is open and operates 24 hours a day, and that changes to operations or expansion of the airport facilities, including the construction of new runways, may affect the living environment of the residents of this property/area.* *The Ottawa Macdonald-Cartier International Airport Authority, its acoustical consultants and the City of Ottawa are not responsible if, regardless of the implementation of noise control features, the purchaser/occupant of this dwelling finds that the noise levels due to aircraft operations continue to be of concern or are offensive.*

Appendix B: Table of Traffic and Road Parameters To Be Used For Sound Level Predictions

Table B1 Traffic And Road Parameters To Be Used For Sound Level Predictions

Row Width (m)	Implied Roadway Class	AADT Vehicles/Day	Posted Speed Km/Hr	Day/Night Split %	Medium Trucks %	Heavy Trucks % [1]
NA [2]	Freeway, Queensway, Highway	18,333 per lane	100	92/8	7	5
37.5-44.5	6-Lane Urban Arterial-Divided (6 UAD)	50,000	50-80	92/8	7	5
34-37.5	4-Lane Urban Arterial-Divided (4-UAD)	35,000	50-80	92/8	7	5
23-34	4-Lane Urban Arterial-Undivided (4-UAU)	30,000	50-80	92/8	7	5
23-34	4-Lane Major Collector (4-UMCU)	24,000	40-60	92/8	7	5
30-35.5	2-Lane Rural Arterial (2-RAU)	15,000	50-80	92/8	7	5
20-30	2-Lane Urban Arterial (2-UAU)	15,000	50-80	92/8	7	5
20-30	2-Lane Major Collector (2-UMCU)	12,000	40-60	92/8	7	5
30-35.5	2-Lane Outer Rural Arterial (near the extremities of the City) (2-RAU)	10,000	50-80	92/8	7	5
20-30	2-Lane Urban Collector (2-UCU)	8,000	40-50	92/8	7	5

[1] The MOE Vehicle Classification definitions should be used to estimate automobiles, medium trucks and heavy trucks.
[2] The number of lanes is determined by the future mature state of the roadway.

Appendix B
STAMPSON Noise Modelling Results

STAMSON 5.0 SUMMARY REPORT Date: 26-04-2018 12:42:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg	47.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	37.50 / 37.50	m
Receiver height	:	1.50 / 4.50	m
Topography	:	2	(Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg	Angle2 : 47.00 deg
Barrier height	:	6.00 m	
Barrier receiver distance	:	3.00 / 3.00	m
Source elevation	:	90.38 m	
Receiver elevation	:	90.32 m	
Barrier elevation	:	90.50 m	
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	8000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

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

Angle1 Angle2	47.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	37.50 / 37.50	m
Receiver height	1.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
Reference angle	0.00	

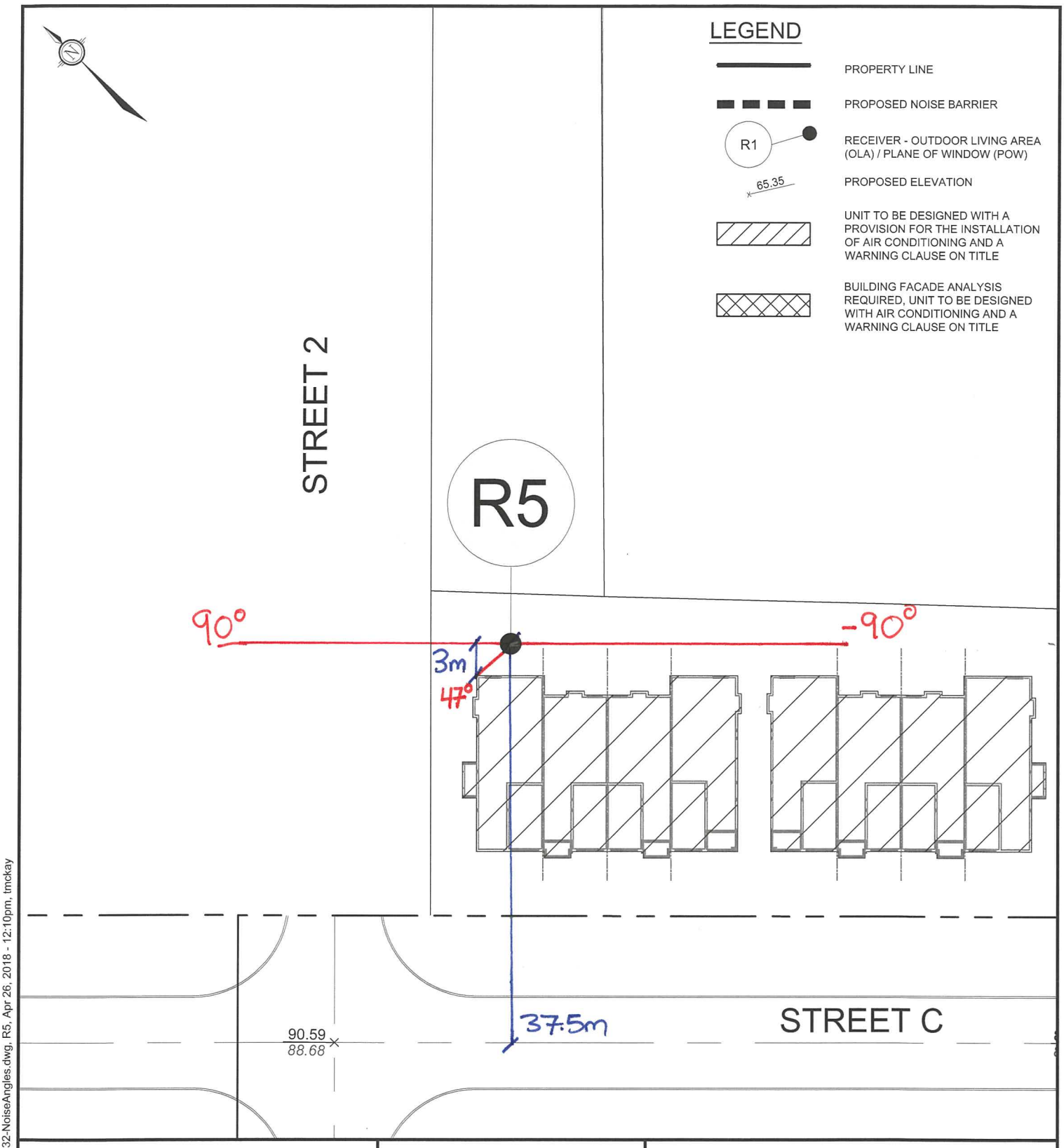
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.house	1.50	39.43	39.43
2.open	1.50	47.99	47.99
Total			48.56 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.house	1.50	37.05	37.05
2.open	1.50	41.12	41.12
Total			42.56 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.56
(NIGHT): 42.56



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R5

SCALE 1 : 500 (0 5 10 15 20)

DATE	JOB	FIGURE
APR 2018	116132	R5

M:\2016\116132\CAD\Design\Figures\Noise\116132-NoiseAngles.dwg, R5, Apr 26, 2018 - 12:10pm, tmckay

STAMSON 5.0 SUMMARY REPORT Date: 26-02-2018 10:22:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6bar22.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -32.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	21.90 / 21.90 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -32.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	4.80 / 4.80 m
Source elevation	:	90.10 m
Receiver elevation	:	90.32 m
Barrier elevation	:	90.50 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-32.00 deg 47.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	21.90 / 21.90 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-32.00 deg Angle2 : 47.00 deg
Barrier height	:	2.20 m
Barrier receiver distance	:	9.90 / 9.90 m
Source elevation	:	90.10 m
Receiver elevation	:	90.32 m
Barrier elevation	:	90.20 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563 veh/TimePeriod *
Medium truck volume	:	515/45 veh/TimePeriod *
Heavy truck volume	:	368/32 veh/TimePeriod *
Posted speed limit	:	40 km/h
Road gradient	:	1 %
Road pavement	:	1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	: 47.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 21.90 / 21.90	m
Receiver height	: 1.50 / 4.50	m
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: 47.00 deg	Angle2 : 90.00 deg
Barrier height	: 6.00	m
Barrier receiver distance	: 4.20 / 4.20	m
Source elevation	: 90.10	m
Receiver elevation	: 90.32	m
Barrier elevation	: 90.31	m
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.house	1.50	40.33	40.33
2.open	1.50	50.88	50.88
3.house	1.50	39.61	39.61
Total			51.53 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.house	1.50	37.15	37.15	
2.open	1.50	49.98	49.98	*
3.house	1.50	36.81	36.81	
Total			50.40 dBA	

TOTAL Leq FROM ALL SOURCES (DAY): 51.53
(NIGHT): 50.40

STAMSON 5.0 SUMMARY REPORT Date: 26-02-2018 10:21:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40	km/h
Road gradient	:	1	%
Road pavement	:	1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -32.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	21.90 / 21.90 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -32.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	4.80 / 4.80 m
Source elevation	:	90.10 m
Receiver elevation	:	90.32 m
Barrier elevation	:	90.50 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40	km/h
Road gradient	:	1	%
Road pavement	:	1	(Typical asphalt or concrete)

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 2: open (day/night)
--------------------------------------
Angle1   Angle2           : -32.00 deg   47.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  21.90 / 21.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: house (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 3: house (day/night)
---------------------------------------
Angle1   Angle2           :  47.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  21.90 / 21.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  47.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   4.20 / 4.20   m
Source elevation          :  90.10 m
Receiver elevation        :  90.32 m
Barrier elevation         :  90.31 m
Reference angle           :   0.00
```

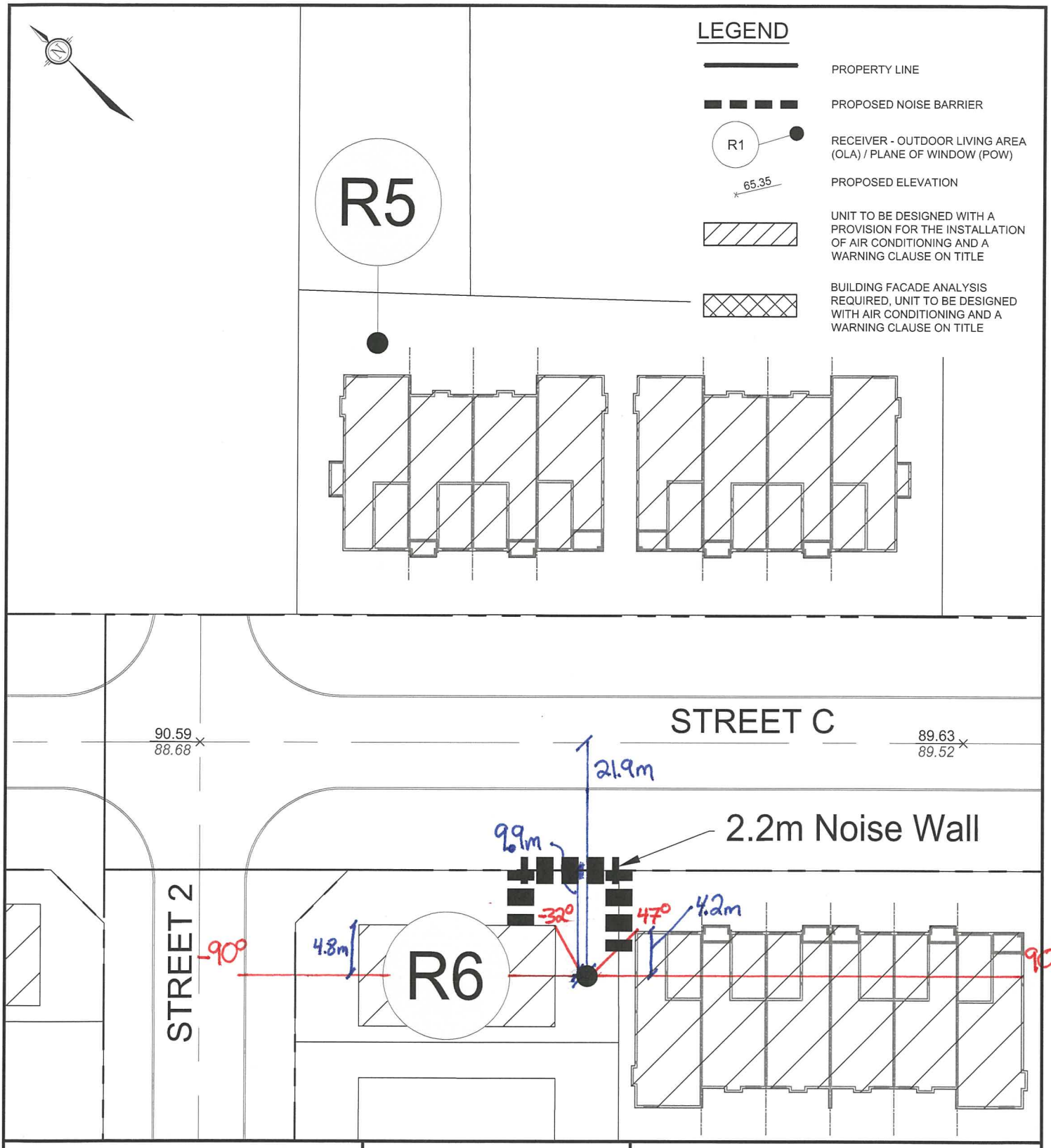
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.house	1.50	40.33	40.33
2.open	1.50	57.39	57.39
3.house	1.50	39.61	39.61
Total			57.55 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.house	1.50	37.15	37.15
2.open	1.50	49.98	49.98
3.house	1.50	36.81	36.81
Total			50.40 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.55
(NIGHT): 50.40



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R6

SCALE 1 : 500 (0 5 10 15 20)

DATE	JOB	FIGURE
APR 2018	116132	R6

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STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 13:15:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg	-47.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	37.50 / 37.50	m
Receiver height	:	1.50 / 4.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

```
Angle1   Angle2           : -47.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  37.50 / 37.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -47.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :  89.57 m
Receiver elevation        :  89.84 m
Barrier elevation         :  89.90 m
Reference angle           :   0.00
```

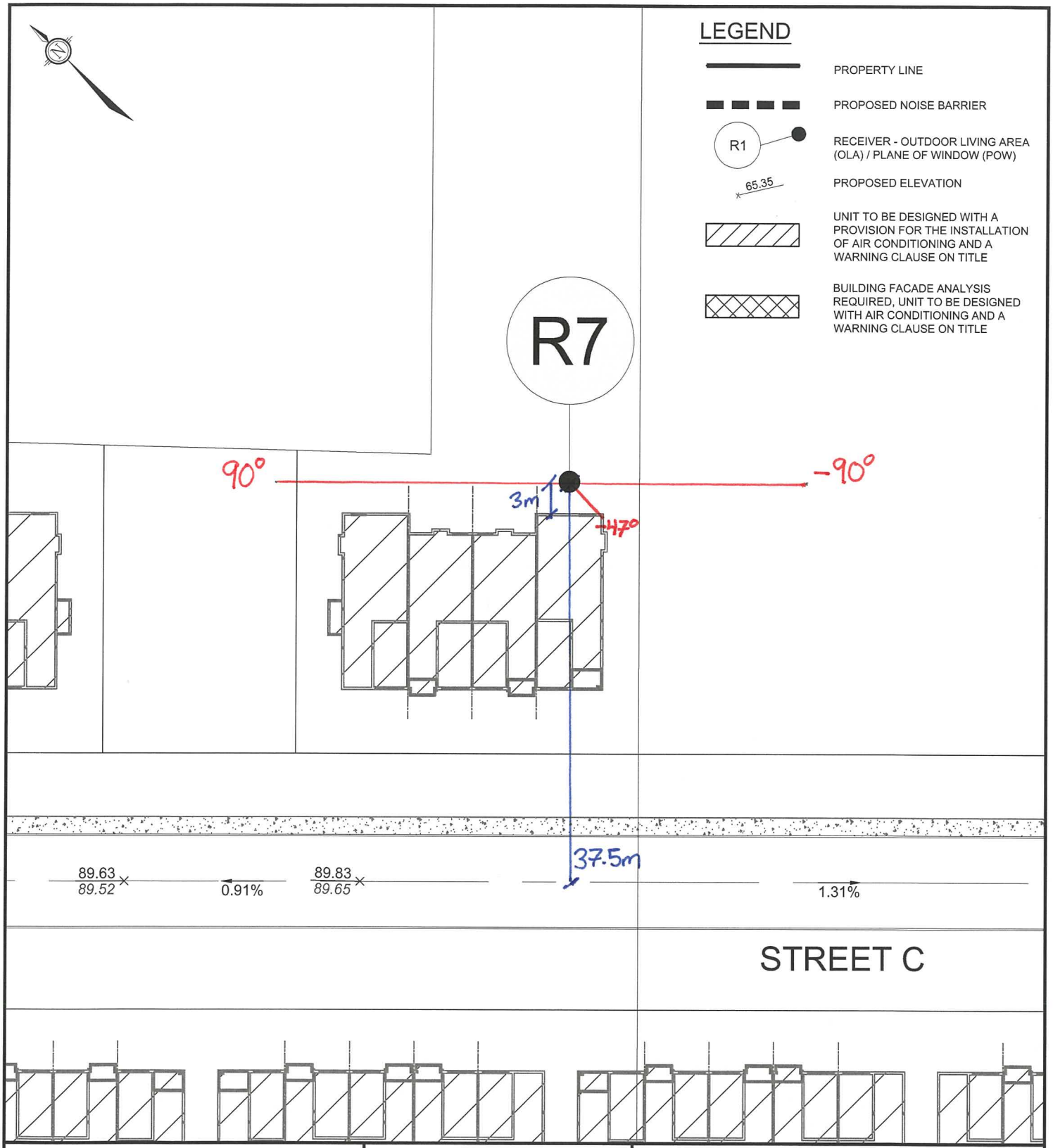
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.open	1.50	47.99	47.99
2.house	1.50	39.48	39.48
Total			48.56 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.open	1.50	41.12	41.12
2.house	1.50	37.35	37.35
Total			42.64 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.56
(NIGHT): 42.64



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R7

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE APR 2018 | JOB 116132 | FIGURE R7

STAMSON 5.0 SUMMARY REPORT Date: 26-02-2018 10:28:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8bar22.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg 13.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	47.70 / 47.70 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : 13.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	13.50 / 13.50 m
Source elevation	:	88.68 m
Receiver elevation	:	89.27 m
Barrier elevation	:	89.00 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	13.00 deg 50.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	47.70 / 47.70 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	13.00 deg Angle2 : 50.00 deg
Barrier height	:	2.20 m
Barrier receiver distance	:	18.60 / 18.60 m
Source elevation	:	88.68 m
Receiver elevation	:	89.27 m
Barrier elevation	:	88.70 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563 veh/TimePeriod *
Medium truck volume	:	515/45 veh/TimePeriod *
Heavy truck volume	:	368/32 veh/TimePeriod *
Posted speed limit	:	40 km/h
Road gradient	:	1 %
Road pavement	:	1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

```
Data for Segment # 3: StrCHouse (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  :  47.70 / 47.70  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  50.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  30.00 / 30.00  m
Source elevation          :  88.68 m
Receiver elevation        :  89.27 m
Barrier elevation         :  89.00 m
Reference angle           :   0.00

Road data, segment # 4: Str1House (day/night)
-------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: Str1House (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   -77.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.60 / 20.60  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -90.00 deg   Angle2 : -77.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.10 / 3.10   m
Source elevation          :  88.64 m
Receiver elevation        :  89.27 m
Barrier elevation         :  89.00 m
Reference angle           :   0.00
```

```
Road data, segment # 5: Str1Open (day/night)
-------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 5: Str1Open (day/night)
------------------------------------------
Angle1   Angle2          : -77.00 deg   43.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      1       (Absorptive ground surface)
Receiver source distance :  20.60 / 20.60  m
Receiver height          :   1.50 / 4.50   m
Topography               :      2       (Flat/gentle slope; with
barrier)
Barrier angle1           : -77.00 deg   Angle2 : 43.00 deg
Barrier height           :   2.20 m
Barrier receiver distance :   8.60 / 8.60   m
Source elevation         :  88.64 m
Receiver elevation       :  89.27 m
Barrier elevation        :  88.70 m
Reference angle          :   0.00

Road data, segment # 6: Str1House (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00
```

Data for Segment # 6: Str1House (day/night)

Angle1 Angle2	:	43.00 deg 90.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	20.60 / 20.60 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	43.00 deg Angle2 : 90.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	3.20 / 3.20 m
Source elevation	:	88.64 m
Receiver elevation	:	89.27 m
Barrier elevation	:	89.45 m
Reference angle	:	0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrCHouse	1.50	40.49	40.49
2.StrOpen	1.50	43.74	43.74
3.StrCHouse	1.50	38.14	38.14
4.Str1House	1.50	36.61	36.61
5.Str1Open	1.50	53.89	53.89
6.Str1House	1.50	39.46	39.46
Total			54.77 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.StrCHouse	1.50	37.59	37.59	
2.StrOpen	1.50	41.16	41.16	*
3.StrCHouse	1.50	32.98	32.98	
4.Str1House	1.50	33.70	33.70	
5.Str1Open	1.50	51.81	51.81	*
6.Str1House	1.50	36.42	36.42	
Total			52.53 dBA	

TOTAL Leq FROM ALL SOURCES (DAY): 54.77
(NIGHT): 52.53

STAMSON 5.0 SUMMARY REPORT Date: 26-02-2018 10:25:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg 13.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	47.70 / 47.70 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : 13.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	13.50 / 13.50 m
Source elevation	:	88.68 m
Receiver elevation	:	89.27 m
Barrier elevation	:	89.00 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: StrCopen (day/night)
------------------------------------------
Angle1   Angle2           :  13.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  47.70 / 47.70  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: StrCHouse (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: StrCHouse (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  :  47.70 / 47.70  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  50.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  30.00 / 30.00  m
Source elevation          :  88.68 m
Receiver elevation        :  89.27 m
Barrier elevation         :  89.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: Str1House (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: Str1House (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   -77.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.60 / 20.60  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -90.00 deg   Angle2 : -77.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.10 / 3.10   m
Source elevation          :  88.64 m
Receiver elevation        :  89.27 m
Barrier elevation         :  89.00 m
Reference angle           :   0.00

Road data, segment # 5: Str1Open (day/night)
-------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00
```

```
Data for Segment # 5: Str1Open (day/night)
------------------------------------------
Angle1   Angle2           : -77.00 deg   43.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.60 / 20.60  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 6: Str1House (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 6: Str1House (day/night)
-------------------------------------------
Angle1   Angle2           :  43.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.60 / 20.60  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  43.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.20 / 3.20   m
Source elevation          :  88.64 m
Receiver elevation        :  89.27 m
Barrier elevation         :  89.45 m
Reference angle           :   0.00
```

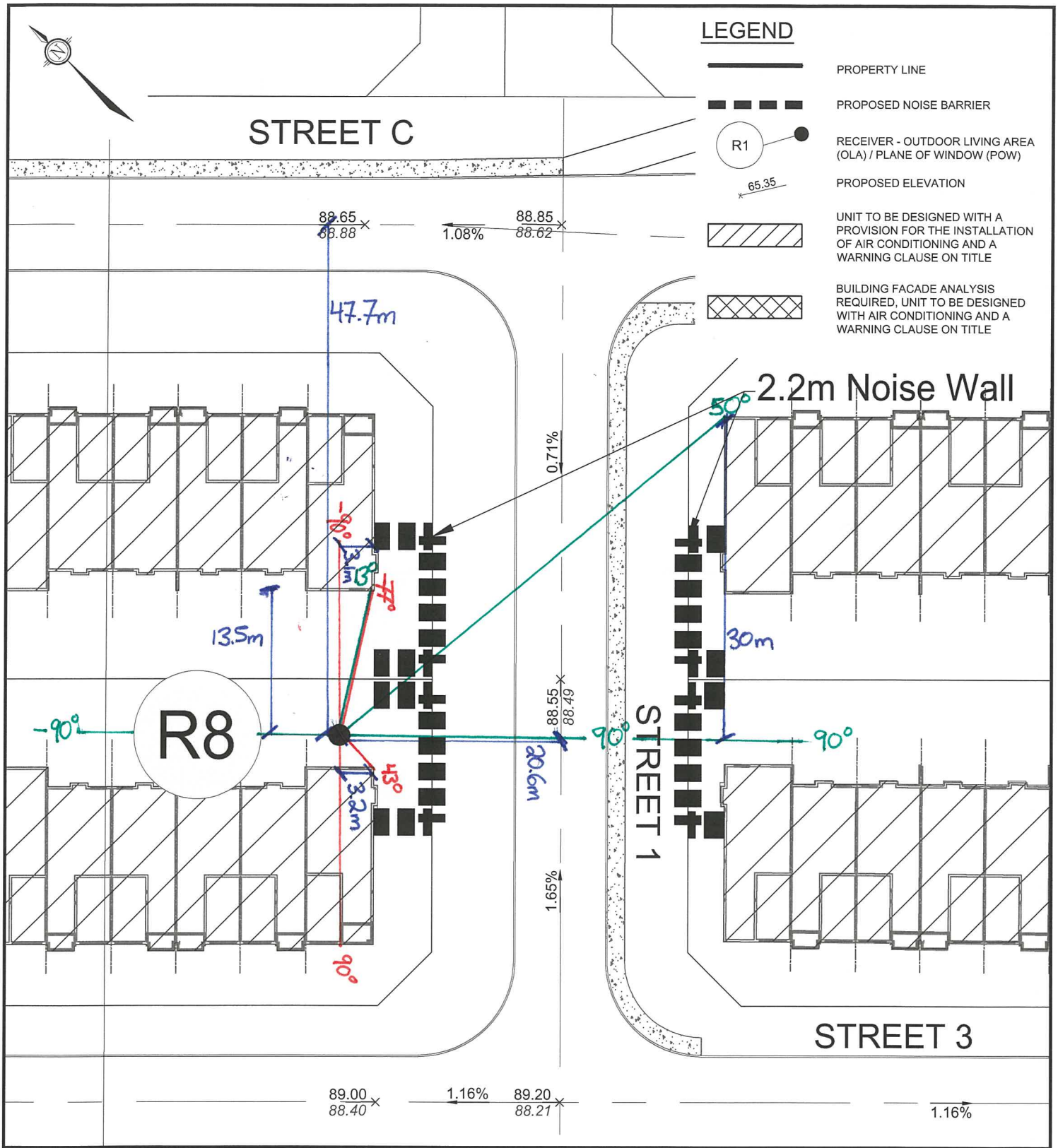
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrCHouse	1.50	40.49	40.49
2.StrCopen	1.50	48.23	48.23
3.StrCHouse	1.50	38.14	38.14
4.Str1House	1.50	36.61	36.61
5.Str1Open	1.50	59.19	59.19
6.Str1House	1.50	39.46	39.46
Total			59.67 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrCHouse	1.50	37.59	37.59
2.StrCopen	1.50	41.16	41.16
3.StrCHouse	1.50	32.98	32.98
4.Str1House	1.50	33.70	33.70
5.Str1Open	1.50	51.81	51.81
6.Str1House	1.50	36.42	36.42
Total			52.53 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.67
(NIGHT): 52.53



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- Street C Angles

CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R8

SCALE 1 : 500 (0 5 10 15 20)

DATE APR 2018 | JOB 116132 | FIGURE R8

M:\2016\116132\CAD\Design\Figures\Noise\116132-NoiseAngles.dwg, R8, Apr 17, 2018 - 11:08am, tmckay

STAMSON 5.0 SUMMARY REPORT Date: 15-03-2018 12:56:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9unmit.te Time Period: Day/Night 16/8 hours
Description: Centre of Multi-Unit Residential (StrC)

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

Car traffic volume	: 6477/563	veh/TimePeriod	*
Medium truck volume	: 515/45	veh/TimePeriod	*
Heavy truck volume	: 368/32	veh/TimePeriod	*
Posted speed limit	: 40	km/h	
Road gradient	: 1	%	
Road pavement	: 1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: open (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	: 82.80 / 82.80	m	
Receiver height	: 1.50 / 4.50	m	
Topography	: 1	(Flat/gentle slope; no barrier)	
Reference angle	: 0.00		

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.open	1.50	50.18	50.18
Total			50.18 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.open	1.50	43.41	43.41
Total			43.41 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.18
(NIGHT): 43.41

STAMSON 5.0 SUMMARY REPORT Date: 26-02-2018 09:58:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r10unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg 4.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	46.50 / 46.50 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : 4.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	11.40 / 11.40 m
Source elevation	:	88.68 m
Receiver elevation	:	88.27 m
Barrier elevation	:	88.20 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: StrCOpen (day/night)
------------------------------------------
Angle1   Angle2           :   4.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  46.50 / 46.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: StrBHouse (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: StrBHouse (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   -71.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 120.90 / 120.90 m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -90.00 deg   Angle2 : -71.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.70 / 3.70   m
Source elevation          :  86.86 m
Receiver elevation        :  88.27 m
Barrier elevation         :  88.20 m
Reference angle           :   0.00
```

Data for Segment # 5: StrBHouse (day/night)

```
Angle1   Angle2           :  63.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 120.90 / 120.90 m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  63.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   2.00 / 2.00   m
Source elevation          :  86.86 m
Receiver elevation        :  88.27 m
Barrier elevation         :  88.45 m
Reference angle           :   0.00
```

Result summary (day)

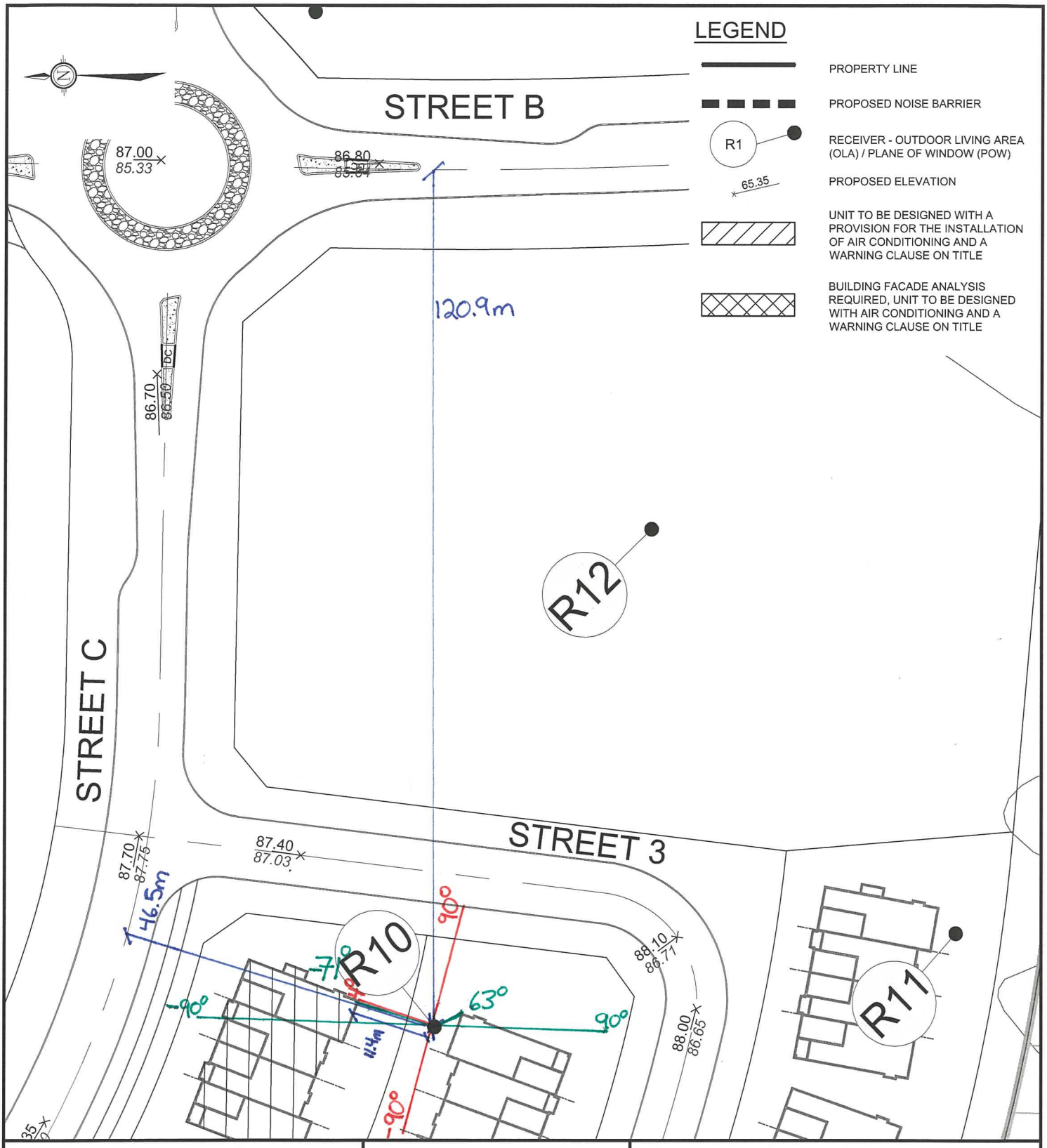
	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrCHouse	1.50	40.15	40.15
2.StrCOpen	1.50	51.05	51.05
3.StrBHouse	1.50	28.35	28.35
4.StrBOpen	1.50	46.90	46.90
5.StrBHouse	1.50	28.09	28.09
Total			52.74 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrCHouse	1.50	37.57	37.57
2.StrCOpen	1.50	44.07	44.07
3.StrBHouse	1.50	26.69	26.69
4.StrBOpen	1.50	40.22	40.22
5.StrBHouse	1.50	26.37	26.37
Total			46.30 dBA

```
TOTAL Leq FROM ALL SOURCES (DAY): 52.74
                           (NIGHT): 46.30
```

```
Road data, segment # 4: StrBOpen (day/night)
-------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: StrBOpen (day/night)
-------------------------------------------
Angle1   Angle2           : -71.00 deg   63.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 120.90 / 120.90 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 5: StrBHouse (day/night)
-------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00
```



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R10

SCALE 1 : 750 (0, 6, 12, 18, 24, 30)

DATE APR 2018 | JOB 116132 | FIGURE R10

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STAMSON 5.0 SUMMARY REPORT Date: 26-02-2018 09:58:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r11unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -27.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	111.00 / 111.00 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -27.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	3.90 / 3.90 m
Source elevation	:	87.26 m
Receiver elevation	:	88.38 m
Barrier elevation	:	88.44 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	8000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

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

Angle1 Angle2	-27.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	111.00 / 111.00 m	
Receiver height	1.50 / 4.50 m	
Topography	1	(Flat/gentle slope; no barrier)
Reference angle	0.00	

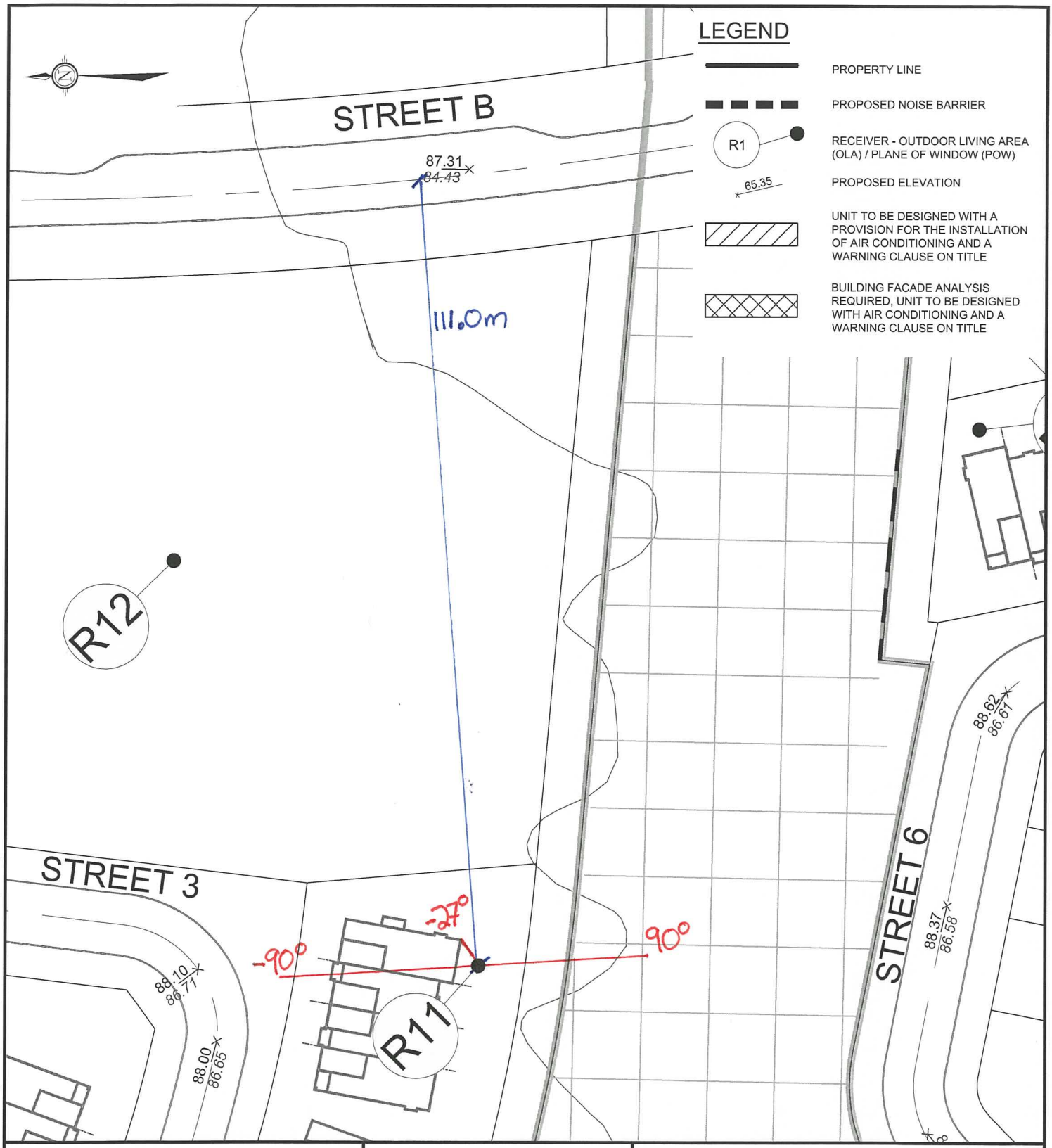
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.house	1.50	31.81	31.81
2.open	1.50	46.55	46.55
Total			46.69 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.house	1.50	30.73	30.73
2.open	1.50	39.85	39.85
Total			40.35 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 46.69
(NIGHT): 40.35



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R11

SCALE 1 : 750 (0, 6, 12, 18, 24, 30)

DATE APR 2018 | JOB 116132 | FIGURE R11

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STAMSON 5.0 SUMMARY REPORT Date: 15-03-2018 13:09:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r12unmit.te Time Period: Day/Night 16/8 hours
Description: Centre of Multi-Unit Residential (StrC&StrB)

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: StrCOpen (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 : 70.40 / 70.40 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: StrBOpen (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	: 51.30 / 51.30	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrCOpen	1.50	51.35	51.35
2.StrBOpen	1.50	53.63	53.63
Total			55.65 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrCOpen	1.50	44.52	44.52
2.StrBOpen	1.50	46.67	46.67
Total			48.74 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.65
(NIGHT): 48.74

STAMSON 5.0 SUMMARY REPORT Date: 15-03-2018 13:11:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r13unmit.te Time Period: Day/Night 16/8 hours
Description: Centre of Multi-Unit Residential (StrC&StrB)

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: StrCOpen (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	:	69.90 / 69.90	m
Receiver height	:	1.50 / 4.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 2: StrBOpen (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	: 40.00 / 40.00	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrCOpen	1.50	52.08	52.08
2.StrBOpen	1.50	55.43	55.43
Total			57.08 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrCOpen	1.50	45.24	45.24
2.StrBOpen	1.50	48.37	48.37
Total			50.09 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.08
(NIGHT): 50.09

STAMSON 5.0 SUMMARY REPORT Date: 15-03-2018 13:13:23
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r14unmit.te Time Period: Day/Night 16/8 hours
Description: Centre of Multi-Unit Residential (StrD&StrB)

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: StrDOpen (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	:	33.70 / 33.70	m
Receiver height	:	1.50 / 4.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 2: StrBOpen (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	: 162.30 / 162.30 m	
Receiver height	: 1.50 / 4.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDOpen	1.50	56.66	56.66
2.StrBOpen	1.50	45.33	45.33
Total			56.97 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDOpen	1.50	49.54	49.54
2.StrBOpen	1.50	38.82	38.82
Total			49.89 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.97
(NIGHT): 49.89

STAMSON 5.0 SUMMARY REPORT Date: 15-03-2018 13:15:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r15unmit.te Time Period: Day/Night 16/8 hours
Description: Centre of Multi-Unit Residential (StrD&StrB)

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: StrDOpen (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	:	84.30 / 84.30	m
Receiver height	:	1.50 / 4.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 2: StrBOpen (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	: 148.40 / 148.40	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDOpen	1.50	50.05	50.05
2.StrBOpen	1.50	45.98	45.98
Total			51.49 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDOpen	1.50	43.29	43.29
2.StrBOpen	1.50	39.43	39.43
Total			44.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.49
(NIGHT): 44.79

STAMSON 5.0 SUMMARY REPORT Date: 15-03-2018 13:17:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r16unmit.te Time Period: Day/Night 16/8 hours
Description: Centre of Multi-Unit Residential (StrD&StrB)

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg	90.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	54.30 / 54.30	m
Receiver height	:	1.50 / 4.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 2: StrBOpen (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	: 58.90 / 58.90	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDOpen	1.50	53.22	53.22
2.StrBOpen	1.50	52.64	52.64
Total			55.95 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDOpen	1.50	46.29	46.29
2.StrBOpen	1.50	45.73	45.73
Total			49.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.95
(NIGHT): 49.03

STAMSON 5.0 SUMMARY REPORT Date: 26-02-2018 10:04:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r17unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg	12.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	46.80 / 46.80	m
Receiver height	:	1.50 / 4.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

```
Angle1   Angle2           :  12.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  46.80 / 46.80  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  12.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  29.40 / 29.40  m
Source elevation          :  87.61 m
Receiver elevation        :  87.54 m
Barrier elevation         :  87.96 m
Reference angle           :   0.00
```

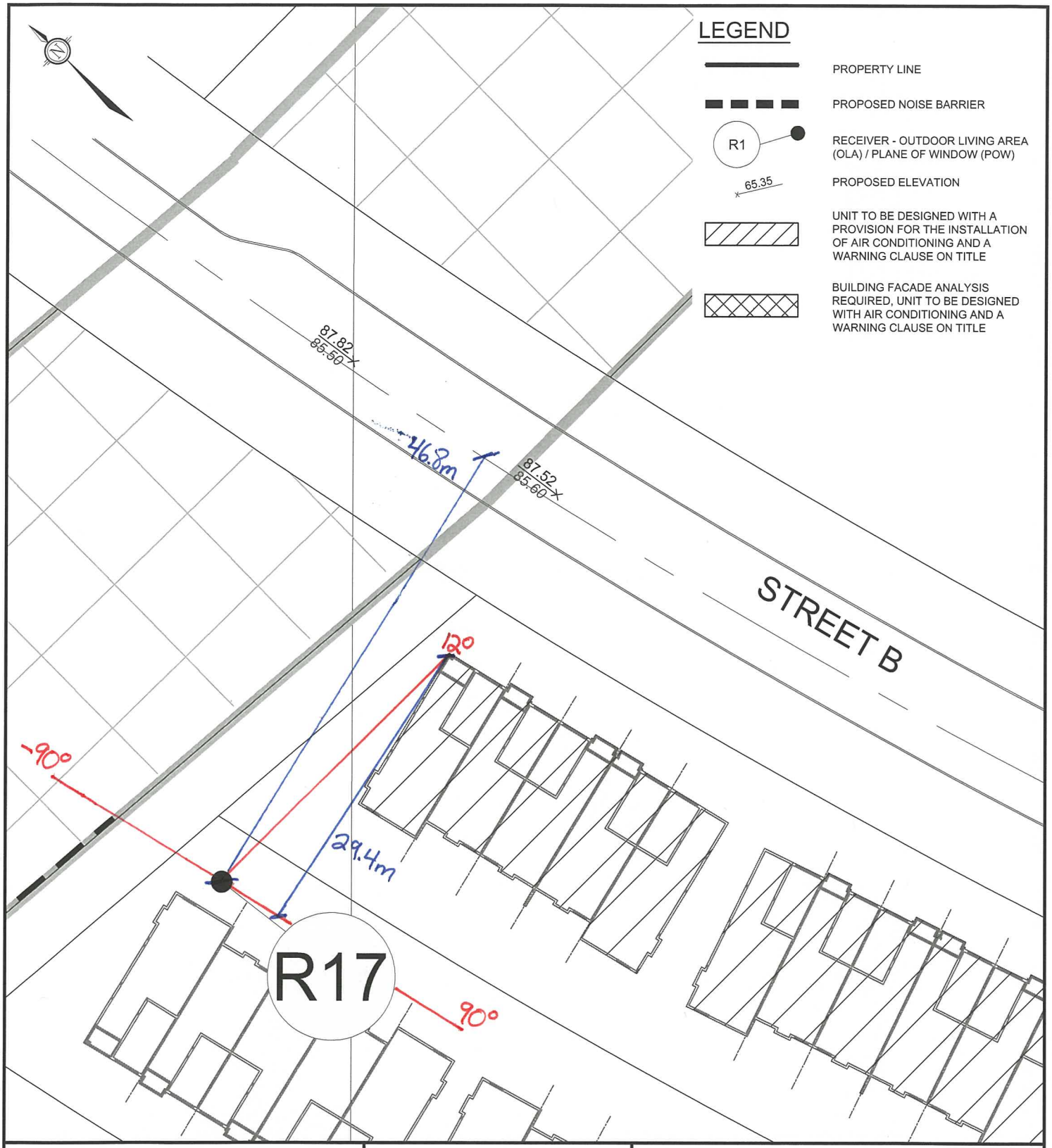
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrBOpen	1.50	52.02	52.02
2.StrBHouse	1.50	39.60	39.60
Total			52.26 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrBOpen	1.50	45.01	45.01
2.StrBHouse	1.50	34.34	34.34
Total			45.37 dBA

```
TOTAL Leq FROM ALL SOURCES (DAY): 52.26
                           (NIGHT): 45.37
```



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R17

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE	JOB	FIGURE
APR 2018	116132	R17

M:\2016\116132\CAD\Design\Figures\Noise\116132-NoiseAngles.dwg, R17, Apr 17, 2018 - 11:46am, tmckay

```
STAMSON 5.0        SUMMARY REPORT        Date: 18-04-2018 13:27:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r18bar22.te          Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: StrBHouse (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: StrBHouse (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   -42.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  24.70 / 24.70  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -90.00 deg   Angle2 : -42.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   6.90 / 6.90   m
Source elevation          :  87.85 m
Receiver elevation        :  88.36 m
Barrier elevation         :  88.11 m
Reference angle           :   0.00

Road data, segment # 2: StrBOpem (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)
```

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: StrBOpem (day/night)
------------------------------------------
Angle1   Angle2           : -42.00 deg   18.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  24.70 / 24.70  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -42.00 deg   Angle2 : 18.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :  13.60 / 13.60  m
Source elevation          :  87.85 m
Receiver elevation        :  88.36 m
Barrier elevation         :  87.95 m
Reference angle           :   0.00

Road data, segment # 3: StrBHouse (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00
```

```
Data for Segment # 3: StrBHouse (day/night)
--------------------------------------------
Angle1   Angle2           :  18.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  24.70 / 24.70  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  18.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   5.30 / 5.30   m
Source elevation          :  87.85 m
Receiver elevation        :  88.36 m
Barrier elevation         :  88.42 m
Reference angle           :   0.00

Road data, segment # 4: StrDOpen (day/night)
--------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: StrDOpen (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   -58.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  39.50 / 39.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -90.00 deg   Angle2 : -58.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :   7.60 / 7.60   m
Source elevation          :  87.99 m
Receiver elevation        :  88.36 m
Barrier elevation         :  87.95 m
Reference angle           :   0.00
```

```
Road data, segment # 5: StrDHouse (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)


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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 5: StrDHouse (day/night)
-------------------------------------------
Angle1   Angle2           : -58.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  39.50 / 39.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -58.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :  87.99 m
Receiver elevation        :  88.36 m
Barrier elevation         :  88.42 m
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.StrBHouse	1.50	40.30	40.30	
2.StrBOpem	1.50	49.51	49.51	
3.StrBHouse	1.50	40.52	40.52	
4.StrDOpen	1.50	47.10	47.10	
5.StrDHouse	1.50	41.20	41.20	
Total			52.45	dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.StrBHouse	1.50	37.17	37.17	
2.StrBOpem	1.50	48.02	48.02	*
3.StrBHouse	1.50	37.53	37.53	
4.StrDOpen	1.50	44.66	44.66	*
5.StrDHouse	1.50	38.70	38.70	
Total			50.45	dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.45
(NIGHT): 50.45

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 13:26:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r18unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg -42.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 24.70 / 24.70 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -42.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 6.90 / 6.90 m
Source elevation : 87.85 m
Receiver elevation : 88.36 m
Barrier elevation : 88.11 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: StrBOpem (day/night)
------------------------------------------
Angle1   Angle2           : -42.00 deg   18.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  24.70 / 24.70  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: StrBHouse (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: StrBHouse (day/night)
-------------------------------------------
Angle1   Angle2           :  18.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  24.70 / 24.70  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  18.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   5.30 / 5.30   m
Source elevation          :  87.85 m
Receiver elevation        :  88.36 m
Barrier elevation         :  88.42 m
Reference angle           :   0.00
```

```
Road data, segment # 4: StrDOpen (day/night)
-------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: StrDOpen (day/night)
------------------------------------------
Angle1   Angle2           : -90.00 deg   -58.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  39.50 / 39.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 5: StrDHouse (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00
```

Data for Segment # 5: StrDHouse (day/night)

```
Angle1   Angle2           : -58.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  39.50 / 39.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -58.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :  87.99 m
Receiver elevation        :  88.36 m
Barrier elevation         :  88.42 m
Reference angle           :   0.00
```

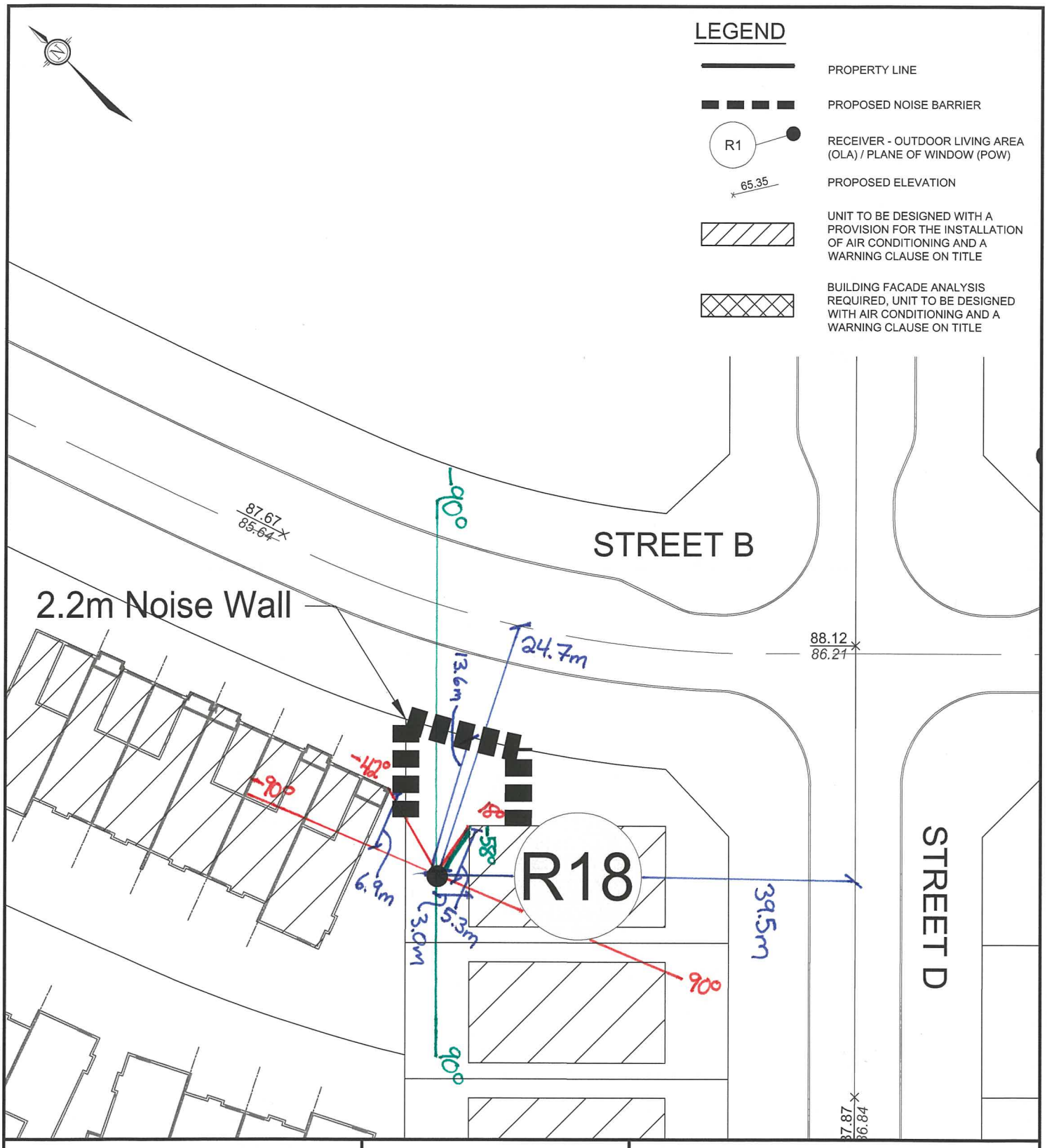
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrBHouse	1.50	40.30	40.30
2.StrBOpem	1.50	55.39	55.39
3.StrBHouse	1.50	40.52	40.52
4.StrDOpen	1.50	45.54	45.54
5.StrDHouse	1.50	41.20	41.20
Total			56.20 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrBHouse	1.50	37.17	37.17
2.StrBOpem	1.50	48.02	48.02
3.StrBHouse	1.50	37.53	37.53
4.StrDOpen	1.50	38.80	38.80
5.StrDHouse	1.50	38.70	38.70
Total			49.51 dBA

```
TOTAL Leq FROM ALL SOURCES (DAY): 56.20
                           (NIGHT): 49.51
```



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- Street B Angles
- Street D Angles

CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R18

SCALE 1 : 500 (0 5 10 15 20)

DATE	JOB	FIGURE
APR 2018	116132	R18

M:\2016\116132\CAD\Design\Figures\Noise\116132-NoiseAngles.dwg, R18, Apr 17, 2018 - 12:34pm, tmckay

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 13:42:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r19bar22.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -32.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	21.20 / 21.20 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -32.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	4.80 / 4.80 m
Source elevation	:	87.84 m
Receiver elevation	:	88.24 m
Barrier elevation	:	88.42 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	: -32.00 deg	63.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 21.20 / 21.20	m
Receiver height	: 1.50 / 4.50	m
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: -32.00 deg	Angle2 : 63.00 deg
Barrier height	: 2.20 m	
Barrier receiver distance	: 9.90 / 9.90	m
Source elevation	: 87.84 m	
Receiver elevation	: 88.24 m	
Barrier elevation	: 87.90 m	
Reference angle	: 0.00	

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

Car traffic volume	: 6477/563	veh/TimePeriod *
Medium truck volume	: 515/45	veh/TimePeriod *
Heavy truck volume	: 368/32	veh/TimePeriod *
Posted speed limit	: 40 km/h	
Road gradient	: 1 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

```
Data for Segment # 3: StrBHouse (day/night)
--------------------------------------------
Angle1   Angle2           :  63.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  21.20 / 21.20  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  63.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :  87.84 m
Receiver elevation        :  88.24 m
Barrier elevation         :  88.42 m
Reference angle           :   0.00

Road data, segment # 4: StrDHouse (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: StrDHouse (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   58.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  39.50 / 39.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -90.00 deg   Angle2 : 58.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :  87.99 m
Receiver elevation        :  88.24 m
Barrier elevation         :  88.42 m
Reference angle           :   0.00
```

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

Car traffic volume	6477/563	veh/TimePeriod *
Medium truck volume	515/45	veh/TimePeriod *
Heavy truck volume	368/32	veh/TimePeriod *
Posted speed limit	40 km/h	
Road gradient	1 %	
Road pavement	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	8000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

Data for Segment # 5: StrDOpen (day/night)

Angle1 Angle2	58.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	2	(Reflective ground surface)
Receiver source distance	39.50 / 39.50 m	
Receiver height	1.50 / 4.50 m	
Topography	2	(Flat/gentle slope; with barrier)
Barrier angle1	58.00 deg	Angle2 : 90.00 deg
Barrier height	2.20 m	
Barrier receiver distance	6.20 / 6.20 m	
Source elevation	87.99 m	
Receiver elevation	88.24 m	
Barrier elevation	87.90 m	
Reference angle	0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.StrBHouse	1.50	40.43	40.43	
2.StrBOpem	1.50	52.34	52.34	
3.StrBHouse	1.50	38.28	38.28	
4.StrDHouse	1.50	41.13	41.13	
5.StrDOpen	1.50	47.04	47.04	
Total			54.03	dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.StrBHouse	1.50	37.15	37.15	
2.StrBOpem	1.50	50.83	50.83	*
3.StrBHouse	1.50	35.13	35.13	
4.StrDHouse	1.50	38.32	38.32	
5.StrDOpen	1.50	44.66	44.66	*
Total			52.19	dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 54.03
(NIGHT): 52.19

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 13:43:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r19unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg -32.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 21.20 / 21.20 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -32.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 4.80 / 4.80 m
Source elevation : 87.84 m
Receiver elevation : 88.24 m
Barrier elevation : 88.42 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: StrBOpem (day/night)
------------------------------------------
Angle1   Angle2           : -32.00 deg   63.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  21.20 / 21.20  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: StrBHouse (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: StrBHouse (day/night)
------------------------------------------
Angle1   Angle2           :  63.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  21.20 / 21.20  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  63.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :  87.84 m
Receiver elevation        :  88.24 m
Barrier elevation         :  88.42 m
Reference angle           :   0.00
```

```
Road data, segment # 4: StrDHouse (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 4: StrDHouse (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   58.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  39.50 / 39.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -90.00 deg   Angle2 : 58.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :  87.99 m
Receiver elevation        :  88.24 m
Barrier elevation         :  88.42 m
Reference angle           :   0.00

Road data, segment # 5: StrDOpen (day/night)
--------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00
```

Data for Segment # 5: StrDOpen (day/night)

Angle1 Angle2	:	58.00 deg 90.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	2 (Reflective ground surface)
Receiver source distance	:	39.50 / 39.50 m
Receiver height	:	1.50 / 4.50 m
Topography	:	1 (Flat/gentle slope; no barrier)
Reference angle	:	0.00

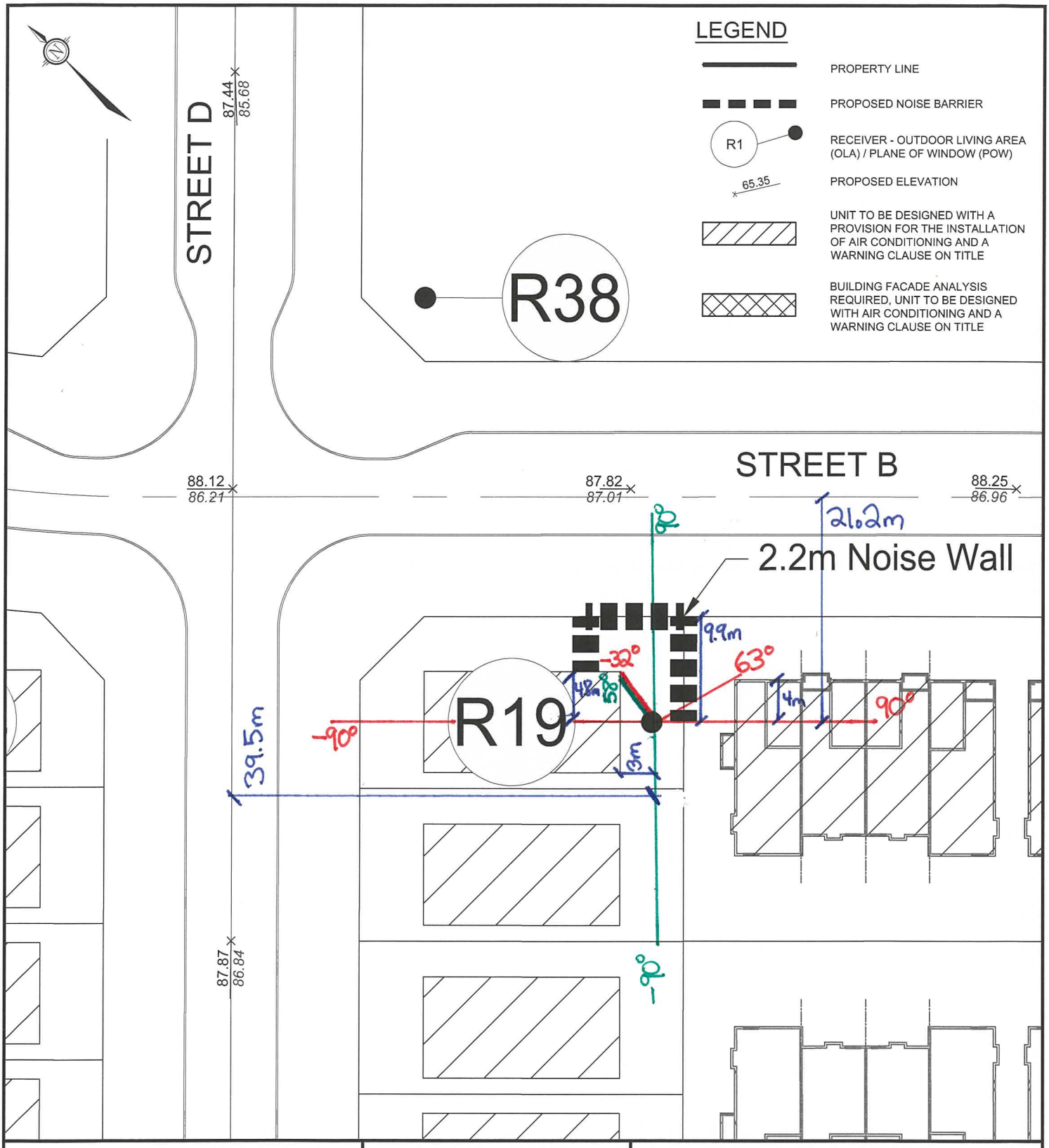
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrBHouse	1.50	40.43	40.43
2.StrBOpem	1.50	58.23	58.23
3.StrBHouse	1.50	38.28	38.28
4.StrDHouse	1.50	41.13	41.13
5.StrDOpen	1.50	52.25	52.25
Total			59.36 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrBHouse	1.50	37.15	37.15
2.StrBOpem	1.50	50.83	50.83
3.StrBHouse	1.50	35.13	35.13
4.StrDHouse	1.50	38.32	38.32
5.StrDOpen	1.50	44.66	44.66
Total			52.19 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.36
(NIGHT): 52.19



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- Street B Angles
- Street D Angles

CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R19

SCALE 1 : 500 (0 5 10 15 20)

DATE APR 2018 | JOB 116132 | FIGURE R19

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STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 13:54:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r20unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg 19.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	47.20 / 47.20 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : 19.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	13.00 / 13.00 m
Source elevation	:	88.23 m
Receiver elevation	:	88.72 m
Barrier elevation	:	88.75 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	8000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

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

Angle1 Angle2	19.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	0 / 0	
Surface	1	(Absorptive ground surface)
Receiver source distance	47.20 / 47.20	m
Receiver height	1.50 / 4.50	m
Topography	1	(Flat/gentle slope; no barrier)
Reference angle	0.00	

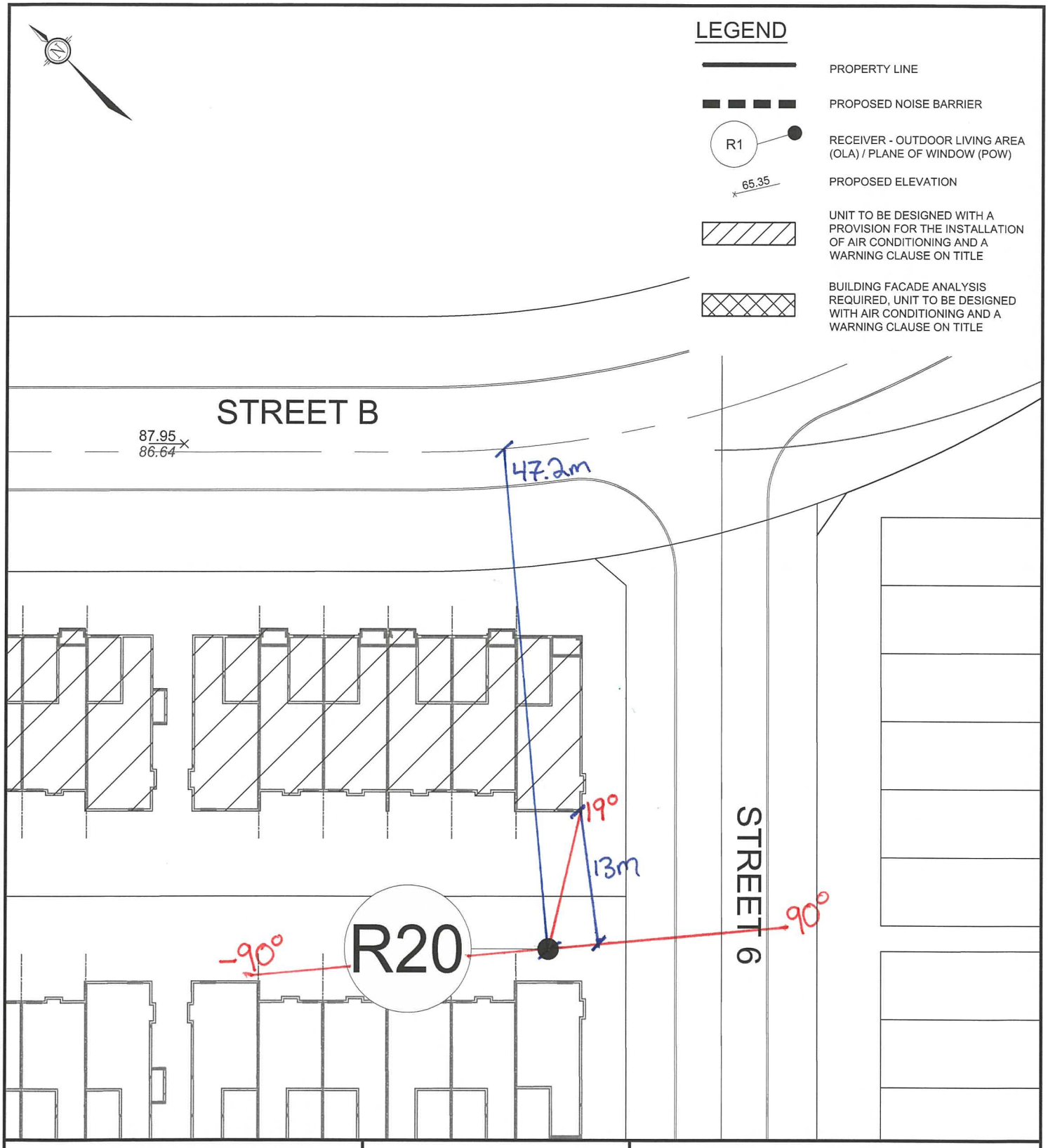
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrBHouse	1.50	40.22	40.22
2.StrBOpen	1.50	49.73	49.73
Total			50.19 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrBHouse	1.50	37.17	37.17
2.StrBOpen	1.50	42.79	42.79
Total			43.84 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.19
(NIGHT): 43.84



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R20

SCALE 1 : 500 (0 5 10 15 20)

DATE	JOB	FIGURE
APR 2018	116132	R20

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STAMSON 5.0 SUMMARY REPORT Date: 26-02-2018 10:05:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r21unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -51.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	2 (Reflective ground surface)
Receiver source distance	:	45.50 / 45.50 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -51.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	27.50 / 27.50 m
Source elevation	:	88.59 m
Receiver elevation	:	88.87 m
Barrier elevation	:	88.45 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: StrDOpem (day/night)
------------------------------------------
Angle1   Angle2           : -51.00 deg   -28.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  45.50 / 45.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: StrDHouse (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: StrDHouse (day/night)
-------------------------------------------
Angle1   Angle2           : -28.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  45.50 / 45.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -28.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   9.00 / 9.00   m
Source elevation          :  88.59 m
Receiver elevation        :  88.87 m
Barrier elevation         :  88.96 m
Reference angle           :   0.00
```

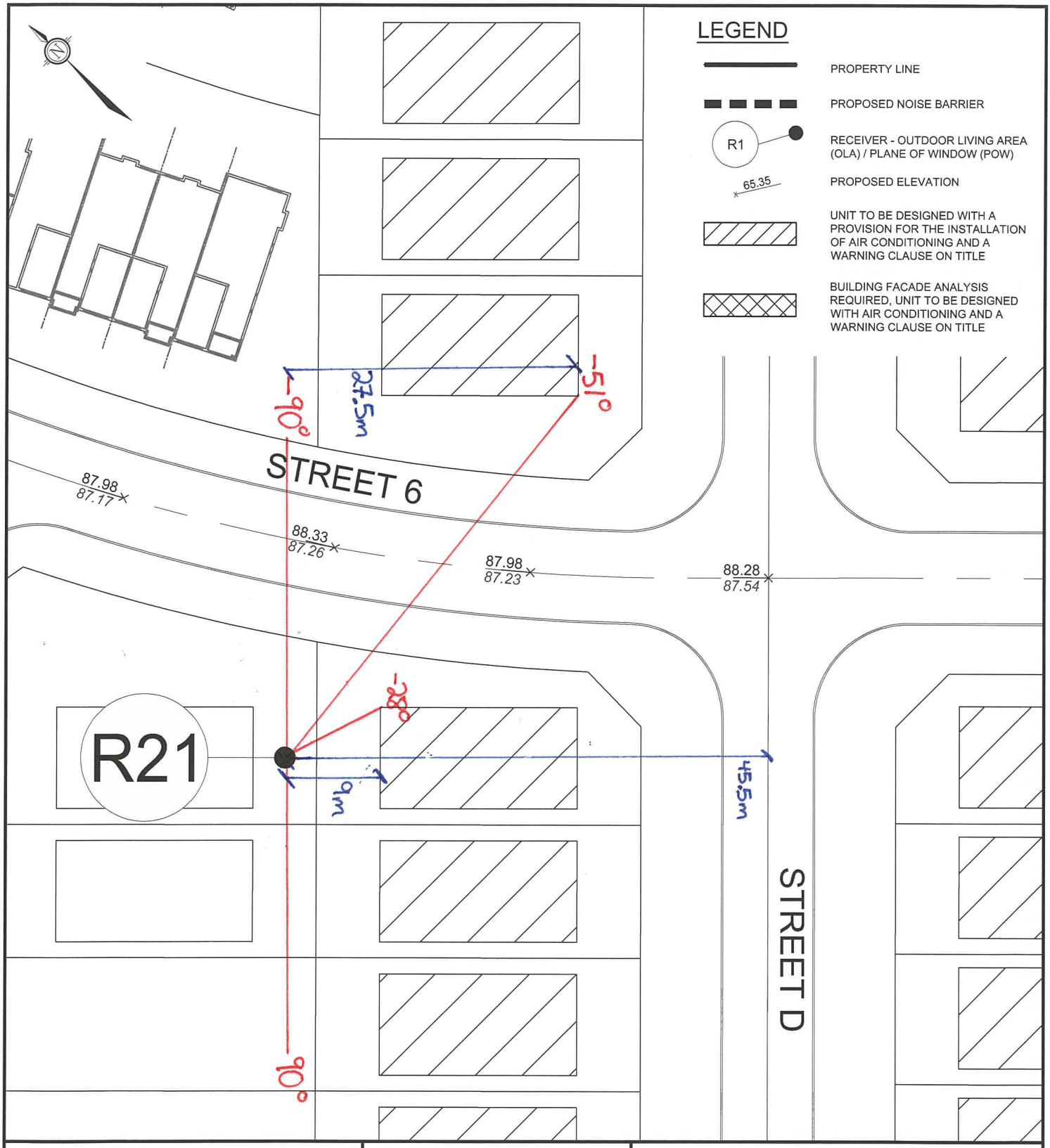
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDHouse	1.50	41.83	41.83
2.StrDOpem	1.50	50.20	50.20
3.StrDHouse	1.50	41.86	41.86
Total			51.31 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDHouse	1.50	35.94	35.94
2.StrDOpem	1.50	42.61	42.61
3.StrDHouse	1.50	38.90	38.90
Total			44.76 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.31
(NIGHT): 44.76



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R21

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE	JOB	FIGURE
APR 2018	116132	R21

SHT8X11.DWG - 216mmx279mm

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STAMSON 5.0 SUMMARY REPORT Date: 26-02-2018 10:06:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r22unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg 28.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	2 (Reflective ground surface)
Receiver source distance	:	45.50 / 45.50 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : 28.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	9.00 / 9.00 m
Source elevation	:	88.59 m
Receiver elevation	:	88.98 m
Barrier elevation	:	88.82 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: StrDOpem (day/night)
------------------------------------------
Angle1   Angle2           :  28.00 deg   48.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  45.50 / 45.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: StrDHouse (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: StrDHouse (day/night)
------------------------------------------
Angle1   Angle2           :  48.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  45.50 / 45.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  48.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :  27.50 / 27.50  m
Source elevation          :  88.59 m
Receiver elevation        :  88.98 m
Barrier elevation         :  88.50 m
Reference angle           :   0.00
```

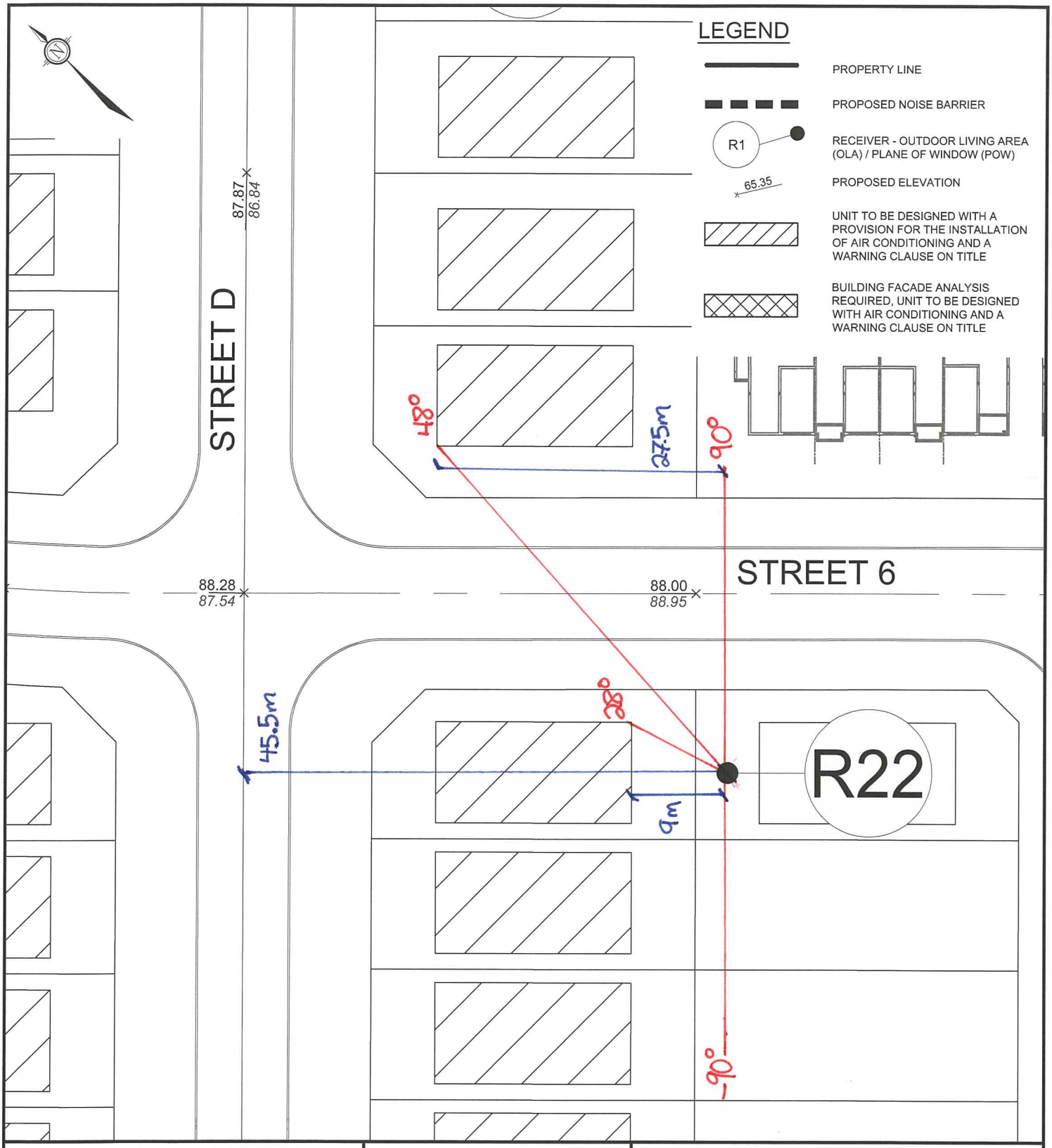
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDHouse	1.50	42.19	42.19
2.StrDOpem	1.50	49.59	49.59
3.StrDHouse	1.50	41.95	41.95
Total			50.91 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDHouse	1.50	39.53	39.53
2.StrDOpem	1.50	42.00	42.00
3.StrDHouse	1.50	36.09	36.09
Total			44.61 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.91
(NIGHT): 44.61



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R22

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE	JOB	FIGURE
APR 2018	116132	R22

M:\2016\116132\CAD\Design\Figures\Noise\116132-NoiseAngles.dwg, R22, Apr 17, 2018 - 1:01pm, tmckay

SHT8X11.DWG 216mmx279mm

STAMSON 5.0 SUMMARY REPORT Date: 15-03-2018 13:25:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r23unmit.te Time Period: Day/Night 16/8 hours
Description: Corner of Multi-Unit Residential (StrD&StrB)

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: StrBOpen (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 : 22.10 / 22.10 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: StrCOpem (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	:	20.60 / 20.60	m
Receiver height	:	1.50 / 4.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrBOpen	1.50	59.71	59.71
2.StrCOpem	1.50	60.21	60.21
Total			62.98 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrBOpen	1.50	52.42	52.42
2.StrCOpem	1.50	52.90	52.90
Total			55.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.98
(NIGHT): 55.68

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 14:00:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r24unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg 28.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	2 (Reflective ground surface)
Receiver source distance	:	45.50 / 45.50 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : 28.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	9.00 / 9.00 m
Source elevation	:	92.27 m
Receiver elevation	:	92.20 m
Barrier elevation	:	92.50 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: StrDOpem (day/night)
------------------------------------------
Angle1  Angle2           :  28.00 deg   47.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      2       (Reflective ground surface)
Receiver source distance :  45.50 / 45.50  m
Receiver height          :   1.50 / 4.50   m
Topography               :      1       (Flat/gentle slope; no barrier)
Reference angle          :   0.00

Road data, segment # 3: StrDHouse (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: StrDHouse (day/night)
------------------------------------------
Angle1   Angle2          :  47.00 deg   90.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      2       (Reflective ground surface)
Receiver source distance :  45.50 / 45.50  m
Receiver height          :   1.50 / 4.50   m
Topography               :      2       (Flat/gentle slope; with
barrier)
Barrier angle1           :  47.00 deg   Angle2 : 90.00 deg
Barrier height           :   6.00 m
Barrier receiver distance :  29.60 / 29.60  m
Source elevation         :  92.27 m
Receiver elevation       :  92.20 m
Barrier elevation        :  92.78 m
Reference angle          :   0.00
```

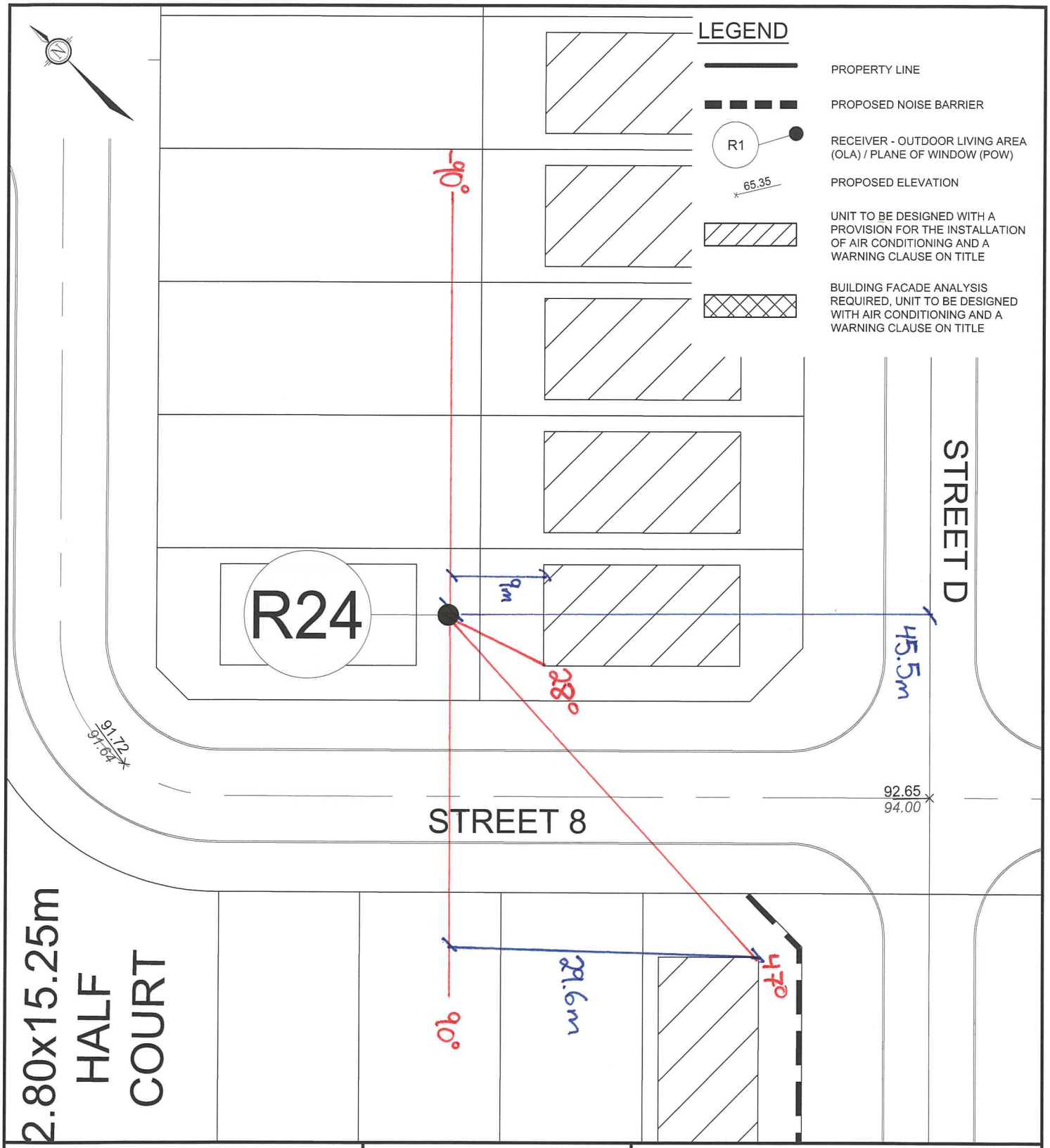
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDHouse	1.50	41.66	41.66
2.StrDOpem	1.50	49.37	49.37
3.StrDHouse	1.50	40.88	40.88
Total			50.55 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDHouse	1.50	38.54	38.54
2.StrDOpem	1.50	41.78	41.78
3.StrDHouse	1.50	34.66	34.66
Total			44.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.55
(NIGHT): 44.00



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R24

SCALE 1 : 500 (0 5 10 15 20)

DATE APR 2018 | JOB 116132 | FIGURE R24

M:\2016\116132\CAD\Design\Figures\Noise\116132-NoiseAngles.dwg, R24, Apr 17, 2018 - 4:16pm, tmckay

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 14:13:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r25bar22.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg -32.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 21.90 / 21.90 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -32.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 4.80 / 4.80 m
Source elevation : 91.84 m
Receiver elevation : 92.48 m
Barrier elevation : 92.66 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	8000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

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

Angle1 Angle2	-32.00 deg 49.00 deg
Wood depth	0 (No woods.)
No of house rows	0 / 0
Surface	1 (Absorptive ground surface)
Receiver source distance	21.90 / 21.90 m
Receiver height	1.50 / 4.50 m
Topography	2 (Flat/gentle slope; with barrier)
Barrier angle1	-32.00 deg Angle2 : 49.00 deg
Barrier height	2.20 m
Barrier receiver distance	9.90 / 9.90 m
Source elevation	91.84 m
Receiver elevation	92.48 m
Barrier elevation	91.91 m
Reference angle	0.00

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

Car traffic volume	6477/563 veh/TimePeriod *
Medium truck volume	515/45 veh/TimePeriod *
Heavy truck volume	368/32 veh/TimePeriod *
Posted speed limit	40 km/h
Road gradient	2 %
Road pavement	1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	8000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

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

```
Angle1   Angle2           :  49.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  21.90 / 21.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  49.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.90 / 3.90   m
Source elevation          :  91.84 m
Receiver elevation        :  92.48 m
Barrier elevation         :  92.00 m
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDHouse	1.50	40.21	40.21
2.StrDOpem	1.50	52.01	52.01
3.StrDHouse	1.50	39.87	39.87
Total			52.53 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.StrDHouse	1.50	36.94	36.94	
2.StrDOpem	1.50	50.07	50.07	*
3.StrDHouse	1.50	37.72	37.72	
Total			50.51 dBA	

```
TOTAL Leq FROM ALL SOURCES (DAY): 52.53
                           (NIGHT): 50.51
```

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 14:14:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r25unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563 veh/TimePeriod	*
Medium truck volume	:	515/45 veh/TimePeriod	*
Heavy truck volume	:	368/32 veh/TimePeriod	*
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -32.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	21.90 / 21.90 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -32.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	4.80 / 4.80 m
Source elevation	:	91.84 m
Receiver elevation	:	92.48 m
Barrier elevation	:	92.66 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563 veh/TimePeriod	*
Medium truck volume	:	515/45 veh/TimePeriod	*
Heavy truck volume	:	368/32 veh/TimePeriod	*
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 2: StrDOpem (day/night)
------------------------------------------
Angle1   Angle2           : -32.00 deg   49.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  21.90 / 21.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: StrDHouse (day/night)
---------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 3: StrDHouse (day/night)
-------------------------------------------
Angle1   Angle2           :  49.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  21.90 / 21.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  49.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.90 / 3.90   m
Source elevation          :  91.84 m
Receiver elevation        :  92.48 m
Barrier elevation         :  92.00 m
Reference angle           :   0.00
```

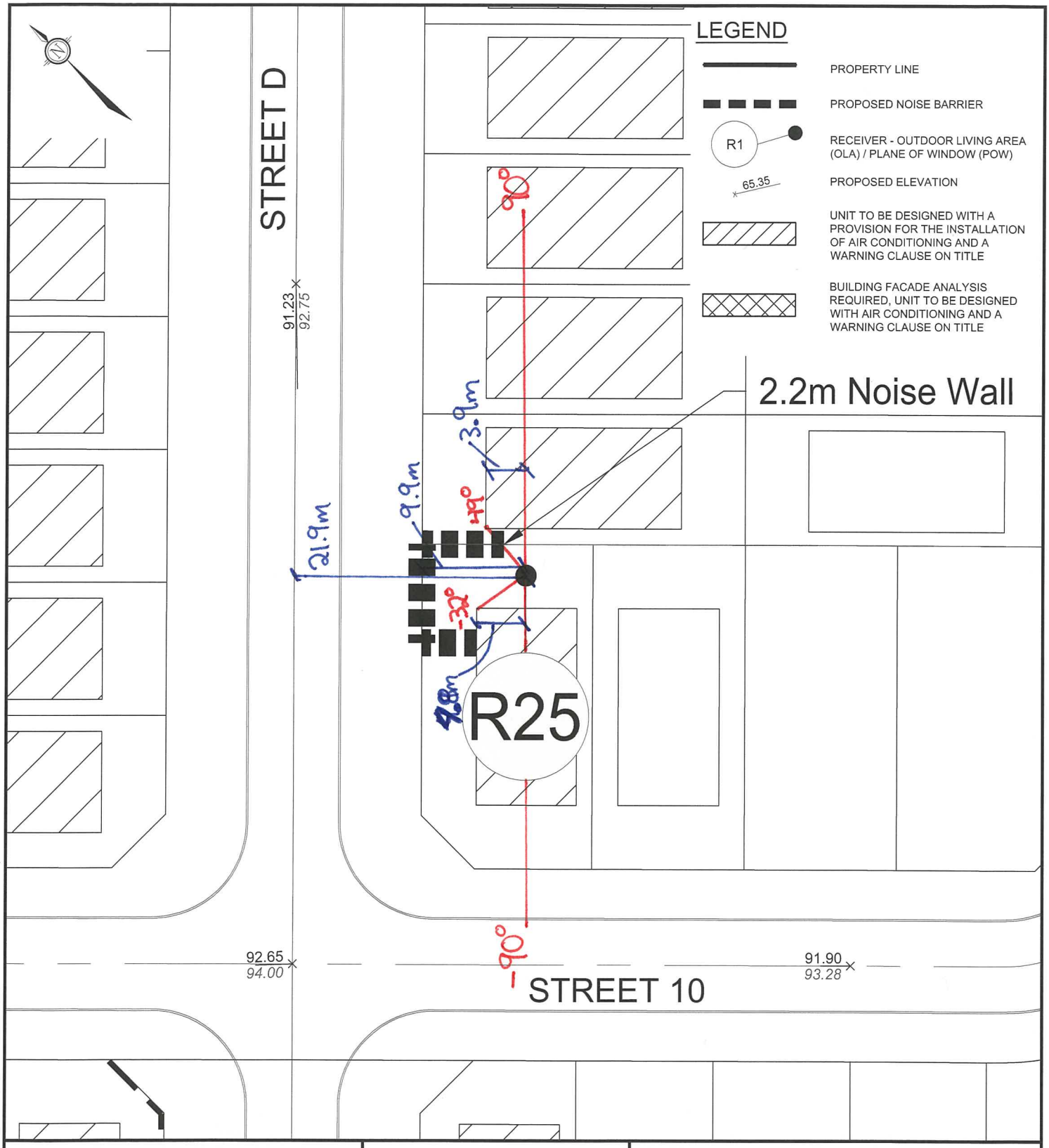
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDHouse	1.50	40.21	40.21
2.StrDOpem	1.50	57.48	57.48
3.StrDHouse	1.50	39.87	39.87
Total			57.63 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.StrDHouse	1.50	36.94	36.94
2.StrDOpem	1.50	50.07	50.07
3.StrDHouse	1.50	37.72	37.72
Total			50.51 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.63
(NIGHT): 50.51



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R25

SCALE 1 : 500 (0 5 10 15 20)

DATE	JOB	FIGURE
APR 2018	116132	R25

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SHT8X11.DWG - 216mmx279mm

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 14:26:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r26unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -69.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	2 (Reflective ground surface)
Receiver source distance	:	39.50 / 39.50 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -69.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	23.10 / 23.10 m
Source elevation	:	89.89 m
Receiver elevation	:	89.15 m
Barrier elevation	:	89.44 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Open (day/night)
--------------------------------------
Angle1   Angle2           : -69.00 deg   -58.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  39.50 / 39.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: House (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: House (day/night)
---------------------------------------
Angle1   Angle2           : -58.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  39.50 / 39.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -58.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :  89.89 m
Receiver elevation        :  89.15 m
Barrier elevation         :  90.31 m
Reference angle           :   0.00
```

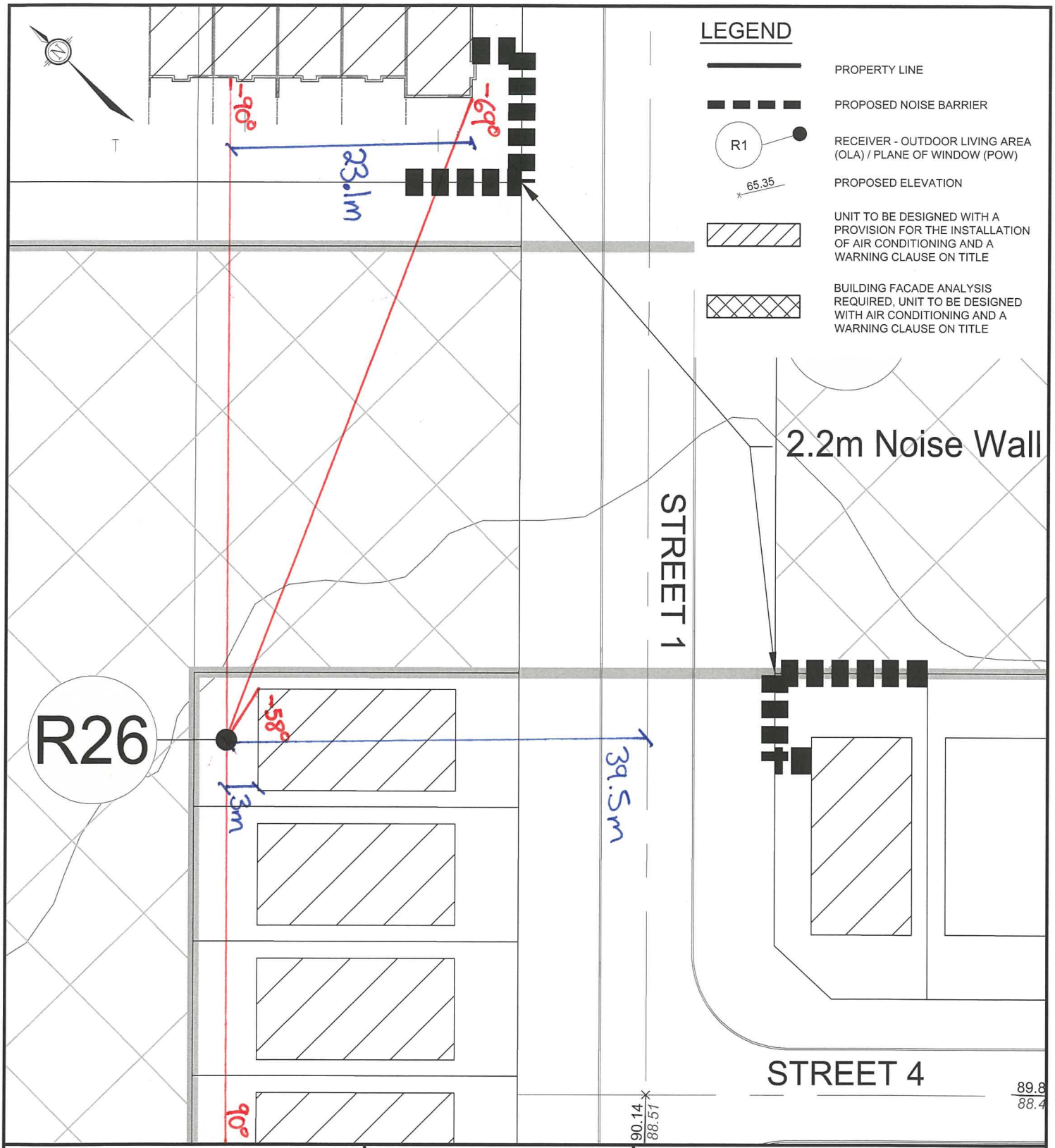
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	40.90	40.90
2.Open	1.50	47.61	47.61
3.House	1.50	40.71	40.71
Total			49.13 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	34.83	34.83
2.Open	1.50	40.02	40.02
3.House	1.50	35.88	35.88
Total			42.29 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.13
(NIGHT): 42.29



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R26

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE APR 2018 | JOB 116132 | FIGURE R26

M:\2016\116132\CAD\Design\Figures\Noise\116132-NoiseAngles.dwg, R26, Apr 17, 2018 - 4:16pm, tmckay

SHTRX11.DWG - 216mmx279mm

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 14:37:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r27bar22.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40	km/h
Road gradient	:	0	%
Road pavement	:	1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg	-32.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	20.20 / 20.20	m
Receiver height	:	1.50 / 4.50	m
Topography	:	2	(Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg	Angle2 : -32.00 deg
Barrier height	:	6.00	m
Barrier receiver distance	:	4.80 / 4.80	m
Source elevation	:	89.86	m
Receiver elevation	:	89.18	m
Barrier elevation	:	90.44	m
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40	km/h
Road gradient	:	0	%
Road pavement	:	1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	: -32.00 deg	85.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 20.20 / 20.20	m
Receiver height	: 1.50 / 4.50	m
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: -32.00 deg	Angle2 : 85.00 deg
Barrier height	: 2.20 m	
Barrier receiver distance	: 8.20 / 8.20	m
Source elevation	: 89.86 m	
Receiver elevation	: 89.18 m	
Barrier elevation	: 90.00 m	
Reference angle	: 0.00	

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

Car traffic volume	: 6477/563	veh/TimePeriod *
Medium truck volume	: 515/45	veh/TimePeriod *
Heavy truck volume	: 368/32	veh/TimePeriod *
Posted speed limit	: 40 km/h	
Road gradient	: 0 %	
Road pavement	: 1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

```
Angle1   Angle2           :  85.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.20 / 20.20  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  85.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   5.00 / 5.00   m
Source elevation          :  89.86 m
Receiver elevation        :  89.18 m
Barrier elevation         :  89.35 m
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	39.96	39.96
2.Open	1.50	50.39	50.39
3.House	1.50	34.15	34.15
Total			50.86 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	35.57	35.57
2.Open	1.50	51.64	51.64 *
3.House	1.50	29.93	29.93
Total			51.77 dBA

```
TOTAL Leq FROM ALL SOURCES (DAY): 50.86
                           (NIGHT): 51.77
```

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 14:38:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r27unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg	-32.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	20.20 / 20.20	m
Receiver height	:	1.50 / 4.50	m
Topography	:	2	(Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg	Angle2 : -32.00 deg
Barrier height	:	6.00 m	
Barrier receiver distance	:	4.80 / 4.80	m
Source elevation	:	89.86 m	
Receiver elevation	:	89.18 m	
Barrier elevation	:	90.44 m	
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Open (day/night)
--------------------------------------
Angle1   Angle2           : -32.00 deg   85.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.20 / 20.20  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: House (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: House (day/night)
---------------------------------------
Angle1   Angle2           :  85.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  20.20 / 20.20  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  85.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   5.00 / 5.00   m
Source elevation          :  89.86 m
Receiver elevation        :  89.18 m
Barrier elevation         :  89.35 m
Reference angle           :   0.00
```

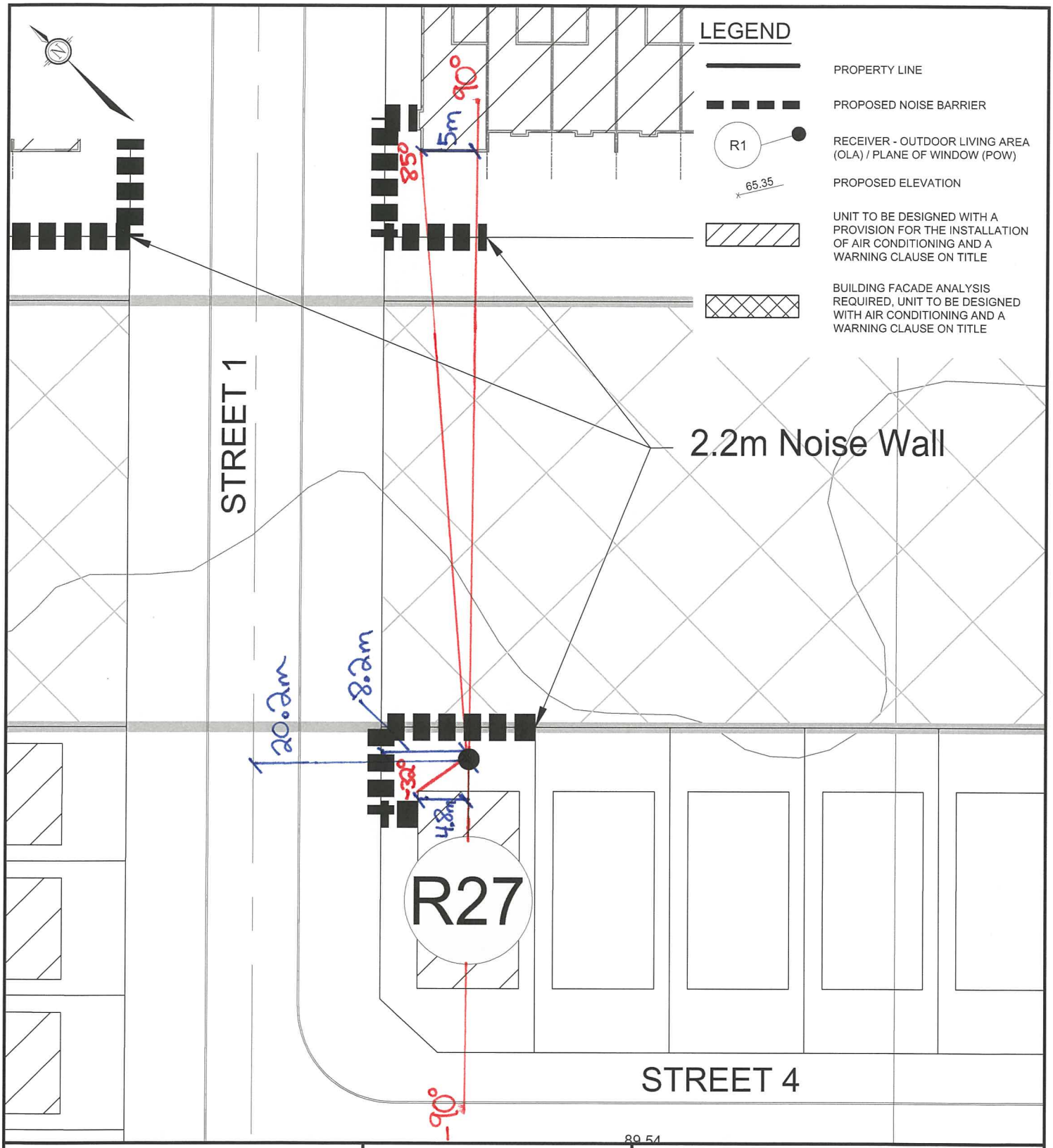
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	39.96	39.96
2.Open	1.50	59.02	59.02
3.House	1.50	34.15	34.15
Total			59.09 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	35.57	35.57
2.Open	1.50	51.64	51.64
3.House	1.50	29.93	29.93
Total			51.77 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.09
(NIGHT): 51.77



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R27

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE	JOB	FIGURE
APR 2018	116132	R27

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STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 15:01:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r28unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -10.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	32.90 / 32.90 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -10.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	17.40 / 17.40 m
Source elevation	:	89.86 m
Receiver elevation	:	89.18 m
Barrier elevation	:	90.44 m
Reference angle	:	0.00

Road data, segment # 2: Bar22 (day/night)

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Bar22 (day/night)
--------------------------------------
Angle1   Angle2           : -10.00 deg   25.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  32.90 / 32.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -10.00 deg   Angle2 : 25.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :  20.90 / 20.90  m
Source elevation          :  89.86 m
Receiver elevation        :  89.18 m
Barrier elevation         :  90.00 m
Reference angle           :   0.00

Road data, segment # 3: Open (day/night)
---------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Open (day/night)
--------------------------------------
Angle1   Angle2           :  25.00 deg   73.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  32.90 / 32.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Car traffic volume	: 6477/563	veh/TimePeriod	*
Medium truck volume	: 515/45	veh/TimePeriod	*
Heavy truck volume	: 368/32	veh/TimePeriod	*
Posted speed limit	: 40	km/h	
Road gradient	: 0	%	
Road pavement	: 1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	: 73.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 32.90 / 32.90	m
Receiver height	: 1.50 / 4.50	m
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: 73.00 deg	Angle2 : 90.00 deg
Barrier height	: 6.00	m
Barrier receiver distance	: 17.40 / 17.40	m
Source elevation	: 89.86	m
Receiver elevation	: 89.18	m
Barrier elevation	: 89.35	m
Reference angle	: 0.00	

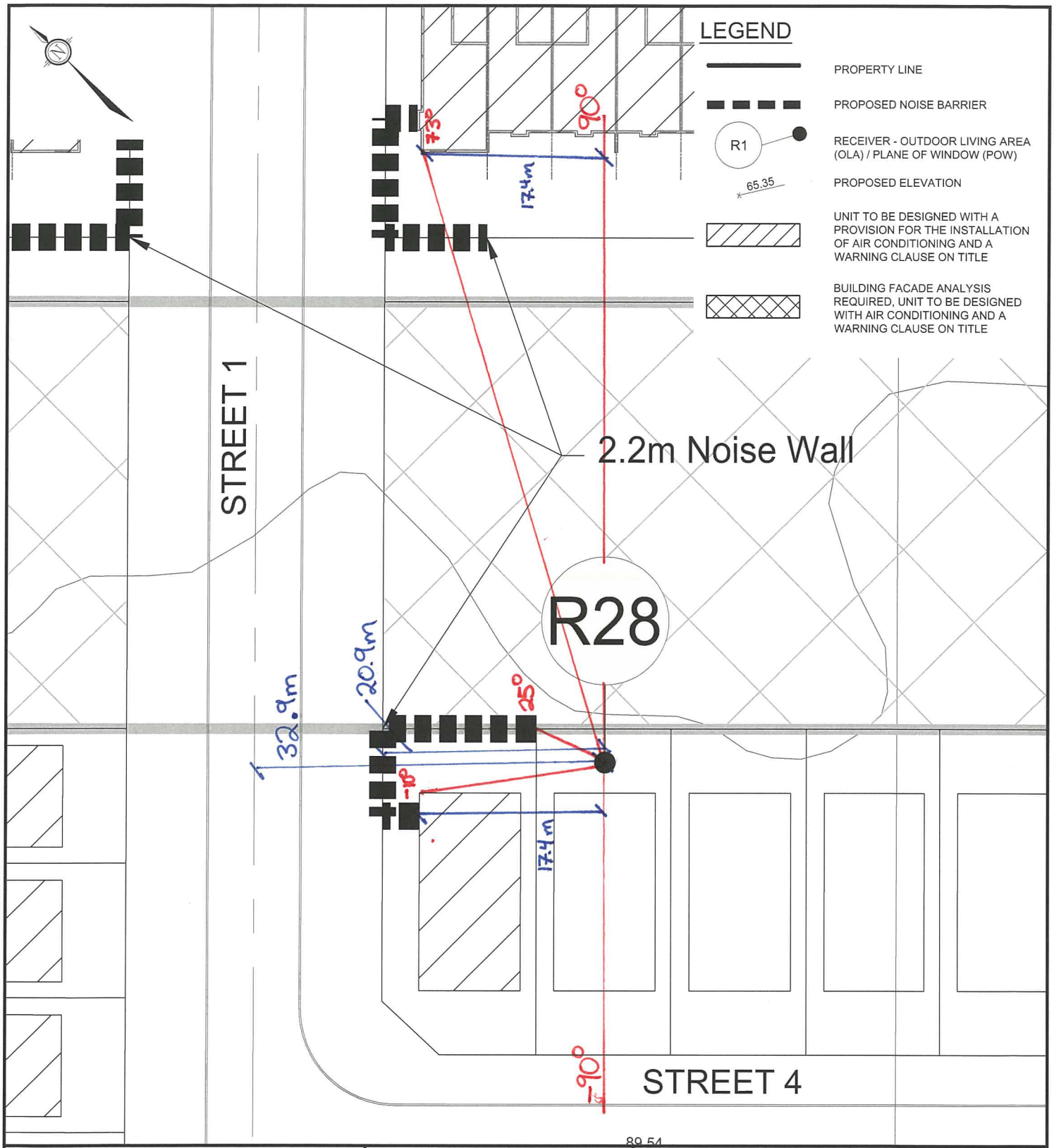
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.House	1.50	40.07	40.07	
2.Bar22	1.50	43.49	43.49	
3.Open	1.50	51.22	51.22	
4.House	1.50	37.21	37.21	
Total			52.31	dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.House	1.50	35.01	35.01	
2.Bar22	1.50	43.83	43.83	*
3.Open	1.50	44.10	44.10	
4.House	1.50	32.42	32.42	
Total			47.39	dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.31
(NIGHT): 47.39



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R28

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE	JOB	FIGURE
APR 2018	116132	R28

M:\2016\116132\CAD\Design\Figures\Noise\116132-NoiseAngles.dwg, R28, Apr 17, 2018 - 3:29pm, tmckay

SHT8X11.DWG - 216mmx279mm

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 15:06:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r29unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40	km/h
Road gradient	:	0	%
Road pavement	:	1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg	-6.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	45.50 / 45.50	m
Receiver height	:	1.50 / 4.50	m
Topography	:	2	(Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg	Angle2 : -6.00 deg
Barrier height	:	6.00	m
Barrier receiver distance	:	30.00 / 30.00	m
Source elevation	:	89.86	m
Receiver elevation	:	89.18	m
Barrier elevation	:	90.44	m
Reference angle	:	0.00	

Road data, segment # 2: Bar22 (day/night)

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40	km/h
Road gradient	:	0	%
Road pavement	:	1	(Typical asphalt or concrete)

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Bar22 (day/night)
---------------------------------------
Angle1   Angle2           :  -6.00 deg   9.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  45.50 / 45.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  -6.00 deg   Angle2 : 9.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :  33.50 / 33.50  m
Source elevation          :  89.86 m
Receiver elevation        :  89.18 m
Barrier elevation         :  90.00 m
Reference angle           :   0.00

Road data, segment # 3: Open (day/night)
----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Open (day/night)
---------------------------------------
Angle1   Angle2           :   9.00 deg   62.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  45.50 / 45.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Car traffic volume	: 6477/563	veh/TimePeriod	*
Medium truck volume	: 515/45	veh/TimePeriod	*
Heavy truck volume	: 368/32	veh/TimePeriod	*
Posted speed limit	: 40	km/h	
Road gradient	: 0	%	
Road pavement	: 1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	: 62.00 deg	90.00 deg	
Wood depth	: 0	(No woods.)	
No of house rows	: 0 / 0		
Surface	: 1	(Absorptive ground surface)	
Receiver source distance	: 45.50 / 45.50	m	
Receiver height	: 1.50 / 4.50	m	
Topography	: 2	(Flat/gentle slope; with barrier)	
Barrier angle1	: 62.00 deg	Angle2 : 90.00 deg	
Barrier height	: 6.00	m	
Barrier receiver distance	: 30.30 / 30.30	m	
Source elevation	: 89.86	m	
Receiver elevation	: 89.18	m	
Barrier elevation	: 89.35	m	
Reference angle	: 0.00		

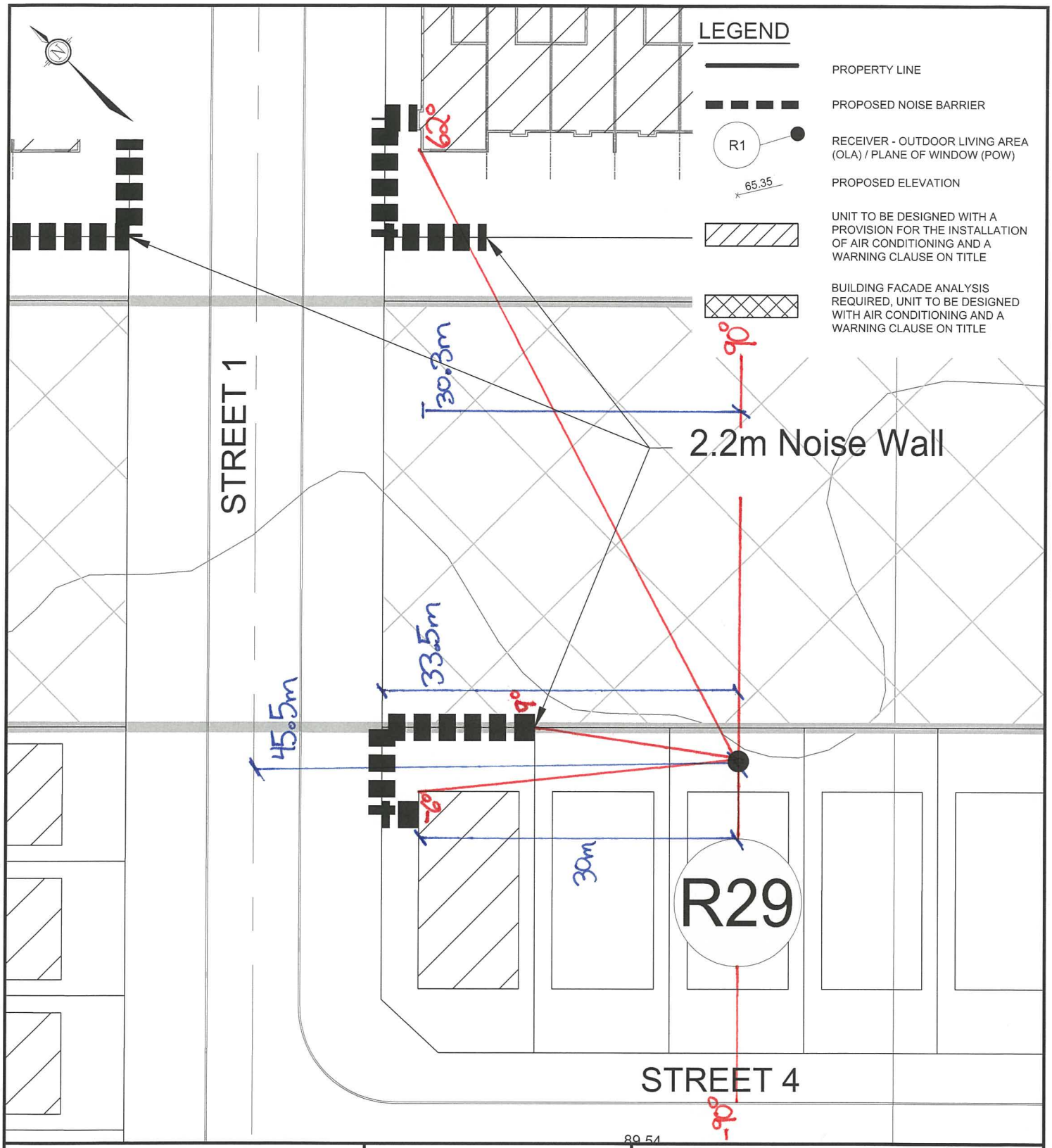
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	39.18	39.18
2.Bar22	1.50	38.27	38.27
3.Open	1.50	49.93	49.93
4.House	1.50	37.57	37.57
Total			50.76 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	33.66	33.66
2.Bar22	1.50	33.48	33.48
3.Open	1.50	42.87	42.87
4.House	1.50	32.34	32.34
Total			44.09 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.76
(NIGHT): 44.09



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R29

SCALE 1 : 500 (0 5 10 15 20)

DATE	JOB	FIGURE
APR 2018	116132	R29

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STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 15:03:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r30unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: House (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	:	87.05 / 87.05	m
Receiver height	:	1.50 / 4.50	m
Topography	:	4	(Elevated; with barrier)
Barrier angle1	:	-90.00 deg	Angle2 : -25.00 deg
Barrier height	:	6.00 m	
Elevation	:	3.54 m	
Barrier receiver distance	:	70.30 / 70.30	m
Source elevation	:	89.68 m	
Receiver elevation	:	89.35 m	
Barrier elevation	:	89.44 m	
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Open (day/night)
--------------------------------------
Angle1   Angle2           : -25.00 deg   18.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  87.05 / 87.05  m
Receiver height           :   1.50 / 4.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   3.54 m
Reference angle           :   0.00

Road data, segment # 3: House (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: House (day/night)
---------------------------------------
Angle1   Angle2           :  18.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  87.05 / 87.05  m
Receiver height           :   1.50 / 4.50   m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            :  18.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Elevation                 :   3.54 m
Barrier receiver distance :  69.20 / 69.20  m
Source elevation          :  89.68 m
Receiver elevation        :  89.35 m
Barrier elevation         :  90.31 m
Reference angle           :   0.00
```

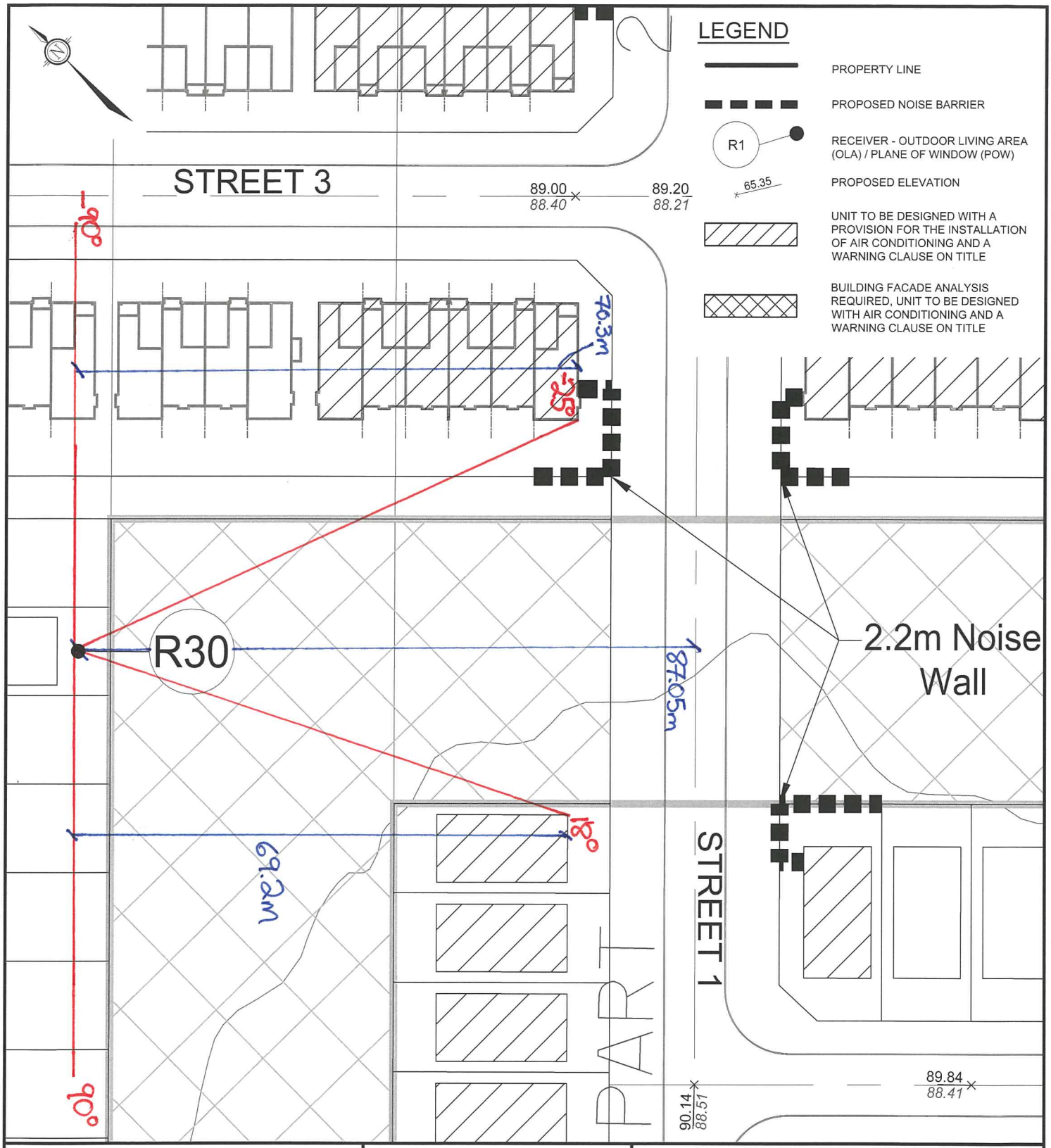
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	38.18	38.18
2.Open	1.50	45.81	45.81
3.House	1.50	37.45	37.45
Total			47.01 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	32.44	32.44
2.Open	1.50	38.91	38.91
3.House	1.50	31.63	31.63
Total			40.41 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 47.01
(NIGHT): 40.41



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R30

SCALE 1 : 750 (0, 6, 12, 18, 24, 30)

DATE APR 2018 | JOB 116132 | FIGURE R30

M:\2016\116132\CAD\Design\Figures\Noise\116132-NoiseAngles.dwg, R30, Apr 17, 2018 - 4:16pm, tmckay

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 15:28:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r31bar22.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	50 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: House (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	:	19.90 / 19.90 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -43.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	3.20 / 3.20 m
Source elevation	:	89.46 m
Receiver elevation	:	89.32 m
Barrier elevation	:	89.44 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	50 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	8000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

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

Angle1 Angle2	-43.00 deg 88.00 deg
Wood depth	0 (No woods.)
No of house rows	0 / 0
Surface	1 (Absorptive ground surface)
Receiver source distance	19.90 / 19.90 m
Receiver height	1.50 / 4.50 m
Topography	2 (Flat/gentle slope; with barrier)
Barrier angle1	-43.00 deg Angle2 : 88.00 deg
Barrier height	2.20 m
Barrier receiver distance	7.90 / 7.90 m
Source elevation	89.46 m
Receiver elevation	89.32 m
Barrier elevation	89.61 m
Reference angle	0.00

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

Car traffic volume	6477/563 veh/TimePeriod *
Medium truck volume	515/45 veh/TimePeriod *
Heavy truck volume	368/32 veh/TimePeriod *
Posted speed limit	50 km/h
Road gradient	0 %
Road pavement	1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	8000
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.00
Heavy Truck % of Total Volume	5.00
Day (16 hrs) % of Total Volume	92.00

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

```
Angle1   Angle2           :  88.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  19.90 / 19.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  88.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   1.80 / 1.80   m
Source elevation          :  89.46 m
Receiver elevation        :  89.32 m
Barrier elevation         :  90.31 m
Reference angle           :   0.00
```

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	41.67	41.67
2.Open	1.50	54.04	54.04
3.House	1.50	31.27	31.27
Total			54.31 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.House	1.50	38.80	38.80	
2.Open	1.50	53.98	53.98	*
3.House	1.50	26.86	26.86	
Total			54.12 dBA	

TOTAL Leq FROM ALL SOURCES (DAY): 54.31
(NIGHT): 54.12

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 15:29:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r31unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: House (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	:	19.90 / 19.90 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -43.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	3.20 / 3.20 m
Source elevation	:	89.46 m
Receiver elevation	:	89.32 m
Barrier elevation	:	89.44 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Open (day/night)
--------------------------------------
Angle1   Angle2           : -43.00 deg   88.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  19.90 / 19.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: House (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: House (day/night)
---------------------------------------
Angle1   Angle2           :  88.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  19.90 / 19.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  88.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   1.80 / 1.80   m
Source elevation          :  89.46 m
Receiver elevation        :  89.32 m
Barrier elevation         :  90.31 m
Reference angle           :   0.00
```

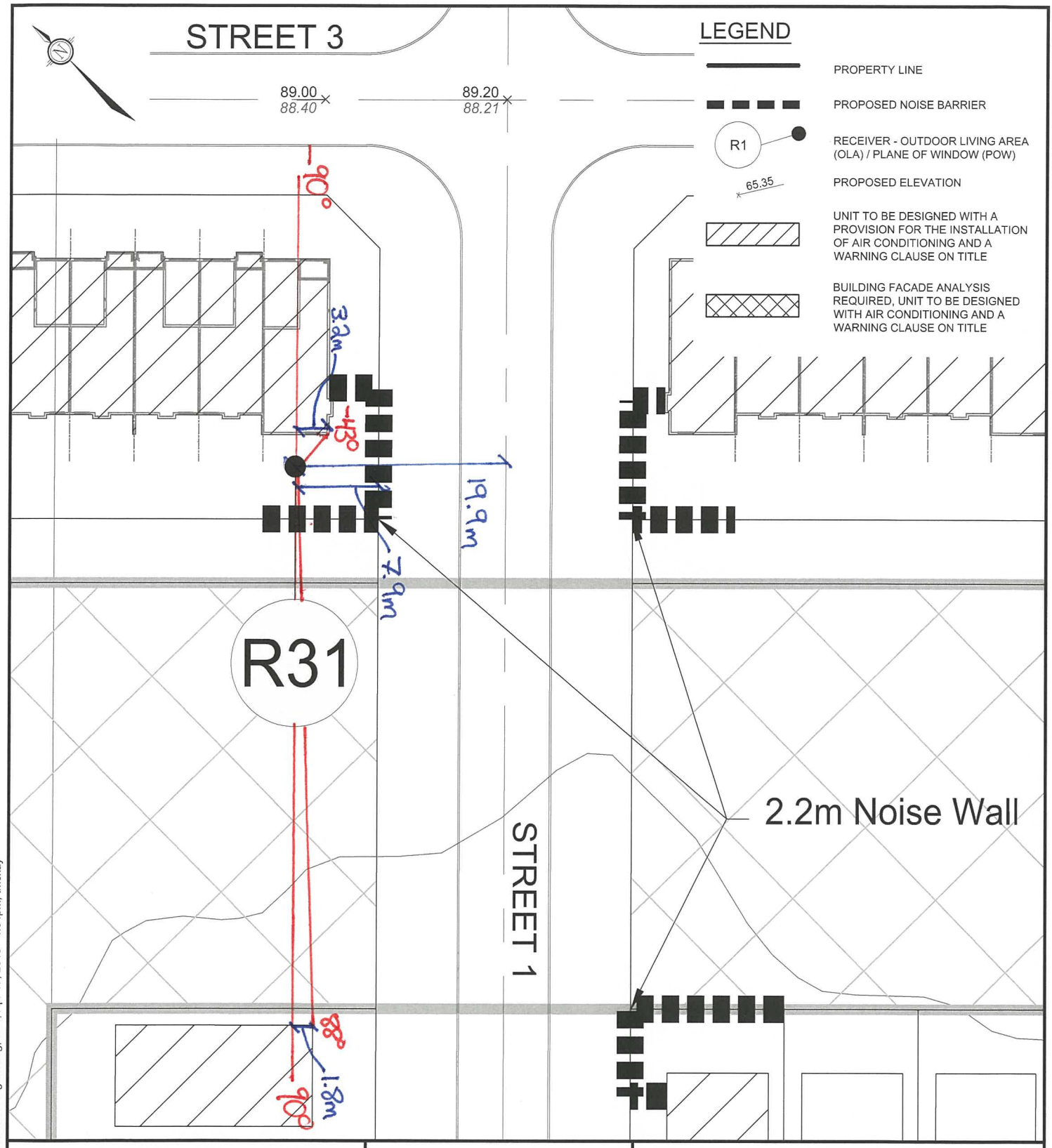
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	39.88	39.88
2.Open	1.50	59.56	59.56
3.House	1.50	29.48	29.48
Total			59.61 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	37.01	37.01
2.Open	1.50	52.18	52.18
3.House	1.50	25.06	25.06
Total			52.32 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.61
(NIGHT): 52.32



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R31

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE	JOB	FIGURE
APR 2018	116132	R31

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SHTBY11.DWG - 216mmx279mm

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 15:25:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r32unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -3.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	38.10 / 38.10 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -3.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	21.40 / 21.40 m
Source elevation	:	89.46 m
Receiver elevation	:	89.41 m
Barrier elevation	:	89.44 m
Reference angle	:	0.00

Road data, segment # 2: Bar22 (day/night)

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 2: Bar22 (day/night)
---------------------------------------
Angle1   Angle2           :  -3.00 deg   24.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  38.10 / 38.10  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  -3.00 deg   Angle2 : 24.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :  26.10 / 26.10  m
Source elevation          :  89.46 m
Receiver elevation        :  89.41 m
Barrier elevation         :  89.61 m
Reference angle           :   0.00

Road data, segment # 3: Open (day/night)
---------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth         :   0.00
    Number of Years of Growth           :   0.00
    Medium Truck % of Total Volume      :   7.00
    Heavy Truck  % of Total Volume      :   5.00
    Day (16 hrs) % of Total Volume      :  92.00

Data for Segment # 3: Open (day/night)
---------------------------------------
Angle1   Angle2           :  24.00 deg   70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  38.10 / 38.10  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Car traffic volume	: 6477/563	veh/TimePeriod	*
Medium truck volume	: 515/45	veh/TimePeriod	*
Heavy truck volume	: 368/32	veh/TimePeriod	*
Posted speed limit	: 40	km/h	
Road gradient	: 0	%	
Road pavement	: 1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 4: House (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	: 38.10 / 38.10	m
Receiver height	: 1.50 / 4.50	m
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: 70.00 deg	Angle2 : 90.00 deg
Barrier height	: 6.00	m
Barrier receiver distance	: 19.80 / 19.80	m
Source elevation	: 89.46	m
Receiver elevation	: 89.41	m
Barrier elevation	: 90.31	m
Reference angle	: 0.00	

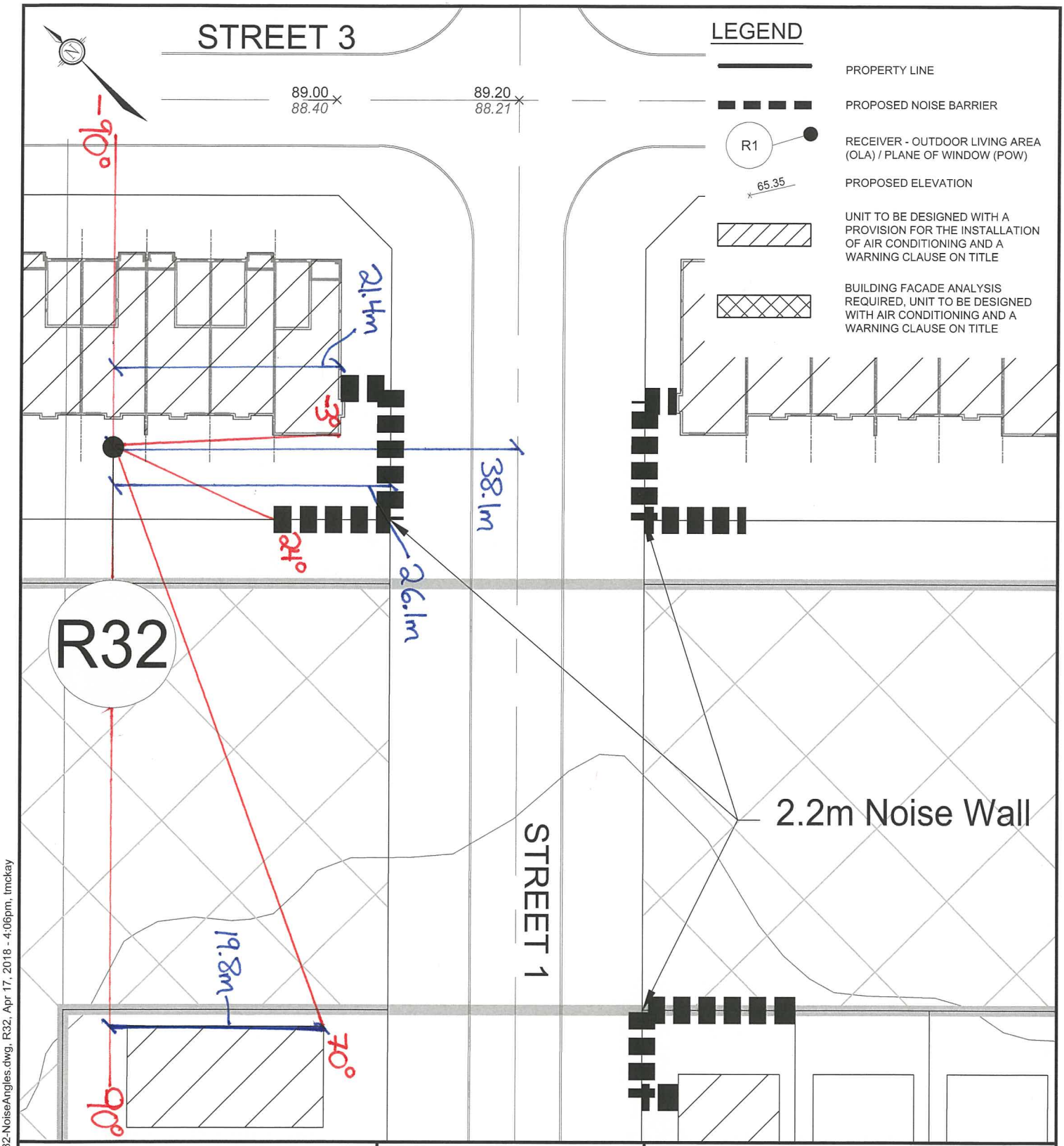
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.House	1.50	41.06	41.06	
2.Bar22	1.50	42.47	42.47	
3.Open	1.50	50.10	50.10	
4.House	1.50	36.13	36.13	
Total			51.36	dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.House	1.50	36.23	36.23	
2.Bar22	1.50	41.70	41.70	*
3.Open	1.50	43.03	43.03	
4.House	1.50	31.21	31.21	
Total			46.06	dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.36
(NIGHT): 46.06



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R32

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE	JOB	FIGURE
APR 2018	116132	R32

M:\2016\116132\CAD\Design\Figures\Noise\116132-NoiseAngles.dwg, R32, Apr 17, 2018 - 4:06pm, tmckay

STAMSON 5.0 SUMMARY REPORT Date: 18-04-2018 15:26:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r33unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	: 6477/563	veh/TimePeriod *
Medium truck volume	: 515/45	veh/TimePeriod *
Heavy truck volume	: 368/32	veh/TimePeriod *
Posted speed limit	: 40	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	: 8000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

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

Angle1 Angle2	: -90.00 deg	-5.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 50.20 / 50.20	m
Receiver height	: 1.50 / 4.50	m
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: -90.00 deg	Angle2 : -5.00 deg
Barrier height	: 6.00	m
Barrier receiver distance	: 33.50 / 33.50	m
Source elevation	: 89.46	m
Receiver elevation	: 89.47	m
Barrier elevation	: 89.44	m
Reference angle	: 0.00	

Road data, segment # 2: Bar22 (day/night)

Car traffic volume	: 6477/563	veh/TimePeriod *
Medium truck volume	: 515/45	veh/TimePeriod *
Heavy truck volume	: 368/32	veh/TimePeriod *
Posted speed limit	: 40	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Bar22 (day/night)
---------------------------------------
Angle1   Angle2           :  -5.00 deg   10.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.20 / 50.20  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  -5.00 deg   Angle2 : 10.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :  38.20 / 38.20  m
Source elevation          :  89.46 m
Receiver elevation        :  89.47 m
Barrier elevation         :  89.61 m
Reference angle           :   0.00

Road data, segment # 3: Open (day/night)
----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Open (day/night)
---------------------------------------
Angle1   Angle2           :  10.00 deg   58.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  50.20 / 50.20  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

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

Car traffic volume	: 6477/563	veh/TimePeriod	*
Medium truck volume	: 515/45	veh/TimePeriod	*
Heavy truck volume	: 368/32	veh/TimePeriod	*
Posted speed limit	: 40	km/h	
Road gradient	: 0	%	
Road pavement	: 1	(Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	: 58.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 50.20 / 50.20	m
Receiver height	: 1.50 / 4.50	m
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: 58.00 deg	Angle2 : 90.00 deg
Barrier height	: 6.00	m
Barrier receiver distance	: 32.60 / 32.60	m
Source elevation	: 89.46	m
Receiver elevation	: 89.47	m
Barrier elevation	: 90.31	m
Reference angle	: 0.00	

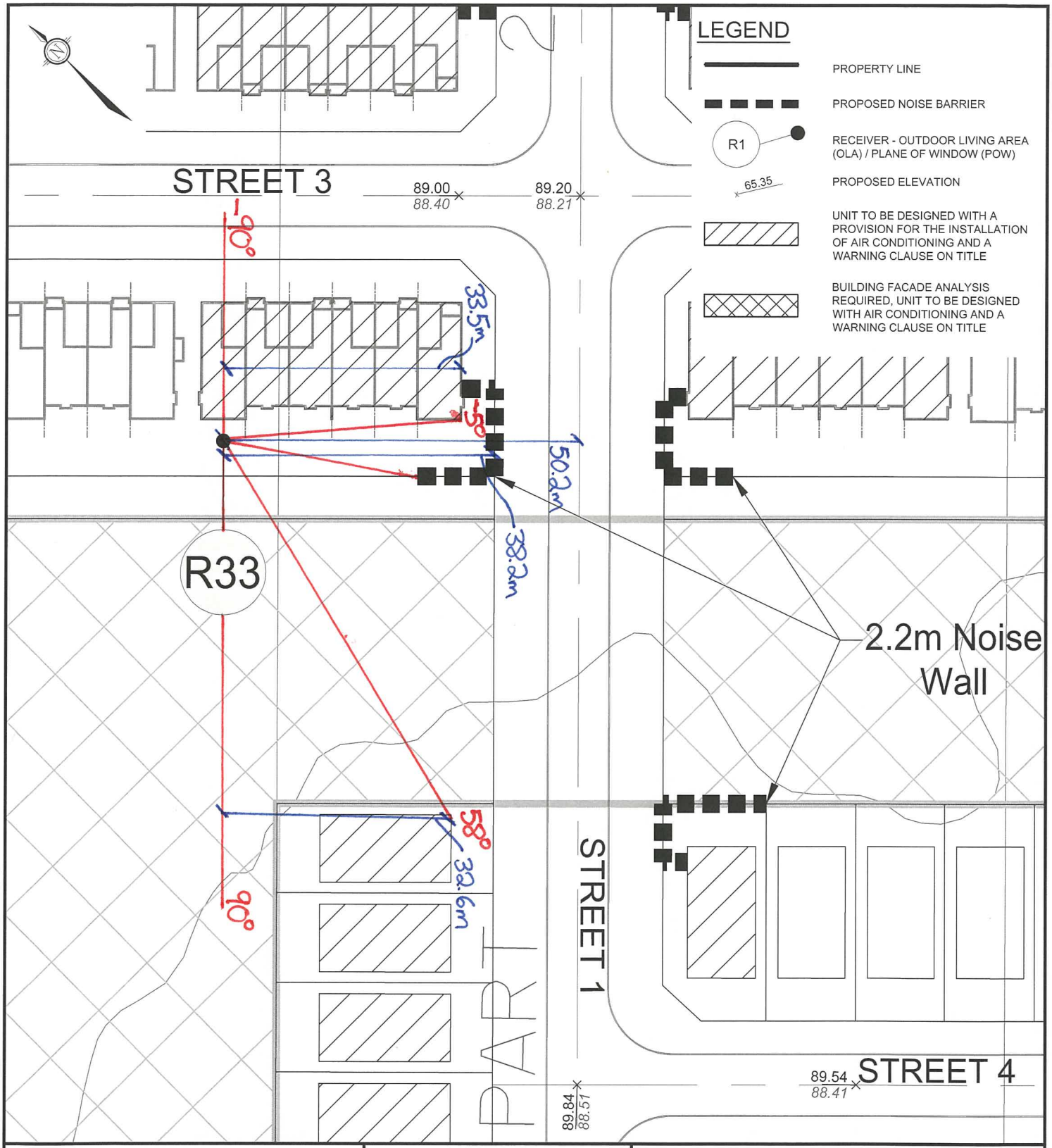
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	40.03	40.03
2.Bar22	1.50	38.34	38.34
3.Open	1.50	48.87	48.87
4.House	1.50	36.45	36.45
Total			49.93 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	34.72	34.72
2.Bar22	1.50	32.97	32.97
3.Open	1.50	41.83	41.83
4.House	1.50	31.10	31.10
Total			43.32 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.93
(NIGHT): 43.32



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R33

SCALE 1 : 750 (0 6 12 18 24 30)

DATE	JOB	FIGURE
APR 2018	116132	R33

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STAMSON 5.0 SUMMARY REPORT Date: 19-04-2018 08:26:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r34bar22.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	: 6477/563	veh/TimePeriod *
Medium truck volume	: 515/45	veh/TimePeriod *
Heavy truck volume	: 368/32	veh/TimePeriod *
Posted speed limit	: 40	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	: 8000
Percentage of Annual Growth	: 0.00
Number of Years of Growth	: 0.00
Medium Truck % of Total Volume	: 7.00
Heavy Truck % of Total Volume	: 5.00
Day (16 hrs) % of Total Volume	: 92.00

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

Angle1 Angle2	: -90.00 deg	-87.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 18.60 / 18.60	m
Receiver height	: 1.50 / 4.50	m
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: -90.00 deg	Angle2 : -87.00 deg
Barrier height	: 6.00	m
Barrier receiver distance	: 3.00 / 3.00	m
Source elevation	: 89.46	m
Receiver elevation	: 89.17	m
Barrier elevation	: 90.44	m
Reference angle	: 0.00	

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

Car traffic volume	: 6477/563	veh/TimePeriod *
Medium truck volume	: 515/45	veh/TimePeriod *
Heavy truck volume	: 368/32	veh/TimePeriod *
Posted speed limit	: 40	km/h
Road gradient	: 0	%
Road pavement	: 1	(Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-87.00 deg 43.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	18.60 / 18.60 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-87.00 deg Angle2 : 43.00 deg
Barrier height	:	2.20 m
Barrier receiver distance	:	6.60 / 6.60 m
Source elevation	:	89.46 m
Receiver elevation	:	89.17 m
Barrier elevation	:	89.61 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563 veh/TimePeriod *
Medium truck volume	:	515/45 veh/TimePeriod *
Heavy truck volume	:	368/32 veh/TimePeriod *
Posted speed limit	:	40 km/h
Road gradient	:	0 %
Road pavement	:	1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	43.00 deg 90.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	18.60 / 18.60 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	43.00 deg Angle2 : 90.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	3.20 / 3.20 m
Source elevation	:	89.46 m
Receiver elevation	:	89.17 m
Barrier elevation	:	89.35 m
Reference angle	:	0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	31.46	31.46
2.Open	1.50	51.97	51.97
3.House	1.50	40.19	40.19
Total			52.29 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	27.04	27.04
2.Open	1.50	52.64	52.64 *
3.House	1.50	37.15	37.15
Total			52.77 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.29
(NIGHT): 52.77

STAMSON 5.0 SUMMARY REPORT Date: 19-04-2018 08:27:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r34unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg -87.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 18.60 / 18.60 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -87.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 89.46 m
Receiver elevation : 89.17 m
Barrier elevation : 90.44 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Open (day/night)
--------------------------------------
Angle1   Angle2           : -87.00 deg   43.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  18.60 / 18.60  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: House (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: House (day/night)
---------------------------------------
Angle1   Angle2           :  43.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  18.60 / 18.60  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  43.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance :   3.20 / 3.20   m
Source elevation          :  89.46 m
Receiver elevation        :  89.17 m
Barrier elevation         :  89.35 m
Reference angle           :   0.00
```

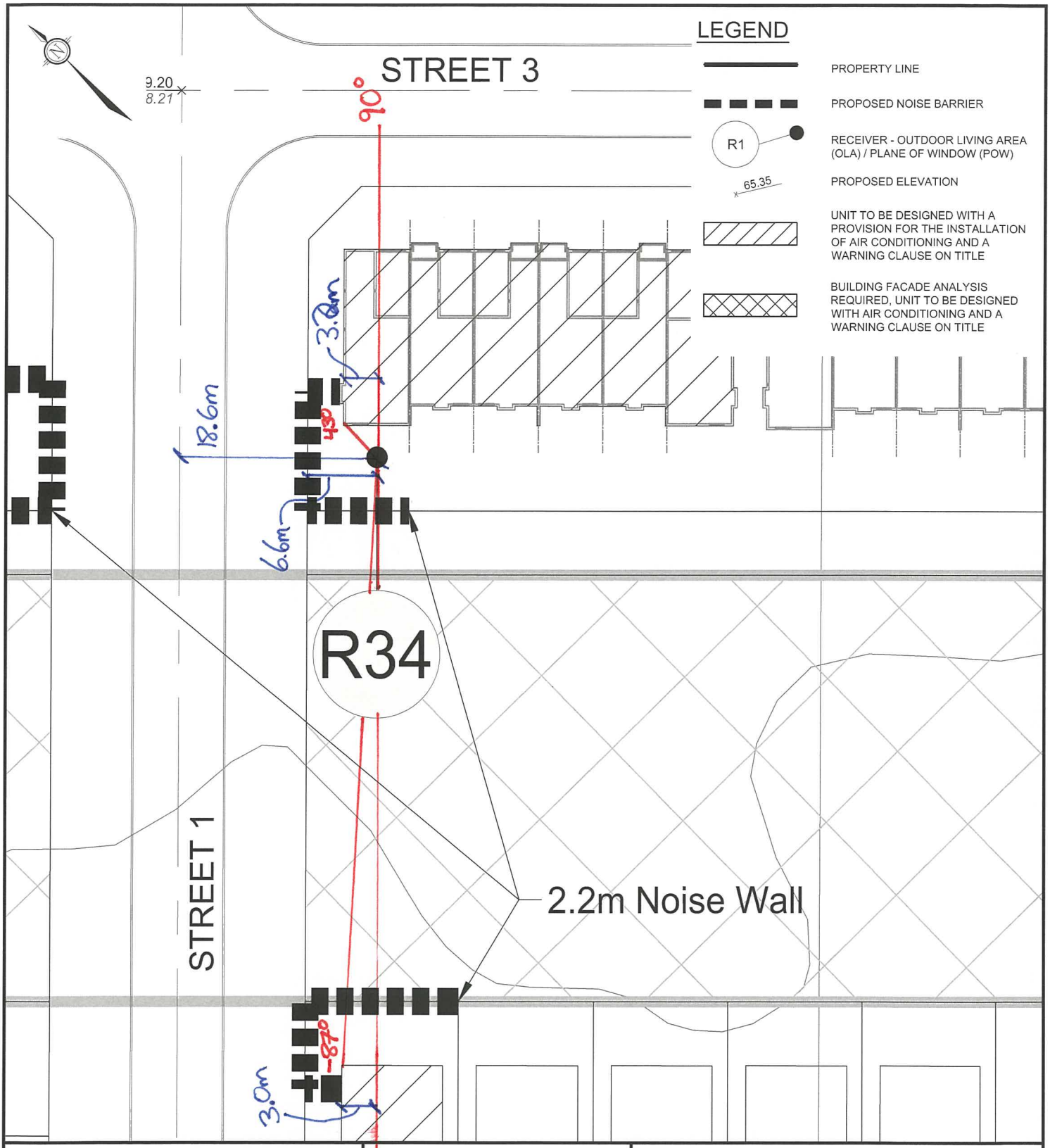
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	31.46	31.46
2.Open	1.50	60.04	60.04
3.House	1.50	40.19	40.19
Total			60.09 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	27.04	27.04
2.Open	1.50	52.64	52.64
3.House	1.50	37.15	37.15
Total			52.77 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.09
(NIGHT): 52.77



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R34

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE APR 2018 | JOB 116132 | FIGURE R34

STAMSON 5.0 SUMMARY REPORT Date: 19-04-2018 08:29:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r35unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -70.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	36.80 / 36.80 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -70.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	21.30 / 21.30 m
Source elevation	:	89.46 m
Receiver elevation	:	88.87 m
Barrier elevation	:	90.44 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Open (day/night)
--------------------------------------
Angle1   Angle2           : -70.00 deg   -23.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  36.80 / 36.80  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: Bar22 (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Bar22 (day/night)
---------------------------------------
Angle1   Angle2           : -23.00 deg   4.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  36.80 / 36.80  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -23.00 deg   Angle2 : 4.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :  24.80 / 24.80  m
Source elevation          :  89.46 m
Receiver elevation        :  88.87 m
Barrier elevation         :  89.61 m
Reference angle           :   0.00
```

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	4.00 deg	90.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	36.80 / 36.80	m
Receiver height	:	1.50 / 4.50	m
Topography	:	2	(Flat/gentle slope; with barrier)
Barrier angle1	:	4.00 deg	Angle2 : 90.00 deg
Barrier height	:	6.00 m	
Barrier receiver distance	:	21.40 / 21.40	m
Source elevation	:	89.46 m	
Receiver elevation	:	88.87 m	
Barrier elevation	:	89.35 m	
Reference angle	:	0.00	

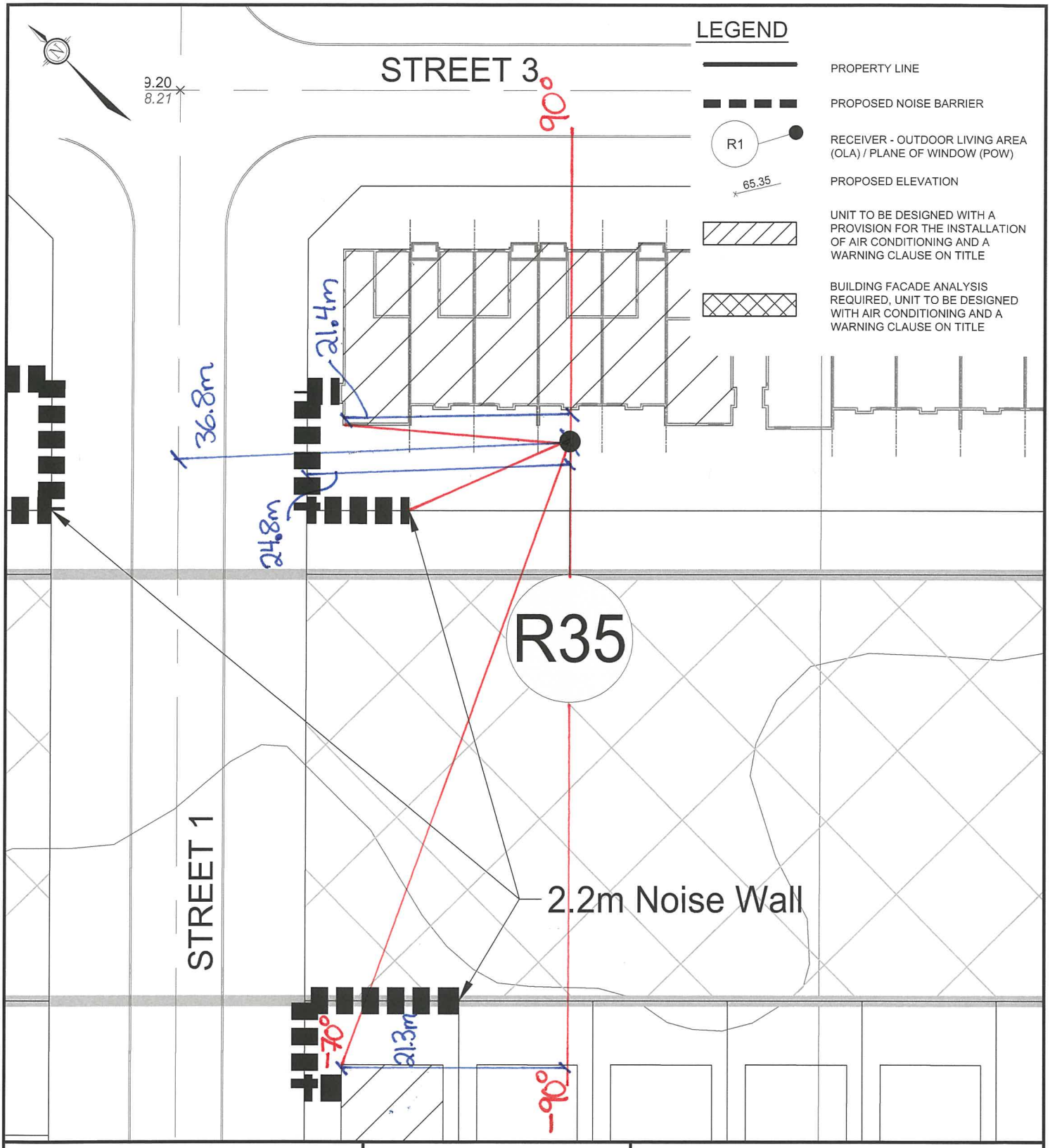
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	35.82	35.82
2.Open	1.50	50.47	50.47
3.Bar22	1.50	41.95	41.95
4.House	1.50	40.89	40.89
Total			51.56 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	30.65	30.65
2.Open	1.50	43.38	43.38
3.Bar22	1.50	37.46	37.46
4.House	1.50	35.89	35.89
Total			45.10 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.56
(NIGHT): 45.10



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R35

SCALE 1 : 500 (0, 5, 10, 15, 20)

DATE	JOB	FIGURE
APR 2018	116132	R35

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SHT8X11.DWG - 216mmx279mm

STAMSON 5.0 SUMMARY REPORT Date: 19-04-2018 08:30:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r36unmit.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

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

Angle1 Angle2	:	-90.00 deg -60.00 deg
Wood depth	:	0 (No woods.)
No of house rows	:	0 / 0
Surface	:	1 (Absorptive ground surface)
Receiver source distance	:	48.90 / 48.90 m
Receiver height	:	1.50 / 4.50 m
Topography	:	2 (Flat/gentle slope; with barrier)
Barrier angle1	:	-90.00 deg Angle2 : -60.00 deg
Barrier height	:	6.00 m
Barrier receiver distance	:	33.10 / 33.10 m
Source elevation	:	89.46 m
Receiver elevation	:	88.87 m
Barrier elevation	:	90.44 m
Reference angle	:	0.00

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

```
* Refers to calculated road volumes based on the following input:
    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 2: Open (day/night)
--------------------------------------
Angle1   Angle2           : -60.00 deg   -11.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  48.90 / 48.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: Bar22 (day/night)
-----------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   7.00
    Heavy Truck  % of Total Volume     :   5.00
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 3: Bar22 (day/night)
--------------------------------------
Angle1   Angle2           : -11.00 deg   5.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  48.90 / 48.90  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -11.00 deg   Angle2 : 5.00 deg
Barrier height            :   2.20 m
Barrier receiver distance :  36.90 / 36.90  m
Source elevation          :  89.46 m
Receiver elevation        :  88.87 m
Barrier elevation         :  89.61 m
Reference angle           :   0.00
```

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	0 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 4: House (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	:	48.90 / 48.90	m
Receiver height	:	1.50 / 4.50	m
Topography	:	2	(Flat/gentle slope; with barrier)
Barrier angle1	:	5.00 deg	Angle2 : 90.00 deg
Barrier height	:	6.00 m	
Barrier receiver distance	:	33.50 / 33.50	m
Source elevation	:	89.46 m	
Receiver elevation	:	88.87 m	
Barrier elevation	:	89.35 m	
Reference angle	:	0.00	

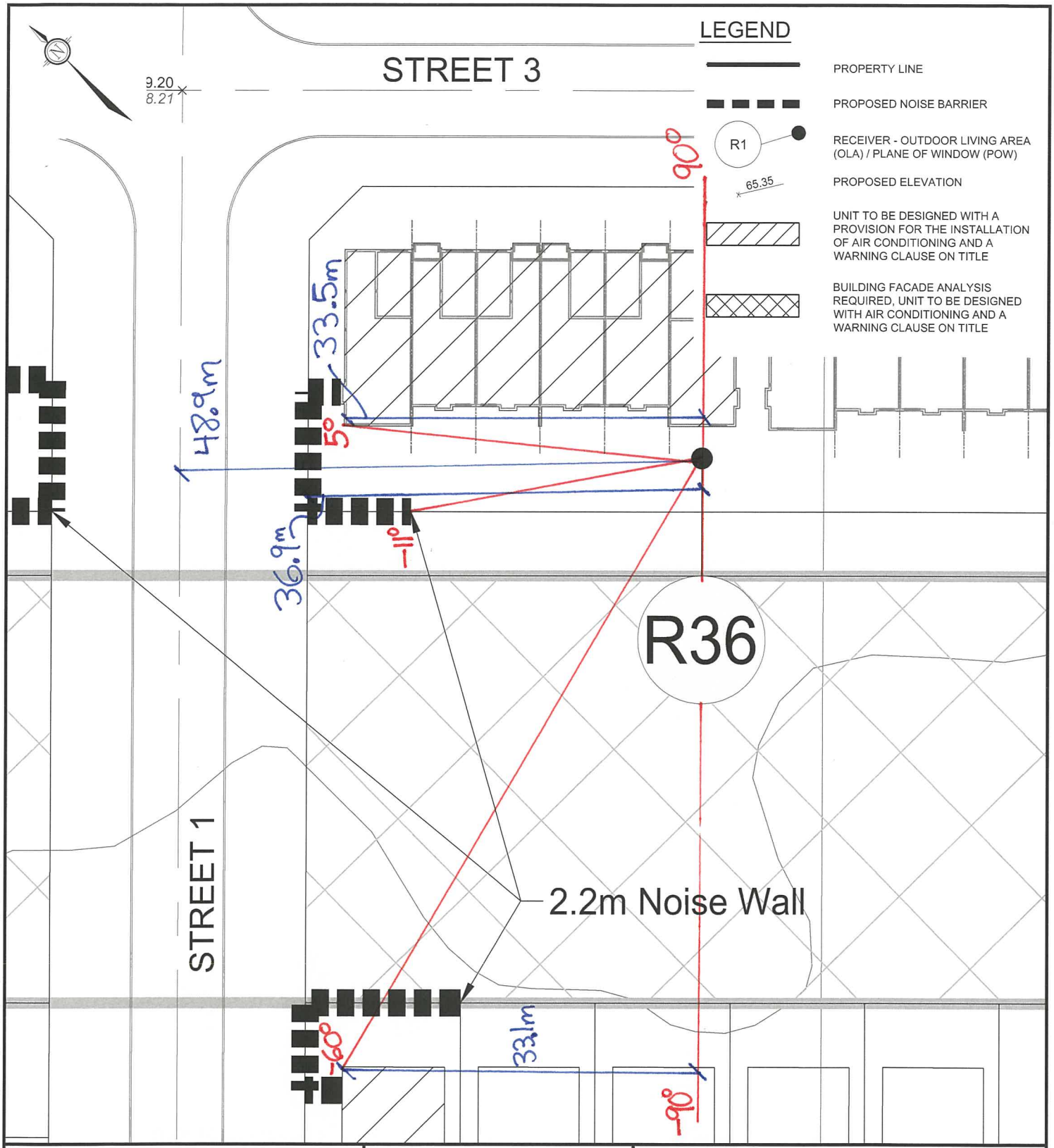
Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	35.89	35.89
2.Open	1.50	49.09	49.09
3.Bar22	1.50	38.22	38.22
4.House	1.50	39.87	39.87
Total			50.06 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.House	1.50	30.42	30.42
2.Open	1.50	42.05	42.05
3.Bar22	1.50	33.26	33.26
4.House	1.50	34.43	34.43
Total			43.43 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.06
(NIGHT): 43.43



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CLARIDGE / UNIFORM DEVELOPMENTS INC. (KNUEA)

RECEIVER ANGLES, R36

SCALE 1 : 500 (0 5 10 15 20)

DATE APR 2018 | JOB 116132 | FIGURE R36

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STAMSON 5.0 SUMMARY REPORT Date: 15-03-2018 13:54:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r37unmit.te Time Period: Day/Night 16/8 hours
Description: Edge of Multi-Unit Residential (StrC)

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 18.00 / 18.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.	1.50	61.18	61.18
Total			61.18 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.	1.50	53.82	53.82
Total			53.82 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.18
(NIGHT): 53.82

STAMSON 5.0 SUMMARY REPORT Date: 15-03-2018 14:01:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r38unmit.te Time Period: Day/Night 16/8 hours
Description: Edge of Institutiontal (StrB&StrD)

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	1 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 1: Street B (day/night)

Angle1 Angle2	:	-90.00 deg	90.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	18.75 / 18.75	m
Receiver height	:	1.50 / 4.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	40 km/h	
Road gradient	:	2 %	
Road pavement	:	1 (Typical asphalt or concrete)	

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

24 hr Traffic Volume (AADT or SADT)	:	8000
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.00
Heavy Truck % of Total Volume	:	5.00
Day (16 hrs) % of Total Volume	:	92.00

Data for Segment # 2: Street D (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 18.00 / 18.00	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Street B	1.50	60.89	60.89
2.Street D	1.50	61.18	61.18
Total			64.05 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Street B	1.50	53.54	53.54
2.Street D	1.50	53.82	53.82
Total			56.69 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.05
(NIGHT): 56.69

Appendix C

Kanata North Community Design Plan - Transportation Master Plan (TMP) – Report No. R-2015-161, dated June 28, 2016, Excerpts.

Figure 23 – Preferred Land Use Plan

9.0 RECOMMENDED PLAN

9.1 Plan of Roads

The Kanata North community will be well served by the adjacent arterial and collector road network, including March Road, Old Carp Road, Second Line Road and Terry Fox Drive. A network of seven collector roads is recommended to safely and adequately distribute traffic throughout the new community. Possible future road connections to the north, east and west allow for future connectivity.

The Preferred Land Use Plan includes four full movement signalized intersections and a right-in right-out intersection. Two right-in right-out driveways are assumed for the commercial uses along the east side of March Road. A full movement intersection on Old Carp Road is also included. These road connections will provide direct access to the new community.

9.1.1 Intersection Spacing

A detailed review of the proposed intersection spacing is provided in the November 25th, 2015 technical memorandum included in **Appendix D**. The memo also includes a review of the existing traffic signal spacing along March Road between Maxwell Bridge Road/Halton Terrace and Herzberg Road. The findings are summarized as follows:

- Transportation Association of Canada (TAC) Geometric Design Guidelines identify minimum spacing requirements along arterial roads. Table 2.3.1.1 of the TAC guidelines suggests a desirable spacing of 835m for signalized intersections with 100 second cycle lengths and a posted speed of 60km/hr to maintain traffic progression through successive intersections. It is noted that the benefits of signal progression are reduced for intersection spacings greater than 800m.

- The current traffic signal spacing along March Road does not meet TAC standards for traffic progression through successive intersections.

- Section 2.3.1.7 of the TAC guidelines indicates that in areas of intense development a typical minimum intersection spacing along arterial roadways is 200m. This 200m spacing allows for minimum lengths of back-to-back storage for left turning vehicles at adjacent intersections.

- The proposed intersection spacing along March Road through the KNUEA exceeds the minimum spacing of 200m, with the exception of the Midblock Collector (Street 'D') intersection which is approximately 190m south of the North Collector (Streets 'C' and 'E') intersection. Since this intersection is a tee intersection with a northbound, southbound and eastbound approach, a southbound left turn lane is not required. As such, the minimum intersection spacing can be less than 200m subject to projected queue lengths.

- The intersection capacity analysis shows that projected queue lengths are not anticipated to impact adjacent intersections.

9.1.2 Complete Streets

The City's 2013 Transportation Master Plan update includes policies and actions for providing safe and efficient roads by designing and building complete streets. Complete streets design elements have been considered for all roadways in the KNUEA.

Cross sections have been developed for March Road as well as the collector and local roadways within the KNUEA. The cross sections incorporate the following complete street principles.

- Pedestrians
  - Buffer between sidewalk and vehicular traffic on collector roadways and March Road
  - Sidewalks on both sides of collector roadways and March Road
- Cyclists
  - Multi-use pathway on one side of collector roadways
  - Raised cycle tracks on March Road
- Transit Users
  - Accessible transit stops
  - Transit shelters on inbound direction (towards downtown) of collector roadways
  - Future median BRT on March Road
- All Road Users
  - Street lighting on all roadways
  - Landscaping in boulevards and medians on all roadways

In addition to the above complete streets elements, a design speed of 40 kph is recommended for collector and local roads in the KNUEA. A lower design speed will help improve the viability of active transportation, especially for vulnerable road users and on local roads without sidewalks. A variety of physical measures could be considered at the Plan of Subdivision stage to ensure compliance with the desired design speed, including:

- Road narrowing at collector/local intersections,
- Midblock narrowing and signage at multi-use pathway crossings,
- Raised crosswalks on local streets (non-transit routes),
- Street trees, and
- On-street parking.

The recommended local, collector and future March Road cross sections are described in more detail in the following sections.

9.1.3 March Road Cross Section

March Road will be widened in two phases to accommodate the increase in vehicular traffic and extend the future Kanata North Transitway. A 44.5m right-of-way width is recommended along the March Road corridor between the current urban area boundary and the northern limit of the KNUEA. This right-of-way width will provide for the interim four lane widening of March Road and the ultimate widening to accommodate extension of the median BRT system.

The City of Ottawa's 2013 TMP identifies the median BRT system along March Road between Corkstown Road and Solandt Road in its 2031 Affordable Rapid Transit and Transit Priority Network. The 2013 TMP also identifies the future need to extend the median BRT system to Maxwell Bridge Road/Halton Terrace post 2031, with a conceptual future transit corridor extending

further north towards Dunrobin Road. The Kanata North CDP TMP satisfies the requirements of the Municipal Class EA process for the portion of the conceptual future transit corridor, as shown in the City's 2013 TMP, that extends between Maxwell Bridge Road/Halton Terrace and the North Collector (Streets 'C' and 'E'). Additional studies will need to be completed to fulfill the Municipal Class EA requirements for any further extension of the median BRT north of the March Road/North Collector intersection.

A median BRT station(s) will be identified along the corridor within the KNUEA, as development occurs and detailed BRT plans are developed. The identification of station location(s) will need to take into consideration the location of the most northerly planned station along the corridor (March/Klondike, as per the approved Kanata North Transitway EA) and the planned park and ride at March Road/North Collector (Streets 'C' and 'E', as per the Kanata North CDP process).

Subject to City and Development Charges funding, March Road will be widened to a four lane divided urban cross section. It is recommended that the City examine and implement interim transit priority measures as required through the study area as part of the initial widening from two to four lanes in preparation for the next City of Ottawa TMP update. Transit priority measures typically include dedicated bus lanes, transit signal priority treatments, and bus queue jumps.

Figure 24 shows the proposed interim cross section for March Road following the widening from two to four lanes. As shown, March Road will not be centred within the right-of-way under the interim condition. This will reduce the construction throwaway cost when the City widens March Road to extend the Kanata North Transitway. When the City of Ottawa extends the median BRT system further north through the KNUEA, the interim cross-section can be widened to the west to form the ultimate median BRT cross-section as shown in **Figure 25**.

The proposed cross sections are consistent with the recommendations of the 1994 March Road Reconstruction ESR and are addressed by the Kanata North Transitway EPR.

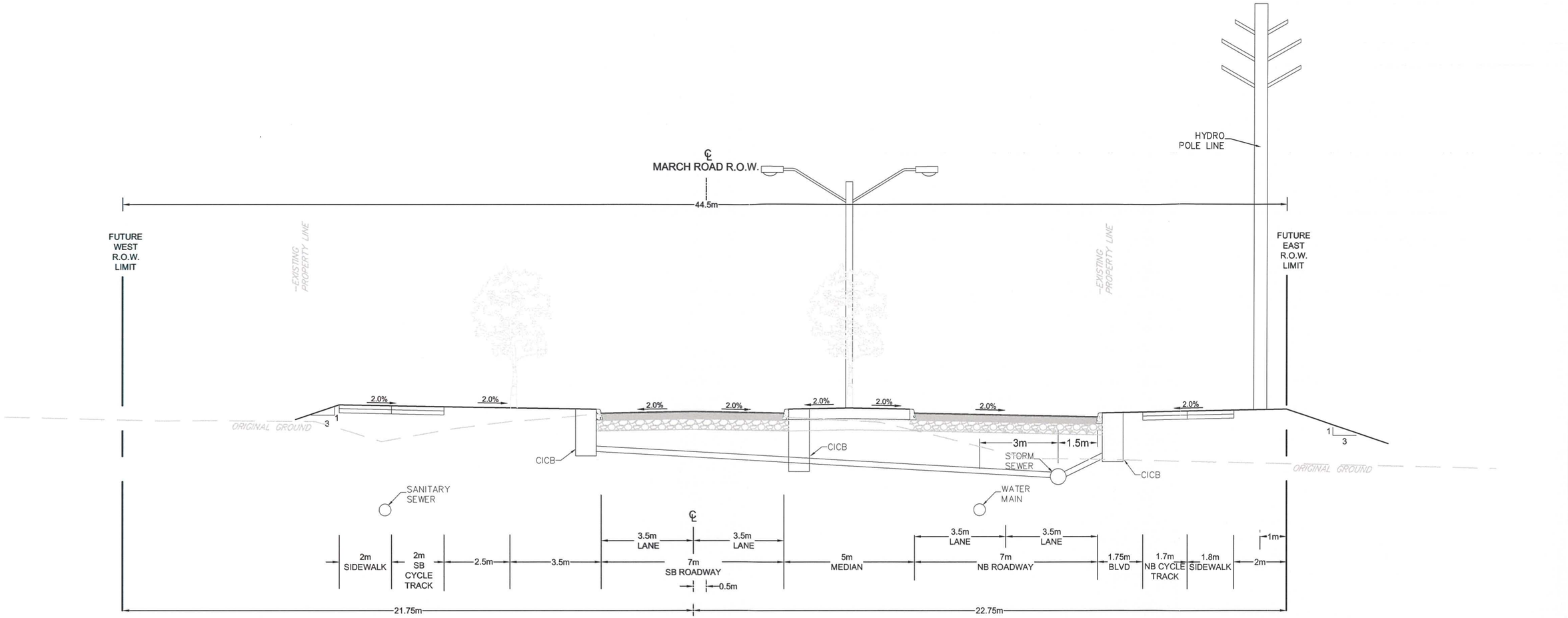
The interim and ultimate cross sections have geometric features (such as landscaping in the medians and narrow lane widths) that reflect a design speed of 60 kilometres per hour.

9.1.4 Collector Road Cross Section

Detailed discussions were held with the TAC to produce three collector roadway cross sections. The right-of-way to be protected along all collector roadways within the KNUEA will be 24m. Future collectors, identified with a dashed line on the Preferred Land Use Plan will be provided with a 24m right-of-way but will be built as local roads in the short term.

All collector roadways, excluding the Midblock Collector (Street 'D'), will have a 7m road platform with a 2.5m parking lane, a multi-use pathway on one side and a sidewalk on the other, as shown in **Figure 26**. Bus shelters will be located on the multi-use pathway side of these roadways, where the multi-use pathway will veer around the bus shelter, as shown in **Figure 27**.

The North-South Collector roadway (Street 'B' and the majority of Street 'A'), between the northern collector (Street 'C') and March Road, on the west side of the KNUEA will have a cross section as depicted in **Figure 28**. Bus shelters will be located on the sidewalk side of this roadway, where the sidewalk will veer in front of the bus shelter, as shown in **Figure 29**.



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KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 24

MARCH ROAD - INTERIM
CROSS SECTION

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

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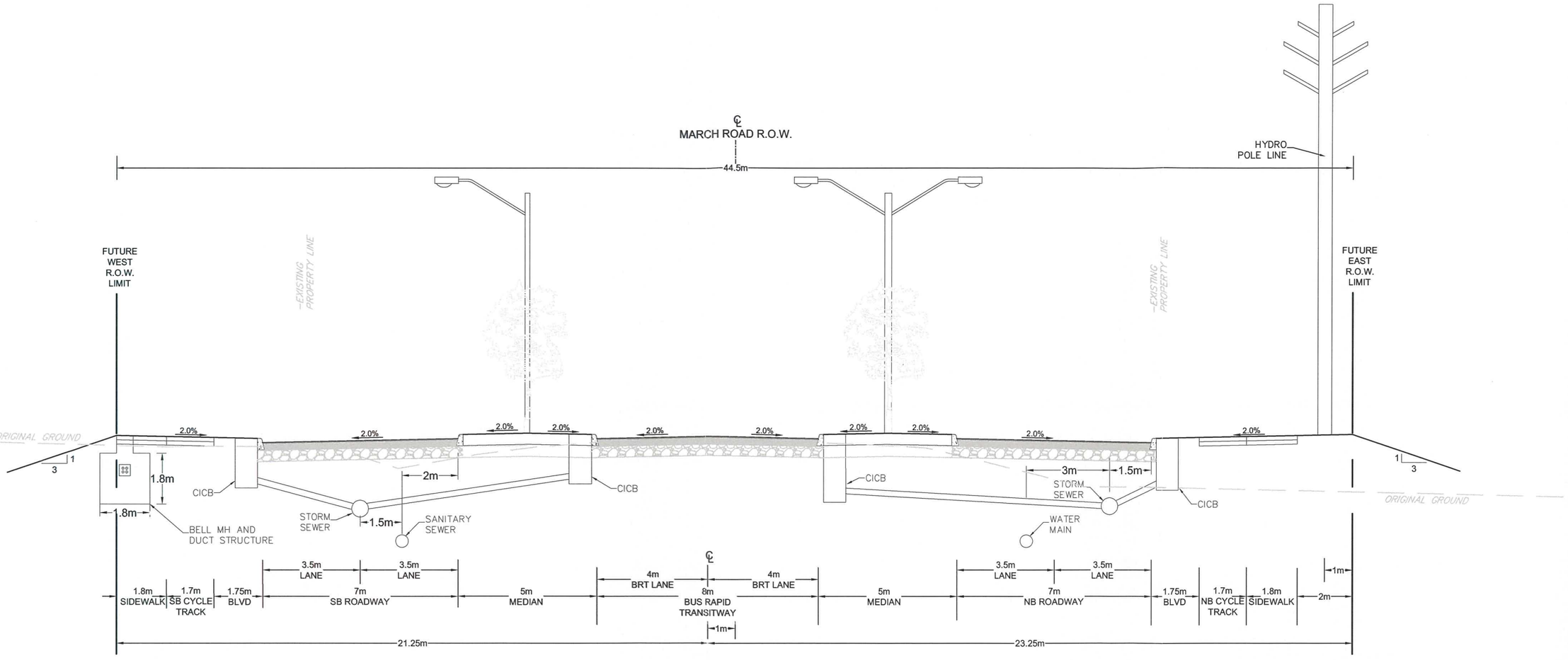

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KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 25

MARCH ROAD - ULTIMATE
CROSS SECTION

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

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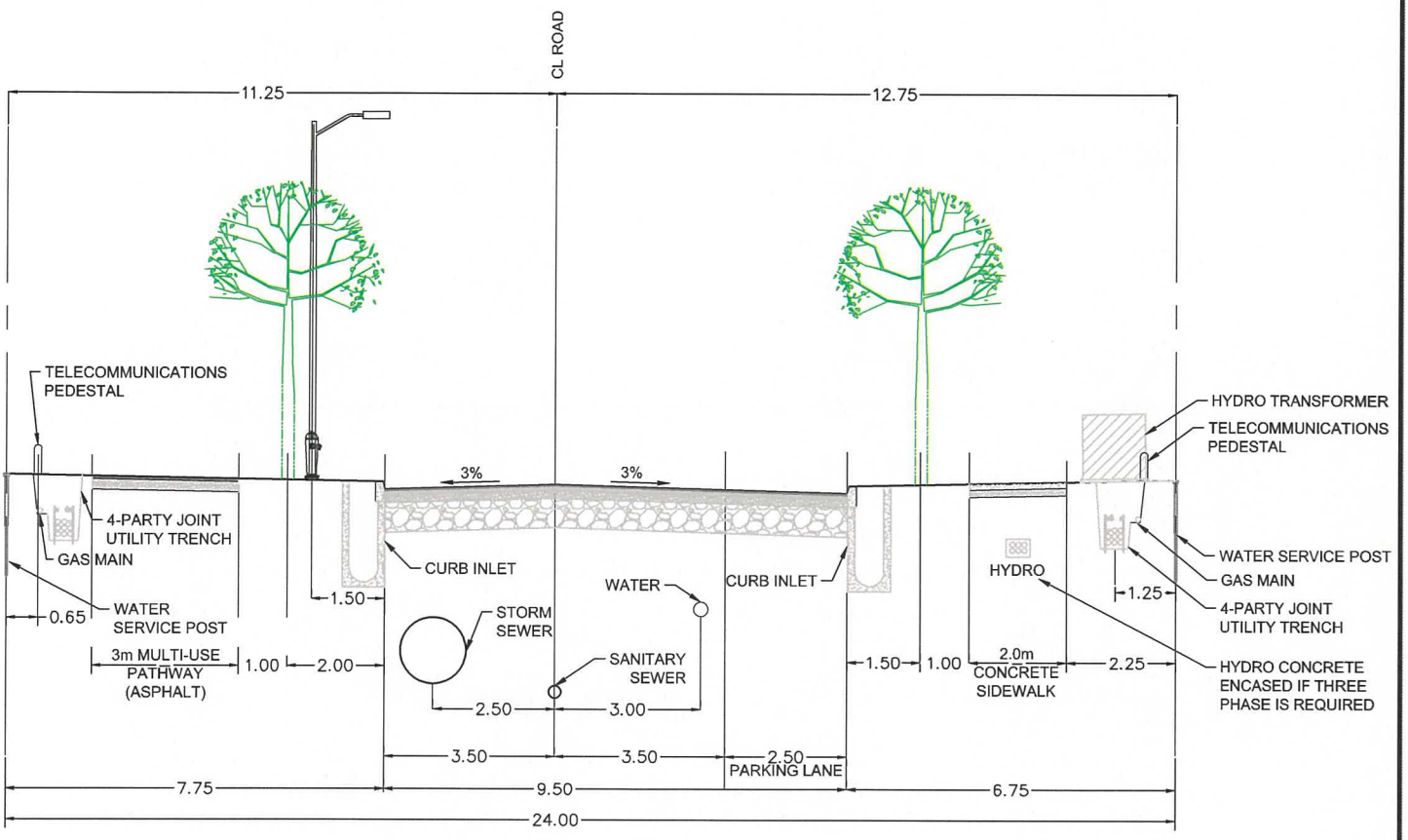
SHT11x17.DWG - 279mmx432mm



KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 26
COLLECTOR ROAD -
TYPICAL CROSS SECTION 1

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

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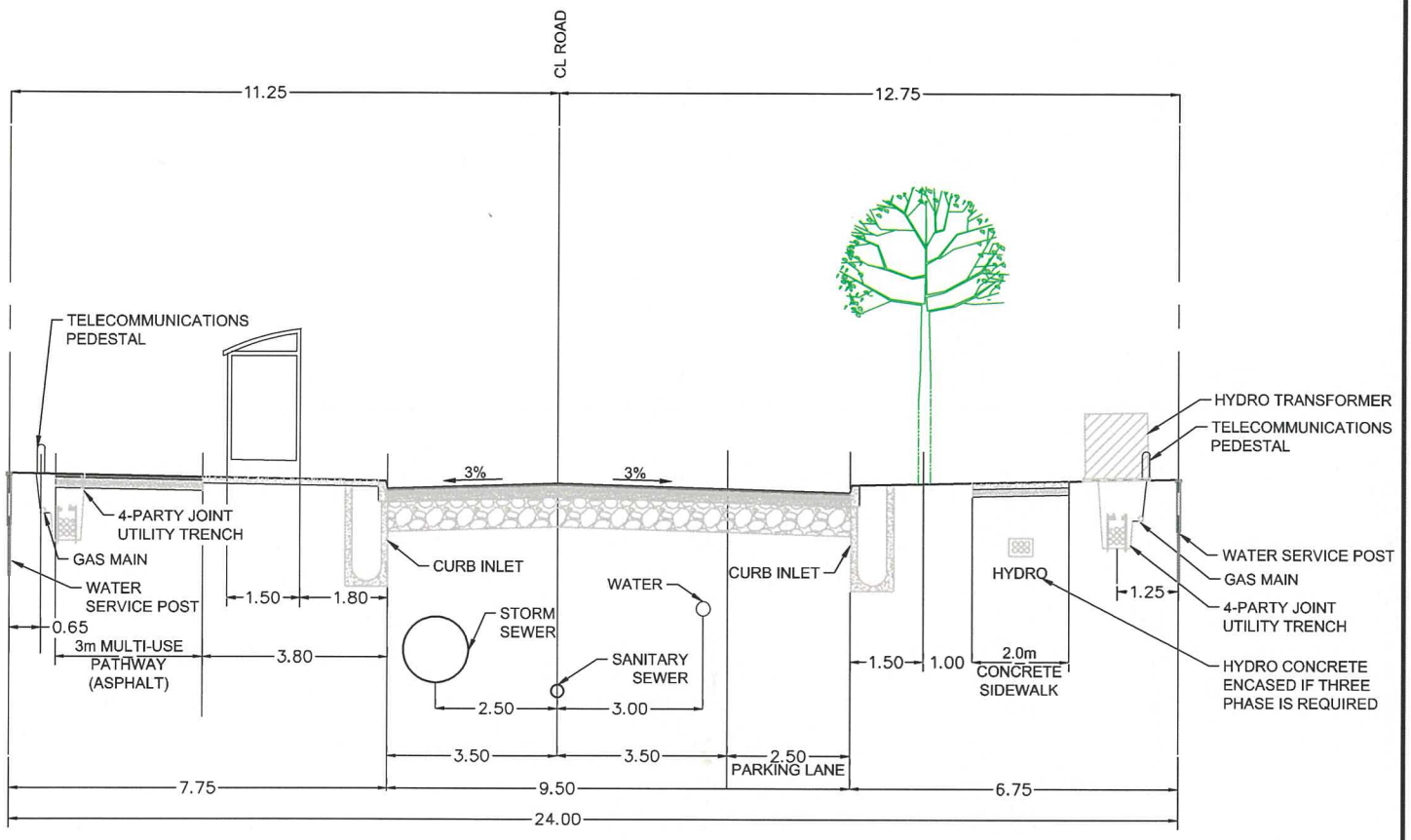

NOTES:

AT THE TIME OF PLAN OF SUBDIVISION OR SITE PLAN CONTROL WHEN BUS STOPS ARE IDENTIFIED, AT THESE LOCATIONS ON THE SIDEWALK SIDE OF THE STREET, THE SIDEWALK SHOULD BE RELOCATED TO BE ADJACENT TO THE CURB AND A BUS PAD (1.55m IN WIDTH), IF DETERMINED TO BE IMPLEMENTED, SHALL BE TO THE REAR OF THE SIDEWALK.

KANATA NORTH
COMMUNITY DESIGN PLAN

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

FIGURE NO. 27
COLLECTOR ROAD -
TYPICAL CROSS SECTION 1
(WITH BUS STOP)

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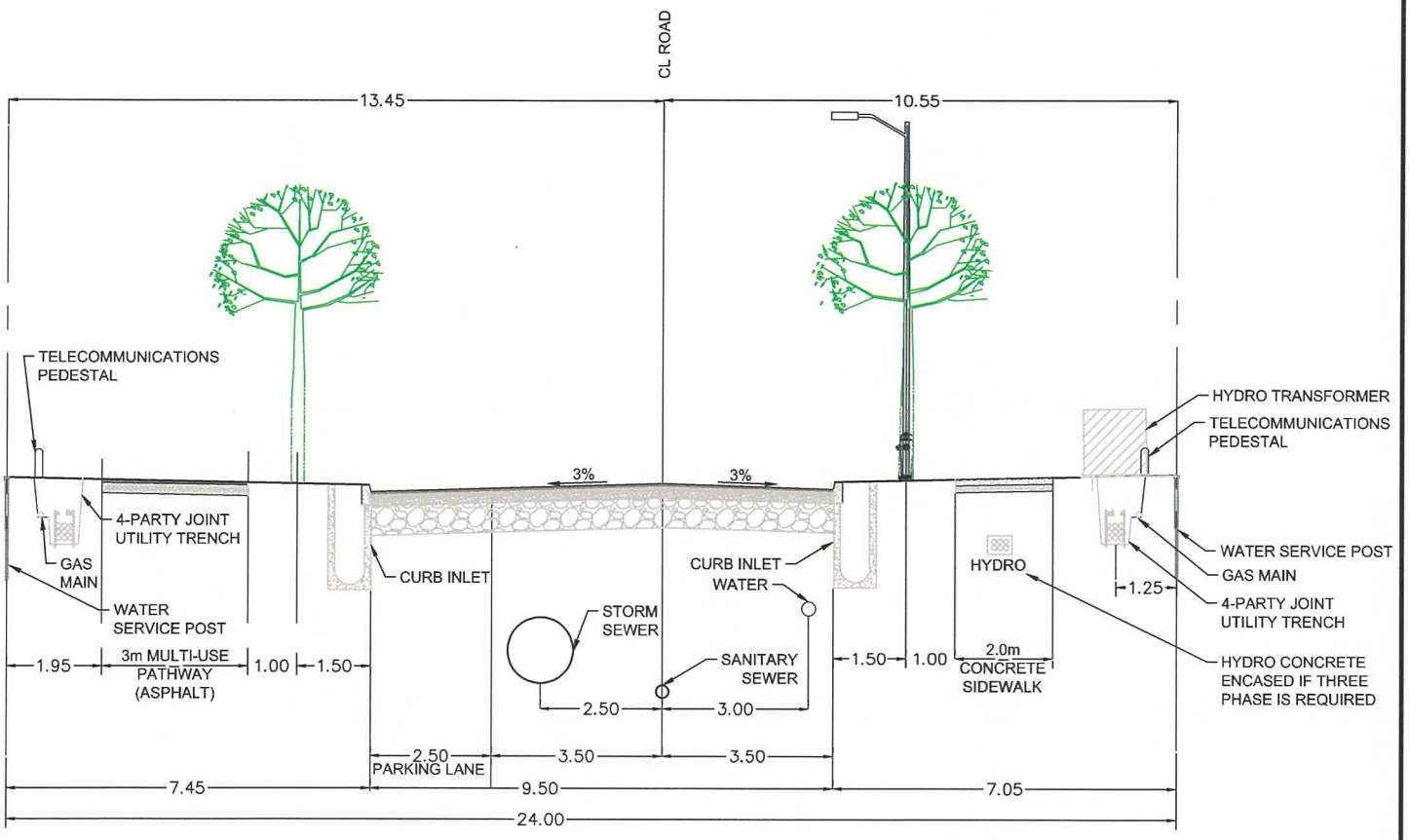
M:\2012\112117\CAD\Design\Figures\Traffic\TMP\FINAL\112117 - FIG-24mROW-MUP (1-150).dwg, TYPICAL 1 BUS (TMP), Mar 28, 2016 - 1:29pm, tbrooks

SHT8x11.DWG 216mmx279mm



KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 28
COLLECTOR ROAD -
TYPICAL CROSS SECTION 2

DATE
JUN 2016

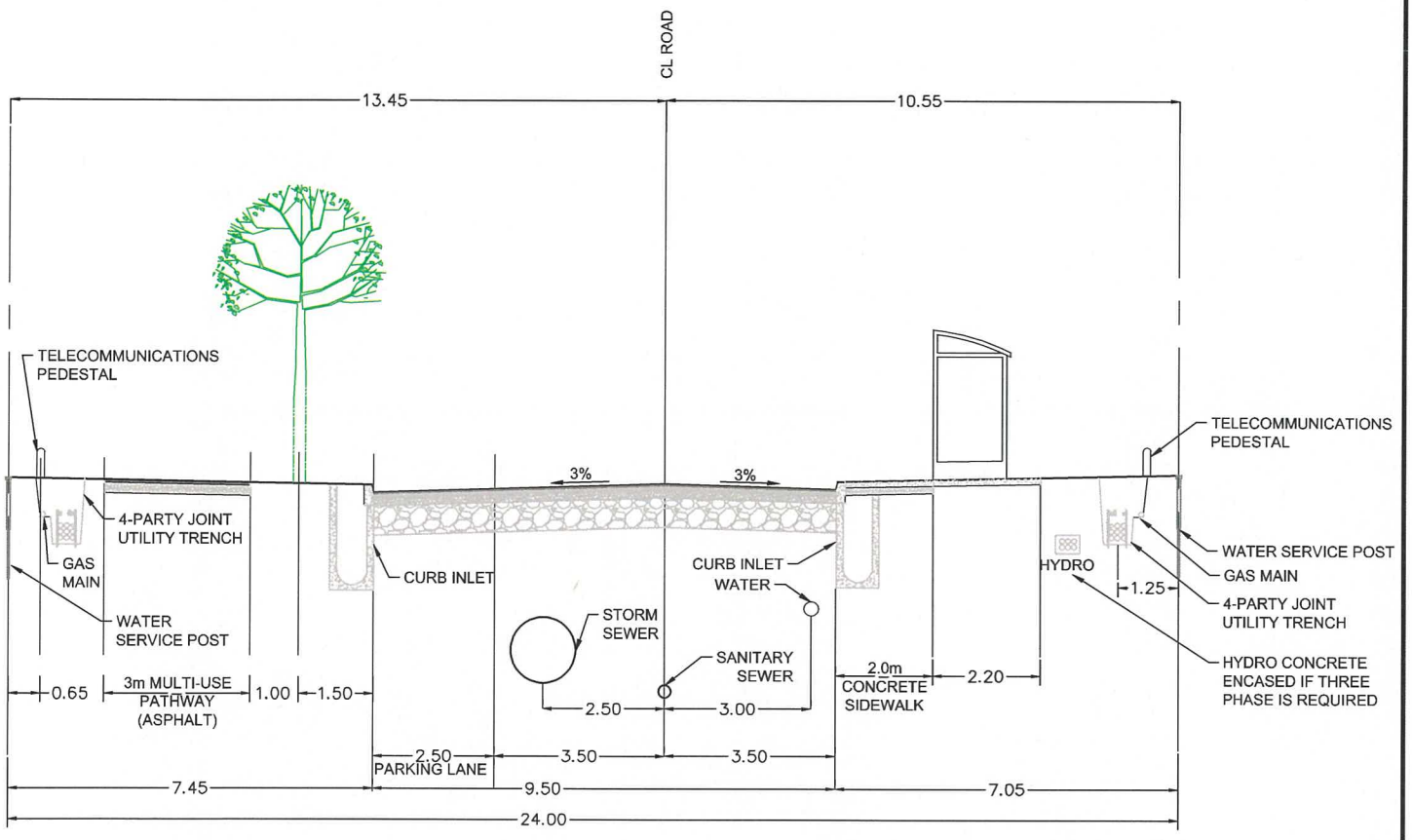
JOB
112117

SCALE
1:150

0 1m 2m 4m

NOVATECH
Engineers, Planners & Landscape Architects

M:\2012\112117\CAD\Design\Figures\Traffic\TMP\FINAL\112117 - FIG-24mROW-MUP (1-150).dwg, TYPICAL 2 (TMP), Mar 28, 2016 - 1:29pm, tbrooks



NOTES:

AT THE TIME OF PLAN OF SUBDIVISION OR SITE PLAN CONTROL WHEN BUS STOPS ARE IDENTIFIED, AT THESE LOCATIONS ON THE MULTI-USE PATHWAY SIDE OF THE STREET, BUS PLATFORMS (1.80m IN WIDTH) WILL BE PLANNED/IMPLEMENTED ADJACENT TO THE CURB.

KANATA NORTH
COMMUNITY DESIGN PLAN

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

FIGURE NO. 29
COLLECTOR ROAD -
TYPICAL CROSS SECTION 2
(WITH BUS STOP)

NOVATECH
Engineers, Planners & Landscape Architects

M:\2012\112117\CAD\Design\Figures\Traffic\TMP\FINAL\112117 - FIG-24mROW-MUP (1-150).dwg, TYPICAL 2 BUS (TMP), Mar 28, 2016 - 1:29pm, tbrooks

SHT8x11.DWG 216mmx279mm

Appendix D

Noise Control Plan