

**NOISE IMPACT FEASIBILITY STUDY
OTTAWA INUIT WOMEN'S SHELTER
250 FORESTGLADE CRESCENT
OTTAWA, ONTARIO**

FOR

**OTTAWA ABORIGINAL COALITION
CANADA MORTGAGE AND HOUSING CORPORATION**

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TABLE OF CONTENTS

INTRODUCTION	1
SITE DESCRIPTION.....	1
NOISE CRITERIA.....	1
Transportation Sources	1
Stationary Sources	3
TRANSPORTATION NOISE SOURCES.....	3
PROJECTED SOUND LEVELS	4
VENTILATION AND WARNING CLAUSE REQUIREMENTS	5
FAÇADE COMPONENTS	5
ON-SITE MECHANICAL EQUIPMENT	6
CONCLUSIONS.....	7
RECOMMENDATIONS.....	8

LIST OF TABLES

Table 1: Sound Level Limits – Roadway Sources	2
Table 2: Sound Level Limits – Roadway Sources	2
Table 3: Traffic Volumes	4
Table 4: Projected Traffic L_{eq} Sound Levels (Unmitigated)	4
Table 5: Bedroom Window Requirements	6

APPENDICES

APPENDIX A: FIGURES
APPENDIX B: SOUND LEVEL CALCULATIONS
APPENDIX C: WARNING CLAUSES
APPENDIX D: NOISE CRITERIA
APPENDIX E: REFERENCES

INTRODUCTION

At the request of the Ottawa Aboriginal Coalition and the Canada Mortgage and Housing Corporation, J.E. COULTER ASSOCIATES LIMITED has reviewed the proposed Ottawa Inuit Women's Shelter at 250 Forestglade Crescent in Ottawa, Ontario, for potential noise impact (see Appendix A, Figures 1 and 2). The purpose of this feasibility noise study is to establish noise mitigation measures that may be necessary as a result of transportation (roadways) and stationary sources to satisfy the requirements of the City of Ottawa noise guidelines (see Appendix D, Reference 1).

SITE DESCRIPTION

The proposed site is located at 250 Forestglade Crescent (see Appendix A, Figures 4 to 7 for plans and elevations). This proposed shelter is a 3-storey structure with grade-level outdoor living areas.

NOISE CRITERIA

The City of Ottawa's Environmental Noise Control Guidelines (ENCG) and MECP's NPC-300 Noise Guidelines applies to the proposed mixed-use development site, as explained below.

Transportation Sources

For residential buildings where the sound levels at the exterior of the building façade exceed 55 dB L_{eq} daytime or 50 dB L_{eq} nighttime, the dwelling units must be provided with forced air heating, with a provision for future installation of air conditioning by the owner. An excess up to 10 dB is permissible, provided a warning clause is given. Where the sound levels exceed this limit (i.e., 65 dB daytime or 60 dB nighttime), air conditioning must be incorporated into the building prior to occupancy. Warning clauses are applicable as well.

Air-conditioning requirements are applied so that adequate interior sound levels can be maintained by closing the windows.

The noise criteria pertaining to the interior and exterior noise limits for this development are provided in Tables 1 and 2.

Table 1: Sound Level Limits – Roadway Sources		
Type of Space	Time Period	L_{eq} (dBA)
		Road
INDOOR LIMITS		
Living/dining areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, theatres, places of worship, libraries, individual or semiprivate offices, conference rooms, reading rooms, etc.	07:00–23:00	45
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00–07:00	45
Sleeping quarters	07:00–23:00	45
	23:00–07:00	40

Table 2: Sound Level Limits – Roadway Sources		
Type of Space	Time Period	L_{eq} (dBA)
		Road
OUTDOOR LIMITS		
Outdoor recreation areas ¹	07:00 - 23:00	55
Plane of window	23:00 – 07:00	50
Plane of window	07:00 – 23:00	55

Additional Notes:

- a. The objective for outdoor sound levels is the higher of the L_{eq16hr} 55 dBA or the L_{eq16hr} ambient sound level that may prevail at the start of project construction (referred to as the "established ambient").
- b. The City prefers retrofit sound barrier walls at the flanking ends to be on City owned lands; however, if required, property owners at the termination points of the noise abatement wall will be asked to register an easement to the City for the construction and maintenance of an acoustic barrier along a side lot line. The side lot line acoustic barrier will provide protection for the rear yard area of the adjacent property. If the landowner refuses to transfer the easement, the City will not attempt to purchase or expropriate the easement but will delete this section of wall from the noise abatement construction project.
- c. Where the dominant noise source is due to transit activities within an LRT or a Transitway terminal, a rail yard facility to accommodate the LRT service yard, or a terminal building containing mechanical systems, then the City will use the "Stationary Sources" criteria.

Stationary Sources

There were no off-site stationary noise sources identified that would impact this proposed development from a noise perspective. The area is predominately residential. The St. Thomas More Public School at 1250 Blohm Drive is more than 250m to the northwest with intervening homes. To the east, at the northeast corner of Hunt Club Road and Hawthorne Road is Ottawa Hydro. There are approximately 8 to 10 rows of existing housing between the Ottawa Hydro site and the proposed development. Given the distances and significant noise attenuation from intervening buildings, no further analysis was undertaken.

TRANSPORTATION NOISE SOURCES

The potential transportation noise concern for this proposed development is the traffic on Blohm Drive to the west. The traffic on Hunt Club Road is not considered because this site is more than 100m from the arterial roadway's right-of-way, as per City of Ottawa's noise guidelines. The City of Ottawa has indicated that Hunt Club Road is not part of this review.

Based on the City of Ottawa's Environmental Noise Control Guidelines (Table 1.7), the traffic volumes as shown in Table 3, below, were assumed for Blohm Drive.

Table 3: Traffic Volumes					
Roadway	AADT (Veh/Day)	Truck Percentage		Day/Night Split (%)	Posted Speed Limit
		Medium	Heavy		
Blohm Drive, 2 lanes Urban Collector (2UCU)	8,000	7%	5%	92/8	50 kph

PROJECTED SOUND LEVELS

The MECP's *ORNAMENT* noise prediction procedure (*STAMSON Version 5.04* computer programme) was used to predict the sound levels. *STAMSON 5.04* uses the daily traffic volumes for the road and basic topographical information for the site in its calculations (see Appendix B).

Table 4, below, provides the projected unmitigated sound levels at various locations exposed to Blohm Drive. The distances between the source and receivers and segment angles are provided in Appendix A, Figures 8 to 10. The centreline of Blohm Drive is approximately 12.6m from the west property line.

The daytime and nighttime sound levels generated by Blohm Drive were calculated at various locations and are summarized in Table 4, below.

Table 4: Projected Traffic L_{eq} Sound Levels (Unmitigated)		
Location	Daytime Sound Level (dB L_{eq})	Nighttime Sound Level (dB L_{eq})
Loc 1: OLA North	59	--
Loc 2: S. Façade at Bedroom Window (2 nd Floor)	52	45
Loc 3: W. Façade (Geodesic Dome)	63	56
Loc 4: N. Façade at Bedroom Window (2 nd Floor)	60	53
Loc 5: OLA South	52	--

As summarized in the table above, the projected sound levels generated by Blohm Drive exceed the City of Ottawa's noise guidelines. The sound levels at the exterior building façade will require a review of the window, wall, and door and ventilation requirements to meet the City of Ottawa's noise criteria. Given the modest sound levels, upgrades to the exterior façade (glazing, doors and walls) from the minimum OBC requirement are not expected.

The outdoor amenity area (Location 1) exposed to Blohm Drive resulted in a sound level that is greater than 55 dB L_{eq} daytime. Noise control measures are to be considered to achieve 55 dB L_{eq} daytime. It is recommended that a 1.8m high acoustic fence be constructed to protect this area (see Appendix A, Figure 3).

As required by the City of Ottawa Noise Guidelines, the acoustic fence shall meet the following requirements:

1. The Sound Transmission Class (STC) of the panel material to be 20, or greater, when tested in accordance with ASTM-E90 (a test report to be submitted for approval).
2. The Sound Transmission Class (STC) of the panel material has historically been demonstrated to be 30 or greater.
3. Surface mass density not less than 20 kg/sq. m (4 lbs/sq.ft.) in order to ensure that the sound component transmitted through the barrier material is at least 10 dB below the sound component diffracted across the top of the barrier.

The sound level at Location 5: OLA is less than 55 dB L_{eq} daytime and meets the City of Ottawa's noise criterion.

VENTILATION AND WARNING CLAUSE REQUIREMENTS

The sound levels generated by the combination of all roadways are less than 65 dB L_{eq} daytime and 60 dB L_{eq} nighttime at the exterior façades. As a result, ventilation measures are required as per MECP's noise guidelines. While not a requirement because of the exterior sound levels, the building will be centrally air conditioned in any case. At this time, there are no details regarding the type of ventilation system to be used.

The exterior façade sound levels are above the City of Ottawa's noise criteria such that a warning clause is required. The warning clause is to be inserted into the *Occupancy Agreements* for those affected units as noted above, indicating that the sound levels will exceed the noise guidelines.

A warning clause is to be inserted into all occupancy agreements for this development, notifying them of the exterior sound levels (see Appendix C: Warning Clauses C).

FAÇADE COMPONENTS

A review of the architectural drawings in terms of the sound insulation was undertaken. The factors that affect the interior sound levels for the living areas are the window-area to floor-area ratio and the exterior wall construction.

The exterior wall construction consists of the following:

Hardi Board Horizontal Exterior Wall System:

- a. 8mm smooth-faced concrete horizontal boards (James Hardi Board or equivalent)

- b. Exposed face, c/w metal trim outside corners and inside corners by Fry Reglet
- c. 19 x 89 P.T. vertical nailers
- d. R10 – 64mm Comfortboard 110 rigid mineral wool insulation – adhered air barrier
- e. 38 x 185 (2x8) SPF studs @ 400mm o.c.
- f. Cavity filled with R17 mineral wool batt
- g. 6 mil vapour barrier
- h. 51 x 51 (2x2) strapping @ 400 o.c., packed with Roxul Comfort batts
- i. 16mm drywall.

Based on the proposed construction noted above, this assembly is estimated be rated at STC 47 to 49.

The living spaces in the shelter consist of the following room types:

- a. Studio Connected Unit: 1 to 2 bed capacity
- b. 30 One Bedroom Unit (Accessible): 3 bed capacity, or 4 beds (2 beds and a bunk bed)
- c. Studio Unit: 1 to 2 bed capacity.

The following table illustrates the minimum window requirements as a result of the exterior traffic.

Table 5: Bedroom Window Requirements	
Bedroom Window-Area to Floor-Area Ratios	Minimum STC Requirement for Windows
up to 100%	STC 27

A review of the architectural drawings found that the window-area to floor-area ratio is below 100% and, as a result, no upgrades are required for the windows or wall construction of the living spaces. Calculations are based on the NRC’s BPN-56 model for calculation interior sound levels from transportation sources.

On the basis of the predicted sound levels at the exterior façades (see Table 4 on page 4) along with the proposed wall construction and window areas, no special construction measures are needed.

ON-SITE MECHANICAL EQUIPMENT

At the time of final design, the rooftop HVAC equipment should be reviewed to ensure the development itself meets the City of Ottawa’s noise criteria. If noise control measures are required, this may include but not be limited to the installation of exhaust silencers, partial enclosure, barriers, or the selection of quieter equipment.

CONCLUSIONS

The acoustic analysis indicates a modest noise impact from traffic on Blohm Drive at the proposed shelter. It is feasible to meet the City of Ottawa's noise criteria using standard measures found at many residential buildings close to arterial roadways. Noise control measures including the ventilation (central air conditioning will be provided), double glazing, and warning clauses to deal with traffic noise will be required to satisfy the various noise criteria.

The outdoor amenity areas do not require noise control measures (i.e., barriers) to meet the noise guidelines.

RECOMMENDATIONS

To meet the current noise guidelines of the City of Ottawa, the following recommendations are proposed:

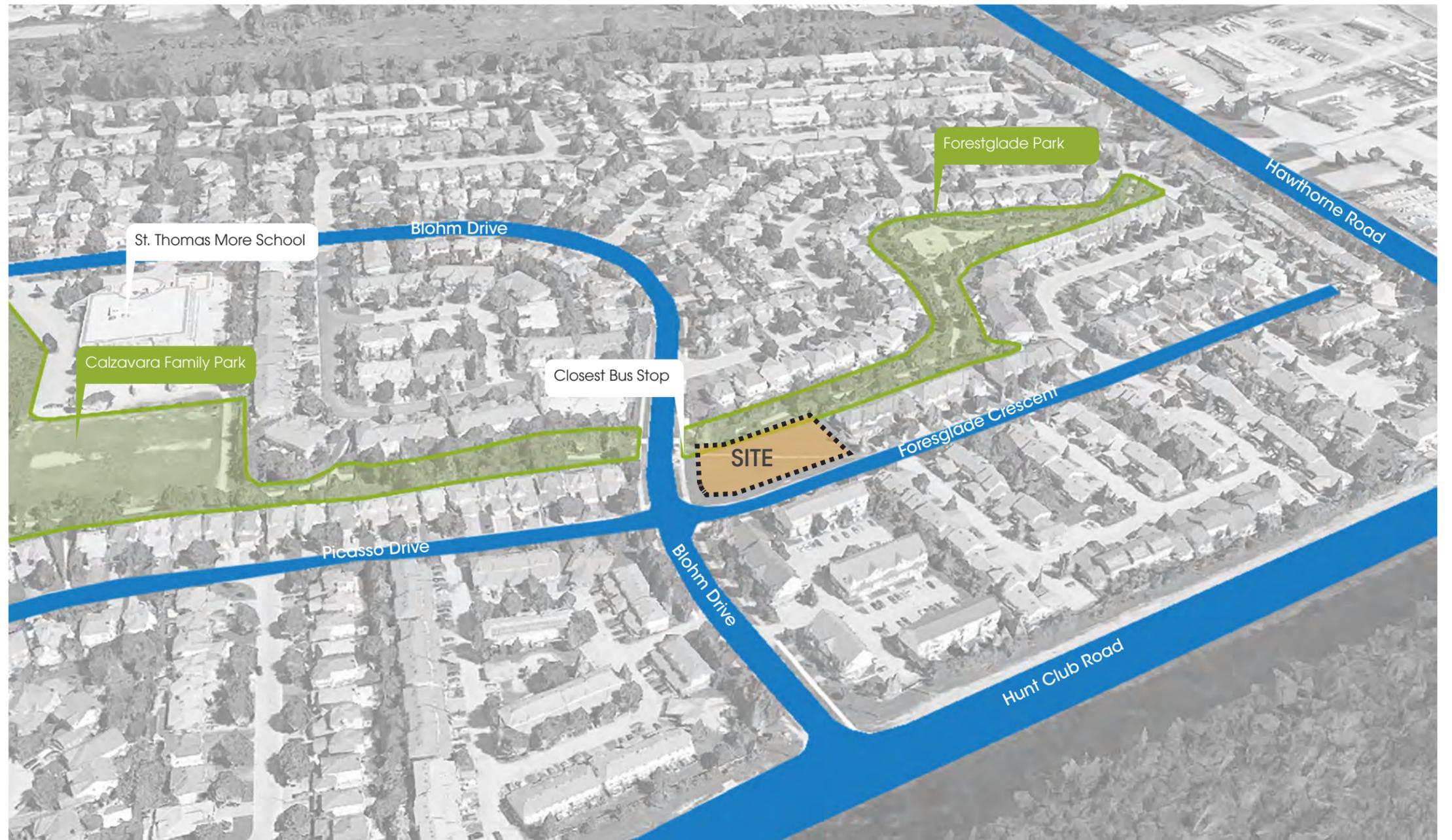
1. It is recommended all residential units be equipped with a ventilation system as per MECP's noise guidelines. While not a requirement because of the exterior sound levels, the building will be centrally air conditioned in any case. At this time, there are no details regarding the type of ventilation system to be used.
2. It is recommended that the north OLA incorporate a 1.8m high acoustic fence to achieve a daytime sound level of 55 dB L_{eq} or less. The extent of the acoustic fence is shown in Appendix A, Figure 3).
3. A review of the final central air-conditioning system is recommended to ensure there are no on-site or off-site noise impacts, as required by MECP's *NPC-300* noise criteria.
4. A warning clause is to be inserted into all occupancy agreements for this development, notifying them of the exterior sound levels (see Appendix C: Warning Clauses C).
5. On the basis of the predicted sound levels (see Tables 4 and 5), no special exterior glazing is needed.
6. It is recommended that, once detailed architectural drawings and suite configurations are available, the acoustic consultant confirm the final façade requirements.

APPENDIX A: FIGURES



Satellite view

 Ottawa Inuit Women Shelter



Source: Google Maps

Site Design
Satellite View of the Site



Satellite view - Ottawa Inuit Women Shelter

Site Information

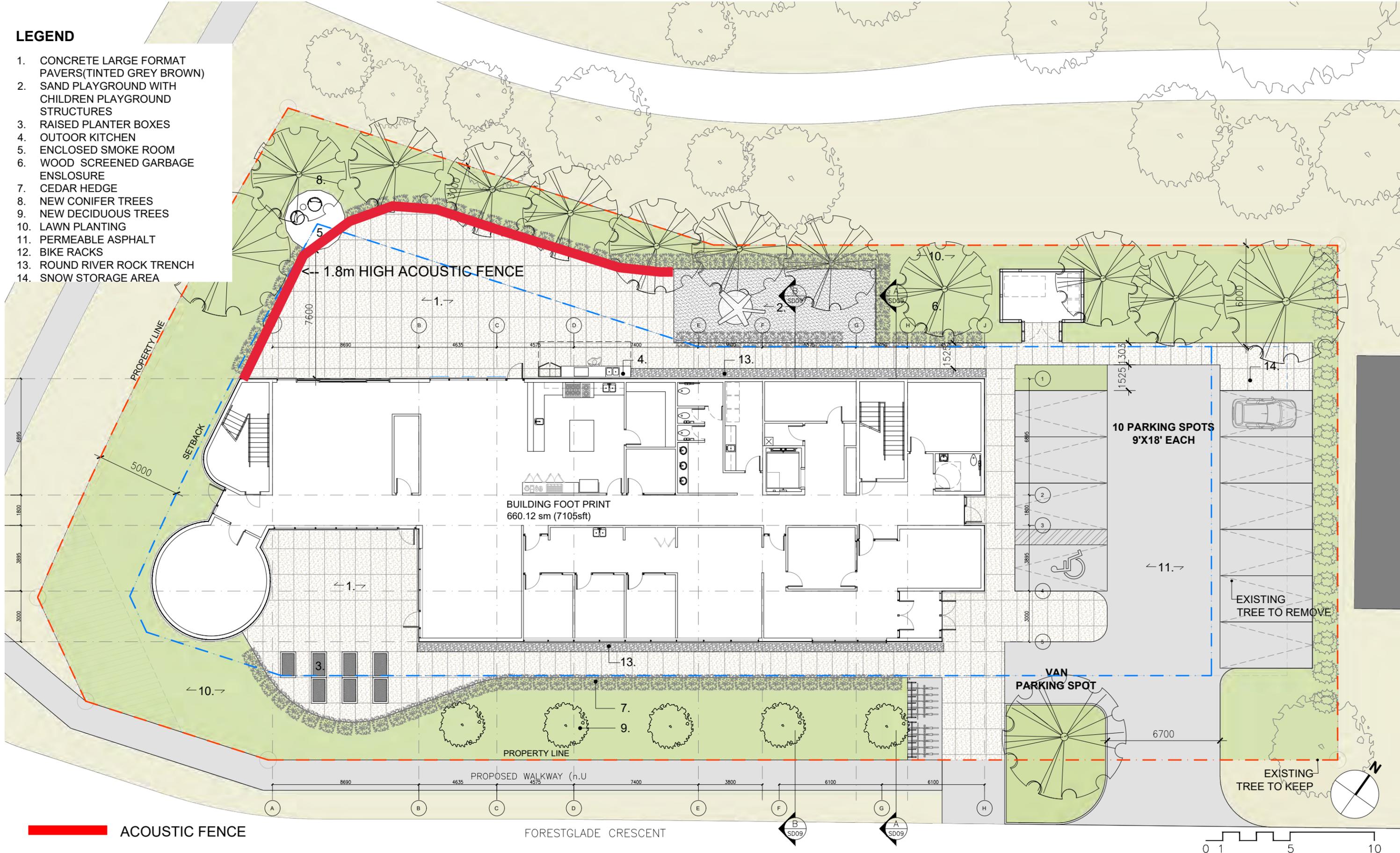
250 Forestglade Cres
Site Area: 2339.15 m²
Site Frontage: 114.32 m
Zoning: R3L
Lot/Block/Plan: 250/90/4M842



Source: Google Maps

LEGEND

1. CONCRETE LARGE FORMAT PAVERS(TINTED GREY BROWN)
2. SAND PLAYGROUND WITH CHILDREN PLAYGROUND STRUCTURES
3. RAISED PLANTER BOXES
4. OUTDOOR KITCHEN
5. ENCLOSED SMOKE ROOM
6. WOOD SCREENED GARBAGE ENCLOSURE
7. CEDAR HEDGE
8. NEW CONIFER TREES
9. NEW DECIDUOUS TREES
10. LAWN PLANTING
11. PERMEABLE ASPHALT
12. BIKE RACKS
13. ROUND RIVER ROCK TRENCH
14. SNOW STORAGE AREA



ACOUSTIC FENCE

FORESTGLADE CRESCENT

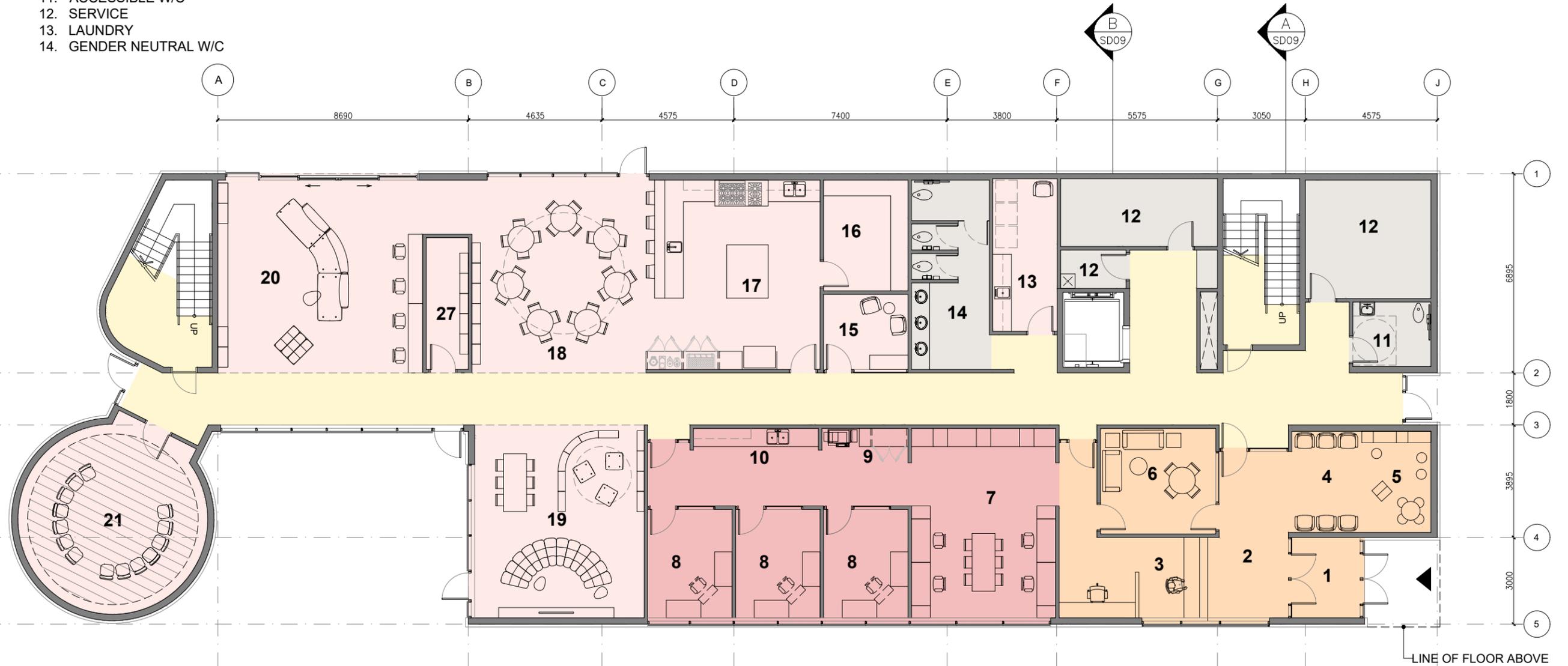
0 1 5 10

COLOR LEGEND

- ENTRY/INTAKE
- ADMINISTRATION
- SERVICE SPACES
- AMENITIES
- CIRCULATION

LEGEND

- | | |
|------------------------|--------------------------|
| 1. ENTRANCE/VESTIBULE | 15. QUIET ROOM/FIRST AID |
| 2. LOBBY | 16. PANTRY |
| 3. RECEPTION | 17. KITCHEN |
| 4. WAITING AREA | 18. DINING |
| 5. CHILDREN' PLAY AREA | 19. FAMILY |
| 6. INTAKE OFFICE | 20. LOUNGE |
| 7. OPENWORK AREA | 21. MULTIPURPOSE |
| 8. OFFICE | |
| 9. IT | |
| 10. KITCHENETTE | |
| 11. ACCESSIBLE W/C | |
| 12. SERVICE | |
| 13. LAUNDRY | |
| 14. GENDER NEUTRAL W/C | |



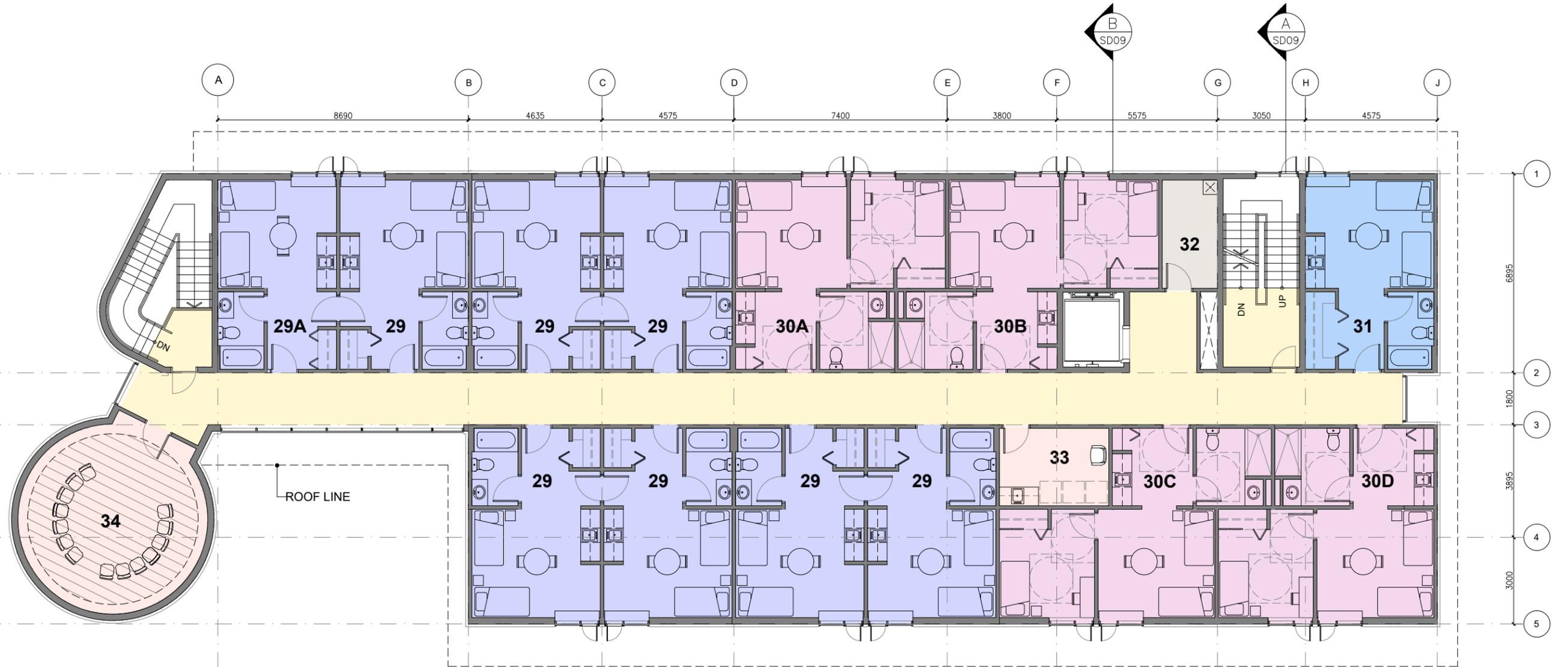
* Refer to Wall, Floor and Roof Legend in SD09

COLOR LEGEND

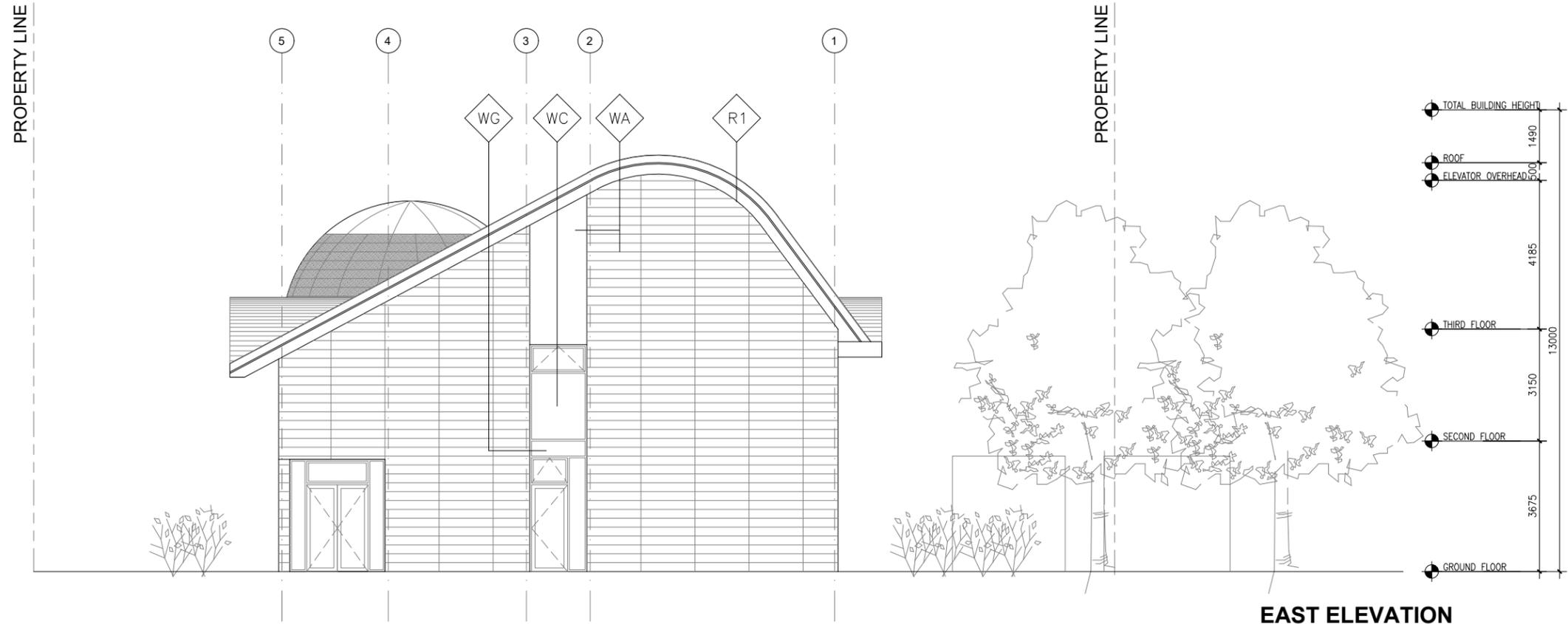
- STUDIO CONNECTED UNIT -1 TO 2 BED CAPACITY
- ONE BEDROOM UNIT (ACCESSIBLE) - 3 BED CAPACITY OR 4 BEDS (2 BEDS AND A BUNK BED)
- STUDIO UNIT -1 TO 2 BED CAPACITY
- SERVICE SPACES
- AMENITIES
- CIRCULATION

LEGEND

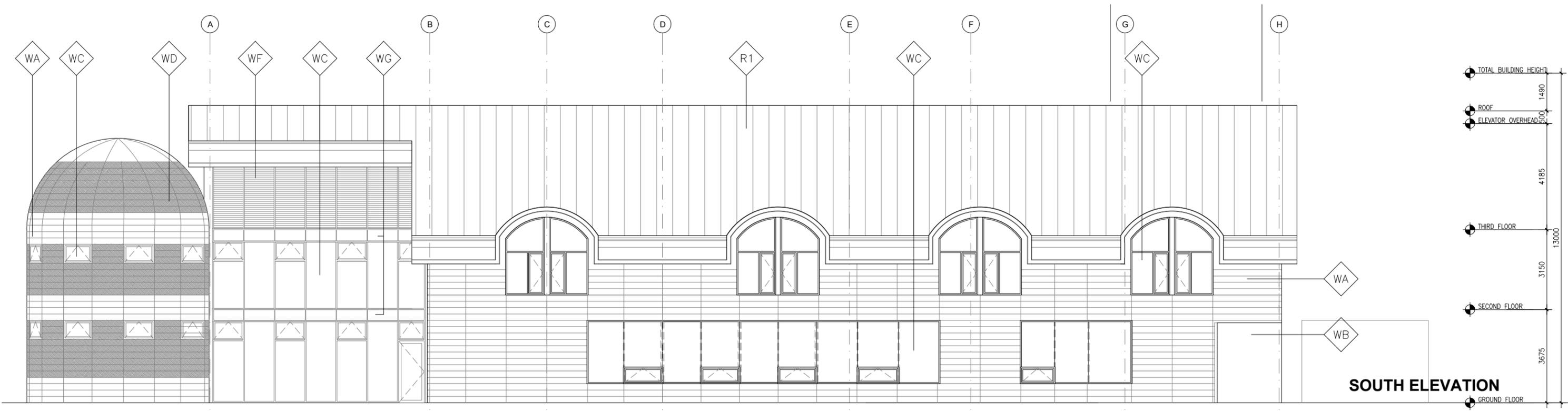
- 29. STUDIO CONNECTED UNIT -1 TO 2 BED CAPACITY
- 30. ONE BEDROOM UNIT (ACCESSIBLE) - 3 BED CAPACITY OR 4 BEDS (2 BEDS AND A BUNK BED)
- 31. STUDIO UNIT -1 TO 2 BED CAPACITY
- 32. JANITOR ROOM
- 33. LAUNDRY
- 34. COUNSELING- MULTIPURPOSE ROOM



* Refer to Wall, Floor and Roof Legend in SD09

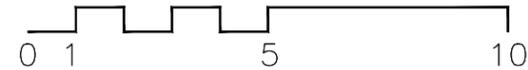


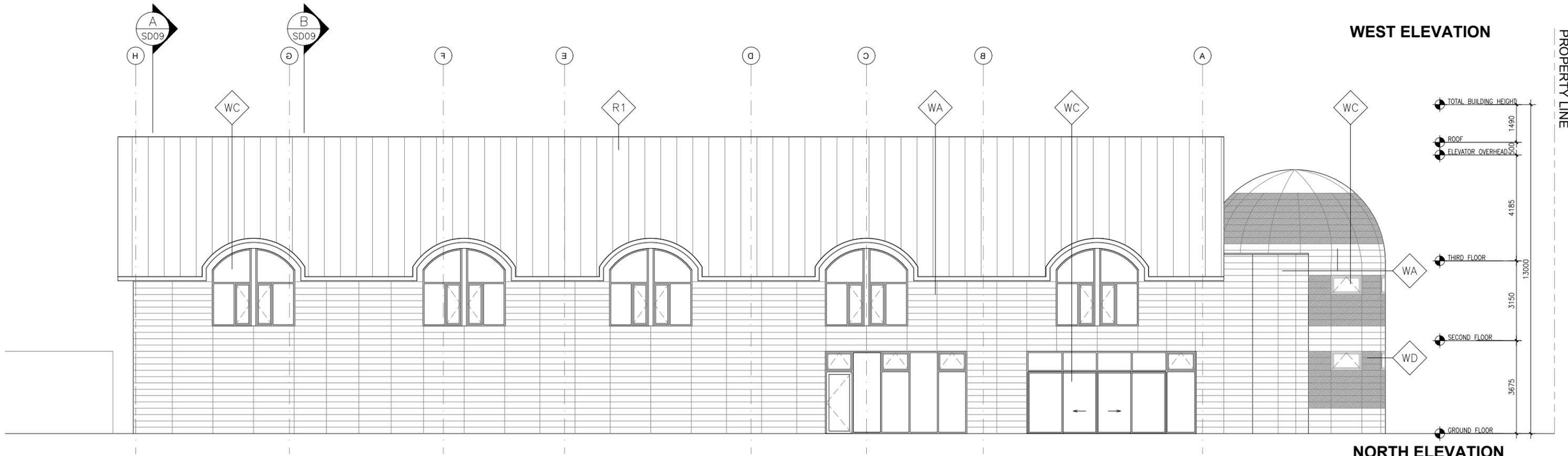
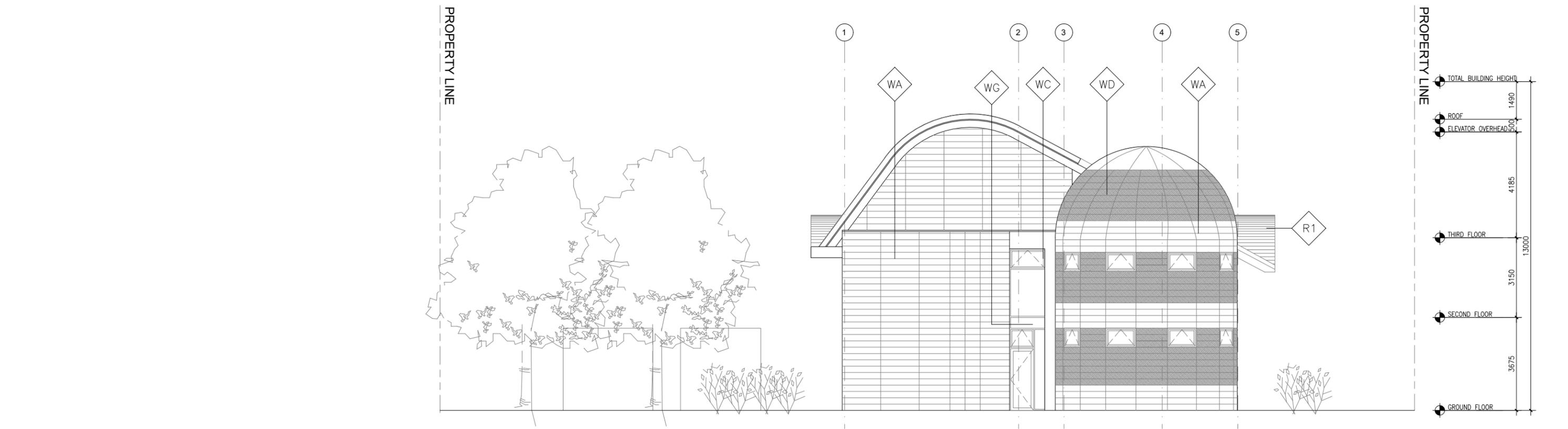
EAST ELEVATION



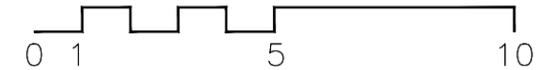
SOUTH ELEVATION

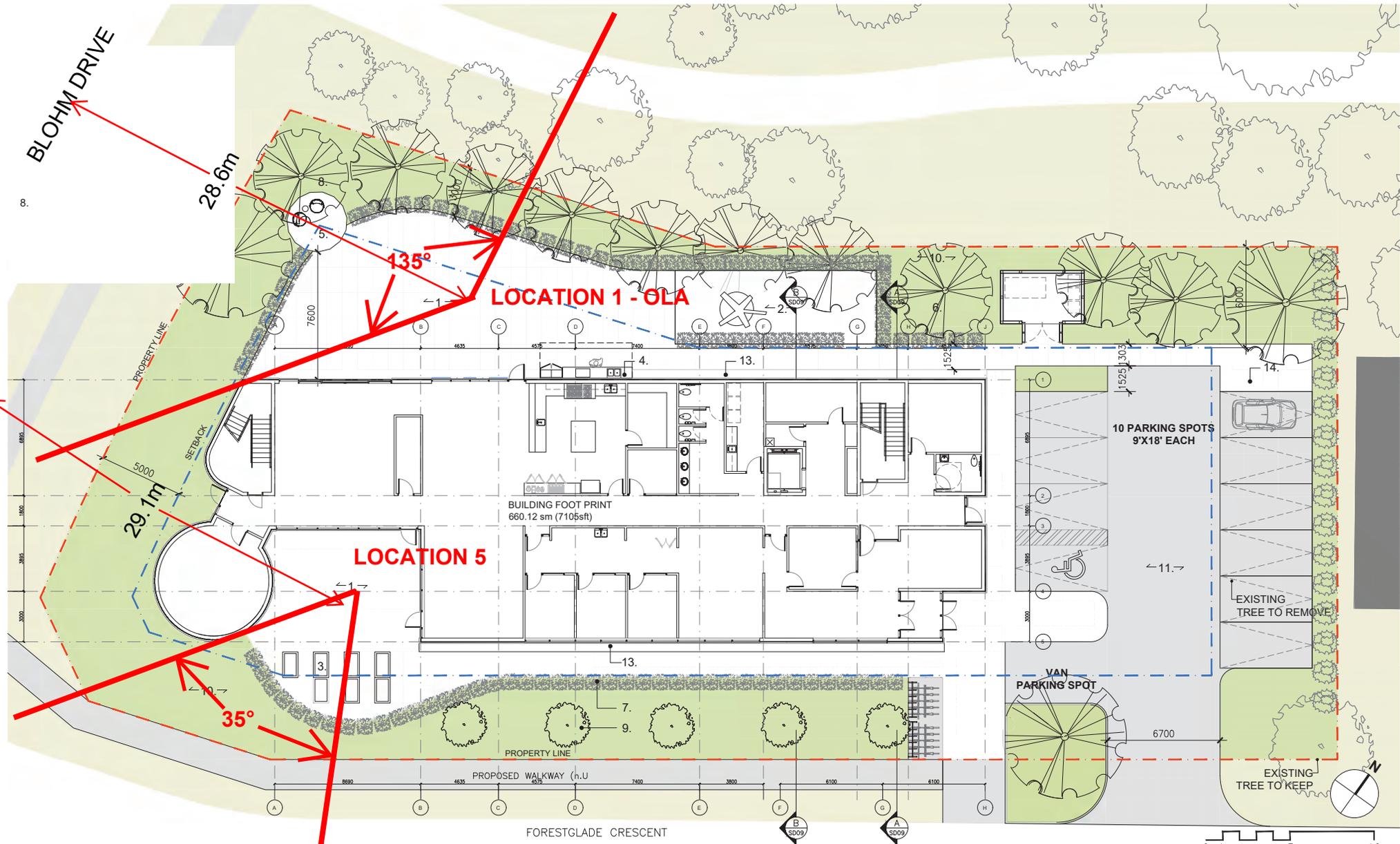
* Refer to Wall, Floor and Roof Legend in SD09



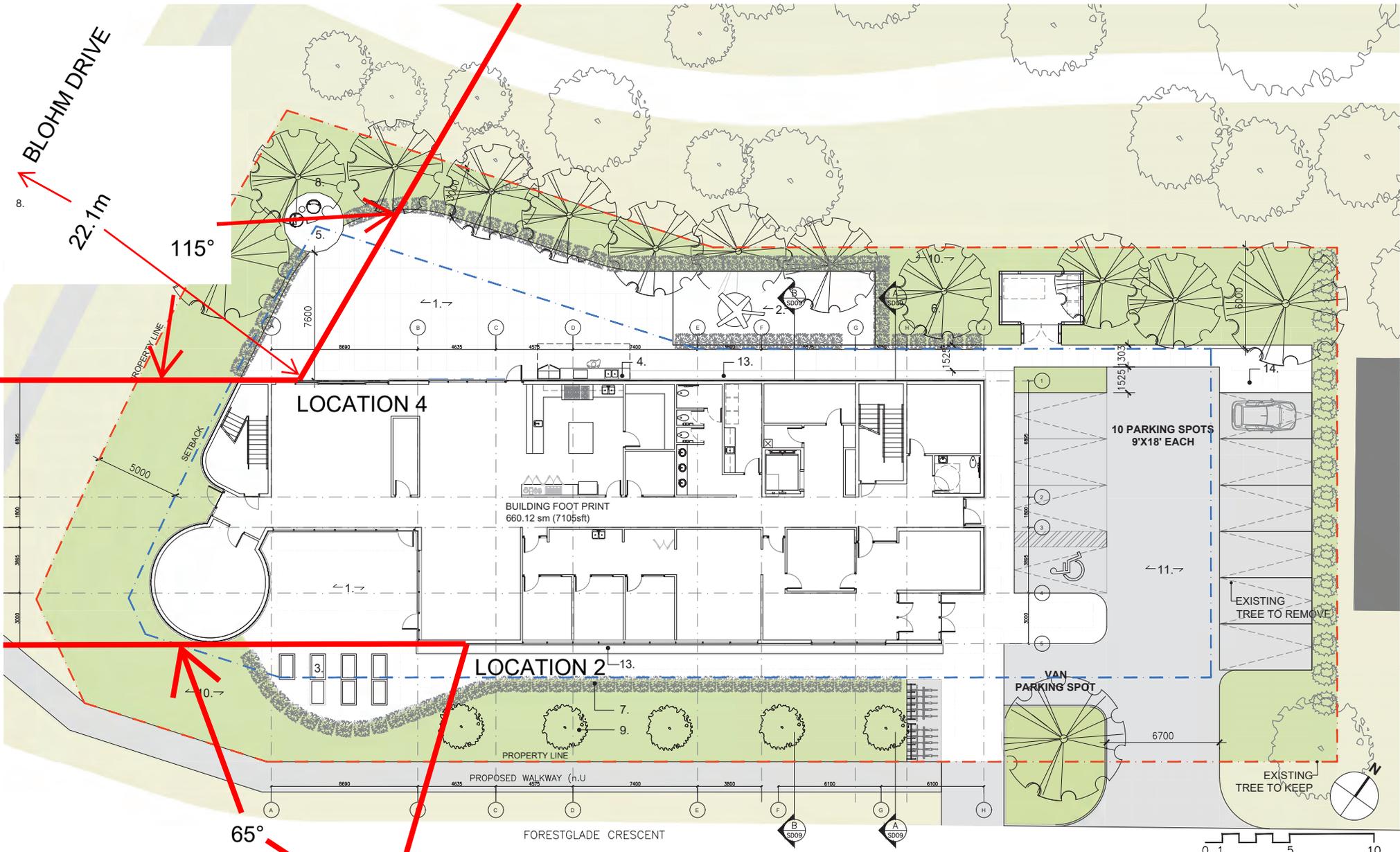


* Refer to Wall, Floor and Roof Legend in SD09





EXPOSURE ANGLES & DISTANCES TO BLOHM DRIVE (CENTRELINE)



BLOHM DRIVE
22.1m
115°

PROPERTY LINE
5000
SETBACK

LOCATION 4

BUILDING FOOT PRINT
660.12 sm (7105sf)

LOCATION 2

PROPOSED WALKWAY (h,u)

10 PARKING SPOTS
9'X18' EACH

VAN
PARKING SPOT

EXISTING
TREE TO REMOVE

EXISTING
TREE TO KEEP

65°

FORESTGLADE CRESCENT

0 1 5 10

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**OTTAWA INUIT WOMEN SHELTER
OPTION A**
OTTAWA, ONTARIO

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24004
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D.A.

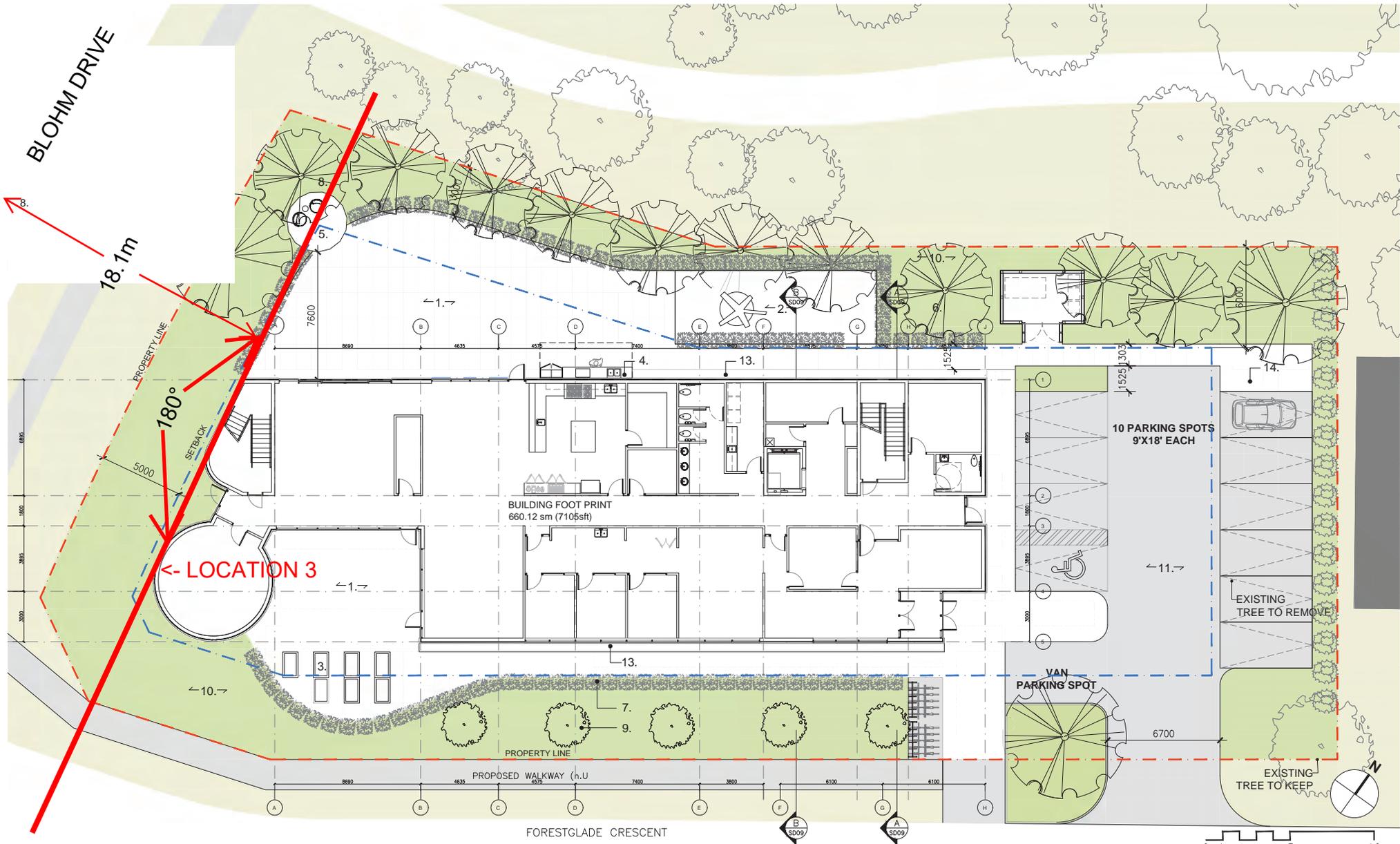
status
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SITE PLAN
scale
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date
2024.12.20

FIGURE 9

drawing number
SD 02
revision

EXPOSURE ANGLES & DISTANCES TO BLOHM DRIVE (CENTRELINE)



EXPOSURE ANGLES & DISTANCES TO BLOHM DRIVE (CENTRELINE)

APPENDIX B: SOUND LEVEL CALCULATIONS

Filename: loc1_ola.te Time Period: Day/Night 16/8 hours
 Description: Loc 1 - North OLA - No Barrier

Road data, segment # 1: Blohm Drive (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           : 10.00
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: Blohm Drive (day/night)

```
-----
Angle1  Angle2      : -40.00 deg  90.00 deg
Wood depth      : 0          (No woods.)
No of house rows : 0
Surface         : 1          (Absorptive ground surface)
Receiver source distance : 28.64 m
Receiver height  : 1.50 m
Topography      : 1          (Flat/gentle slope; no barrier)
```

Results segment # 1: Blohm Drive (day)

Source height = 1.50 m

ROAD (0.00 + 58.63 + 0.00) = 58.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-40	90	0.66	65.75	0.00	-4.66	-2.46	0.00	0.00	0.00	58.63

Segment Leq : 58.63 dBA

Total Leq All Segments: 58.63 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.63

Filename: loc1_ola.te Time Period: Day/Night 16/8 hours
 Description: Common Outdoor Amenity (North) - 1.8m High Fence

Road data, segment # 1: Blohm Drive (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           : 10.00
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: Blohm Drive (day/night)

```
-----
Angle1  Angle2      : -40.00 deg  90.00 deg
Wood depth      : 0          (No woods.)
No of house rows : 0
Surface         : 1          (Absorptive ground surface)
Receiver source distance : 28.64 m
Receiver height  : 1.50 m
Topography      : 2          (Flat/gentle slope; with barrier)
Barrier angle1   : -40.00 deg  Angle2 : 90.00 deg
Barrier height   : 1.80 m
Barrier receiver distance : 9.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
```

Source height = 1.50 m

Barrier height for grazing incidence

```
-----
Source      ! Receiver      ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
1.50 ! 1.50 ! 1.50 ! 1.50
```

ROAD (0.00 + 53.79 + 0.00) = 53.79 dBA

```
-----
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----
-40    90    0.55 65.75 0.00 -4.36 -2.33 0.00 0.00 -5.27 53.79
-----
```

Segment Leq : 53.79 dBA

Total Leq All Segments: 53.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.79

Filename: loc2_bed.te Time Period: Day/Night 16/8 hours
 Description: Loc 2 - South - Bedroom - 2nd Level

Road data, segment # 1: Blohm Drive (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         : 10.00
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: Blohm Drive (day/night)

```
-----
Angle1    Angle2                : -70.00 deg    -25.00 deg
Wood depth                        : 0            (No woods.)
No of house rows                  : 0 / 0
Surface                            : 1            (Absorptive ground surface)
Receiver source distance         : 37.64 / 37.64 m
Receiver height                  : 4.50 / 4.50 m
Topography                        : 1            (Flat/gentle slope; no barrier)
```

Results segment # 1: Blohm Drive (day)

Source height = 1.50 m

ROAD (0.00 + 52.38 + 0.00) = 52.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-70	-25	0.57	65.75	0.00	-6.27	-7.09	0.00	0.00	0.00	52.38

Segment Leq : 52.38 dBA

Total Leq All Segments: 52.38 dBA

Results segment # 1: Blohm Drive (night)

Source height = 1.50 m

ROAD (0.00 + 44.79 + 0.00) = 44.79 dBA

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

-70	-25	0.57	58.16	0.00	-6.27	-7.09	0.00	0.00	0.00	44.79
-----	-----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 44.79 dBA

Total Leq All Segments: 44.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.38

(NIGHT): 44.79

Filename: loc3_mult.te Time Period: Day/Night 16/8 hours
 Description: Loc 3 - West Facade

Road data, segment # 1: Blohm Drive (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           : 10.00
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: Blohm Drive (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 : 18.14 / 18.14 m
Receiver height : 4.50 / 4.50 m
Topography      : 1 (Flat/gentle slope; no barrier)
```

Results segment # 1: Blohm Drive (day)

Source height = 1.50 m

ROAD (0.00 + 63.15 + 0.00) = 63.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.75	0.00	-1.30	-1.30	0.00	0.00	0.00	63.15

Segment Leq : 63.15 dBA

Total Leq All Segments: 63.15 dBA

Results segment # 1: Blohm Drive (night)

Source height = 1.50 m

ROAD (0.00 + 55.56 + 0.00) = 55.56 dBA

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

-90	90	0.57	58.16	0.00	-1.30	-1.30	0.00	0.00	0.00	55.56
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 55.56 dBA

Total Leq All Segments: 55.56 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.15
(NIGHT): 55.56

Filename: loc4_bed.te Time Period: Day/Night 16/8 hours
 Description: Loc 4 - North - Bedroom - 2nd Level

Road data, segment # 1: Blohm Drive (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           : 10.00
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: Blohm Drive (day/night)

```
-----
Angle1  Angle2      : -25.00 deg  90.00 deg
Wood depth      : 0 (No woods.)
No of house rows : 0 / 0
Surface         : 1 (Absorptive ground surface)
Receiver source distance : 22.14 / 22.14 m
Receiver height  : 4.50 / 4.50 m
Topography      : 1 (Flat/gentle slope; no barrier)
```

Results segment # 1: Blohm Drive (day)

Source height = 1.50 m

ROAD (0.00 + 60.14 + 0.00) = 60.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-25	90	0.57	65.75	0.00	-2.65	-2.95	0.00	0.00	0.00	60.14

Segment Leq : 60.14 dBA

Total Leq All Segments: 60.14 dBA

Results segment # 1: Blohm Drive (night)

Source height = 1.50 m

ROAD (0.00 + 52.55 + 0.00) = 52.55 dBA

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

-25	90	0.57	58.16	0.00	-2.65	-2.95	0.00	0.00	0.00	52.55
-----	----	------	-------	------	-------	-------	------	------	------	-------

Segment Leq : 52.55 dBA

Total Leq All Segments: 52.55 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.14

(NIGHT): 52.55

Filename: loc5_ola.te Time Period: Day/Night 16/8 hours
 Description: Loc 5 - South - OLA

Road data, segment # 1: Blohm Drive (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          : 10.00
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: Blohm Drive (day/night)

```
-----
Angle1    Angle2                : -80.00 deg    -45.00 deg
Wood depth                        : 0             (No woods.)
No of house rows                  : 0
Surface                            : 1             (Absorptive ground surface)
Receiver source distance          : 29.14 m
Receiver height                   : 1.50 m
Topography                        : 1             (Flat/gentle slope; no barrier)
```

Results segment # 1: Blohm Drive (day)

Source height = 1.50 m

ROAD (0.00 + 51.53 + 0.00) = 51.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-80	-45	0.66	65.75	0.00	-4.79	-9.43	0.00	0.00	0.00	51.53

Segment Leq : 51.53 dBA

Total Leq All Segments: 51.53 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.53

APPENDIX C: WARNING CLAUSES

TYPE A:

"Occupants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria."

TYPE B:

"Occupants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria."

TYPE C:

"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks."

TYPE D:

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria."

APPENDIX D: NOISE CRITERIA

The noise study will be based on the following criteria for residential units, as required by the City of Ottawa.

SOUND LEVEL LIMITS ROAD AND RAIL			
Type of Space	Time Period	L_{eq} (dBA)	
		Road	Rail
INDOOR LIMITS			
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
OUTDOOR LIMITS			
Outdoor recreation areas ¹	07:00–23:00	55	55
Outside bedroom window	23:00–07:00	50	50
Outside living room window	07:00–23:00	55	55

¹ Up to 5 dB excess above criteria is allowed, provided a warning clause is given. Above 60 dB L_{eq}, exterior noise mitigation measures (i.e., noise barriers, intervening structures, additional setback from source) are required.

All calculations are based on the Preliminary Architectural Plans and Elevations by Rossman Architect, dated August 19, 2021.

L_{eq} (Definition)

The L_{eq} is defined as the mean energy of the noise level averaged over the measurement period. It can be considered as the continuous steady noise level which would have the same acoustic energy as the real fluctuating noise measured over the same period of time.

APPENDIX E: REFERENCES

1. "City of Ottawa Environmental Noise Control Guidelines," January 2016.
2. Ministry of the Environment's *STAMSON* Computer Programme (*Version 5.04*) for the IBM PC.
3. Ministry of the Environment, *ORNAMENT*, "Ontario Road Noise Analysis Method for Environment and Transportation," November 1988.
4. Ministry of the Environment, "Publication NPC-300, Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning," August 2013.