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Noise Feasibility Study
Proposed Mixed Use/Residential Development
774 Bronson Avenue
Ottawa, Ontario

Prepared for:

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1 Introduction Summary

HGC Engineering was retained by SRM Architects Inc. to conduct a noise feasibility study for a proposed mixed use/residential development in the City of Ottawa, Ontario. The site is located on the west side of Bronson Avenue and south of Carling Avenue, specifically at 774 Bronson Avenue. The proposed development will include one 12-storey mixed use/residential building. The study is required by the municipality as part of the planning and approvals process.

The primary noise sources impacting the site are road traffic on Bronson Avenue and Carling Avenue. Relevant traffic data was obtained from the City of Ottawa and was used to estimate future sound levels (L_{EQ}) at the facades of the proposed mixed use/residential building. The estimated sound levels were compared to the guidelines of the Ministry of Environment and Climate Change (MOECC) and the City of Ottawa.

The results of this study indicate that with suitable noise control measures integrated into the design of building, it is feasible to achieve the indoor MOECC guideline sound levels from the road traffic sources. The recommended noise control measures include appropriate wall and window glazing assemblies, and air-conditioning of suites. A number of warning clauses will need to be included in the property, tenancy and rental agreements to the building and property to warn occupants of potentially audible transportation noise levels.

2 Site Description & Noise Sources

The site is situated on the west side of Bronson Avenue and south of Carling Avenue, specifically at 774 Bronson Avenue, in the City of Ottawa, Ontario. Figure 1 shows a key plan of the subject site. A site plan prepared by SRM Architects Inc. dated November 11, 2015 is shown in Figure 2. Figure 2 also indicates the sound level prediction locations, [A] to [I] for reference purposes. The proposed development will consist of a 12-storey residential building with basement parking level and some retail units on ground floor.

HGC Engineering made observations of the acoustical environment through aerial images and identified the significant noise sources in the vicinity. The acoustical environment surrounding the site is urban in nature. Most of the surrounding land uses are existing residential and commercial uses. The subject site is currently vacant. The dominant noise sources impacting the site are road traffic on Bronson Avenue and Carling Avenue. Immediately west of the site is Cambridge Street South, which is a small residential street and has not been considered in the analysis. There are no other stationary sources within 500 m of the subject site.

3 Noise Level Criteria

3.1 Road Traffic

Guidelines for acceptable levels of road traffic noise impacting residential developments are given in the MOECC publication NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning", release date October 21, 2013, and are listed in Table I below. The values in Table I are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table I: MOECC Road Traffic Noise Criteria (dBA)

Area	Daytime L_{EQ} (16 hour) Road	Nighttime L_{EQ}(8 hour) Road
Outside Bedroom Windows	55 dBA	50 dBA
Outdoor Living Area	55 dBA	--
Inside Living/Dining Room	45 dBA	45 dBA
Inside Bedroom	45 dBA	40 dBA

Daytime refers to the period between 07:00 and 23:00. Nighttime refers to the time period between 23:00 and 07:00. The term “outdoor living area” (OLA) is used in reference to an outdoor patio, a backyard, a terrace, or other area where passive recreation is expected to occur.

The MOECC guidelines allow the daytime sound levels in an Outdoor Living Area to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements to the property. Where OLA sound levels exceed 60 dBA, physical mitigation is recommended to reduce the OLA sound level to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible.

MOECC guidelines require a central air conditioning or other ventilation system be installed prior to occupancy as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom or living/dining room windows exceed 60 dBA or daytime sound levels outside bedroom or living/dining room windows exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning is required when nighttime sound levels at bedroom or living/dining room windows are in the range of 51 to 60 dBA or when daytime sound levels at bedroom or living/dining room windows are in the range of 56 to 65 dBA.

Warning clauses to notify future residents of possible excesses are also required when nighttime sound levels exceed 50 dBA at the plane of the bedroom or living/dining room window and daytime sound levels exceed 55 dBA in the outdoor living area and at the plane of the bedroom or living/dining room window due to road traffic.

Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the plane of window nighttime sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise.

4 Traffic Noise Assessment

4.1 Road Traffic

Road traffic data for Bronson Avenue and Carling Avenue was obtained from City of Ottawa in the form 8-hour Turning Movement Count (TMC) and is provided in Appendix A. The higher volumes of the ultimate or projected data was used in the analysis. Ultimate data contained in the City of Ottawa Environmental Noise Control Guidelines dated May 10, 2006 are provided in Appendix A. An AADT of 47 588 vehicles per day was applied to Bronson Avenue. An ultimate volume of 35 000 vehicles per day was applied to Carling Avenue. A commercial vehicle percentage of 2.6% for heavy trucks was used for Bronson Avenue and 3.7% heavy trucks for Carling Avenue. A posted speed limit of 50 km/h for Bronson Avenue and 60 km/h for Carling Avenue was used in the analysis in conjunction with a 90/10 day/night volume split. Traffic volumes were grown at a rate of 2.5% per year to the year 2025. The resulting future traffic volumes used in the analysis are provided in Table II.

Table II: Projected Road Traffic Data to Year 2025

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Bronson Avenue	Daytime	53 400	0	1 425	54 825
	Nighttime	5 933	0	158	6 092
	Total	**59 333**	**0**	**1 584**	**60 917**
Carling Avenue	Daytime	30 335	0	1 166	31 500
	Nighttime	3 371	0	130	3 500
	Total	**33 705**	**0**	**1 295**	**35 000**

4.2 Road Traffic Noise Predictions

To assess the levels of road traffic noise which will impact the subject site in the future, sound level predictions were made using STAMSON version 5.04, a computer algorithm developed by the MOECC. Sample STAMSON output is included in Appendix B.

Predictions of the traffic sound levels were made at representative locations, as shown in Figure 2. The results of these predictions are summarized in Table III. The acoustic recommendations will be subject to modifications if the building envelope is changed

significantly. The worst case prediction locations were chosen at the top floor of the residential building, to investigate ventilation and building facade construction requirements.

Table III: Predicted Future Sound Levels Without Mitigation [dBA]

Prediction Location	Description	OLA - $L_{EQ(16)}$	Daytime – at Façade $L_{EQ(16)}$	Nighttime – at Facade $L_{EQ(8)}$
A	East Façade (2nd to 12th Floor)	--	71	64
B	North Façade (2nd to 4th Floor)	--	67	60
C	North Façade (5th to 12th Floor)	--	68	61
D	West Façade (2nd to 12th Floor)	--	62	55
E	South Façade(5th to 12th Floor)	--	63	57
F	South Façade (2nd to 4th Floor)	--	67	60
G	Outdoor Amenity – 4th Floor Roof	56	--	--
H	Outdoor Amenity – 7th Floor Roof	<55	--	--
I	Outdoor Amenity – 12th Floor Roof	<55	--	--

5 Discussion & Recommendations

The following discussion outlines preliminary recommendations for building façade constructions, ventilation requirements, and noise warning clauses to achieve the noise criteria stated in Table I.

5.1 Outdoor Living Areas

From a review of the preliminary floor plans, there are no proposed balconies for the residential units.

The proposed building has four common outdoor amenity areas provided on the 4th and 7th floor roof and building roof (12th floor). A sound level prediction was performed at these areas, indicated as location G, H and I on Figure 2. The predicted daytime sound level at prediction location G will be 56 dBA, assuming a minimum 1.07 m high solid parapet wall. The 1 dBA in excess of MOECC limit is acceptable with a use of a noise warning clause. The remaining OLA will have predicted sound levels less than 55 dBA, assuming a minimum 1.07 m high solid parapet wall. There are no other common outdoor amenity areas indicated on the provided plans.

5.2 Indoor Living Areas & Ventilation Requirements

The predicted future daytime sound levels outside the plane of windows for living/dining rooms at the east and north (prediction location [A]) will be greater than 65 dBA and greater than 60 dBA during nighttime outside the plane of bedroom windows. To address these traffic noise levels, the MOECC guidelines recommend that all units be equipped with central air conditioning systems, so that windows can be kept closed. Window or through-the-wall air conditioning units are not recommended, unless they are housed in their own closest with an access door, because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall sound insulating properties of the envelope. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MOECC publication NPC-300, Residential Air Conditioning Devices.

5.3 Building Facade Constructions

Future daytime sound levels at the east, north and part of the south façade will exceed 65 dBA during the daytime and 60 dBA during the nightime. MOECC guidelines recommend that the windows, walls and doors be designed so that the indoor sound levels comply with MOECC noise criteria.

Floor plans and elevations have not yet been sufficiently developed for a detailed acoustical specification of the building envelope. For the purposes of this preliminary analysis, typical window-to-floor areas were assumed to be 70% (i.e. 50% fixed, 20% operable including glazed sliding patio doors). The calculation methods were developed by National Research Council (NRC). They are based on the predicted future sound levels at the building facades and the area of the façade components (walls, windows and doors) relative to the floor area of the adjacent room.

In this analysis, it has been assumed that sound transmitted through elements other than the glazing elements is negligible in comparison. Thus, the exterior walls should have sufficient acoustical insulation value such that the noise transmitted through the walls is negligible in comparison with the windows. The exterior walls may include spandrel glass or metal panels

within an aluminum window system. Sufficient sound insulation can typically be achieved by using a drywall assembly on separate framing behind the spandrel panels. The recommended assembly depends on the details of the exterior spandrel panels as well as the relative wall areas versus the window areas in a given room. Further input regarding the design of the exterior walls can be provided during design development, if required.

There may be glazed exterior doors (sliding or swing) for entry onto the balconies from living/dining rooms and some bedrooms. The glazing areas on the doors should be counted as part of the total window glazing area. All exterior doors should include good weather seals to reduce air (and noise) infiltration to the minimum achievable levels.

Based upon these assumptions, it was determined that the glazing along the east façade (prediction location [A]) of the development must achieve a sound transmission class (STC) rating of at least 34 and 30 along the north (prediction location [B] and [C]) and part of the south façade (prediction location [F]), in order to achieve the target indoor sound level criteria. For the remaining facades, any glazing construction meeting the minimum Ontario Building Code (OBC) will provide adequate sound insulation. Awning windows, and swing or sliding doors to balconies should have tight seals sufficient to achieve similar acoustical performance ratings. Figure 3 shows the glazing requirements.

Acoustical requirements for the building envelope should be confirmed once detailed floor plans and elevations have been developed.

5.4 Warning Clauses

MOECC guidelines recommend that appropriate warning clauses be used in the Development Agreements and in purchase, sale and lease agreements (typically by reference to the Development Agreements), to inform future owners and occupants about noise concerns from transportation sources in the area. The following clauses are recommended:

a) Purchasers and tenants area advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwellings occupants as the sound level activities exceed the City's and the Ministry of the Environment and Climate Change noise criteria.

b) Purchasers and tenants are advised that despite the inclusion of noise control features ion the development and within the building units, sound level due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality and the Ministry of Environment and Climate Change noise criteria.

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

These sample clauses are provided by the MOECC as examples and can be modified by the Municipality as required.

6 Impact of the Development on the Environment

Sound levels from noise sources such as rooftop air-conditioners, cooling towers, exhaust fans, etc. should not exceed the minimum one-hour L_{EQ} ambient (background) sound level from road traffic, at any potentially impacted residential point of reception, to comply with City bylaws. Based on the levels observed during our site visit, the typical minimum ambient sound levels in the area are expected to be in the range of 50 dBA or more during the day and 45 dBA or more at night. Thus any electro-mechanical equipment associated with this development (e.g. emergency generator testing, fresh-air handling equipment, etc.) should be designed such that they do not result in noise impact beyond these ranges.

7 Impact of the Development on Itself

Section 5.9.1 of the Ontario Building Code (OBC) specifies the minimum required sound insulation characteristics for demising partitions, in terms of Sound Transmission Class (STC) values. In order to maintain adequate acoustical privacy between separate suites in a multi-tenant building, inter-suite walls should meet or exceed STC-50. Walls separating a suite from a noisy space such as a refuse chute, or elevator shaft, should meet or exceed STC-55. Tables 1 and 2 in Section SB-3 of the Supplementary Guideline to the OBC provide a comprehensive list of constructions that will meet the above requirements.

Tarion's Builder Bulletin B19R requires the internal design of condominium projects to integrate suitable acoustic features to insulate the suites from noise from each other and amenities in accordance with the OBC, and limit the potential intrusions of mechanical and electrical services of the buildings on its residents. If B19R certification is needed, an acoustical consultant is required to review the mechanical and electrical drawings and details of demising constructions and mechanical/electrical equipment, when available, to help ensure that the noise impact of the development on itself is maintained within acceptable levels.

8 Summary of Recommendations

The following list summarizes the recommendations made in this report. The reader is referred to the previous sections of the report where these recommendations are discussed in more detail.

1. Central air conditioning systems are required for all residential suites.
2. Upgraded building and glazing constructions will be required at the east, north and part of the south facades of the proposed residential development, as indicated in Section 5.3.
3. Warning clauses should be included in the Development Agreements registered on titles, and in purchase, sale and lease agreements, to inform future owners and occupants about noise concerns from the road.
4. Tarion Builder's Bulletin B19R requires that the internal design of condominium projects integrates suitable acoustic features to insulate the suites from noise from each other and amenities in accordance with the OBC, and limit the potential intrusions of mechanical and electrical services of the buildings on its residents. If B19R certification is needed, an acoustical consultant is required to review the mechanical and electrical drawings and details of demising constructions and mechanical/electrical equipment, when available, to help ensure that the noise impact of the development on itself are maintained within acceptable levels.

Figure 1: Key Plan

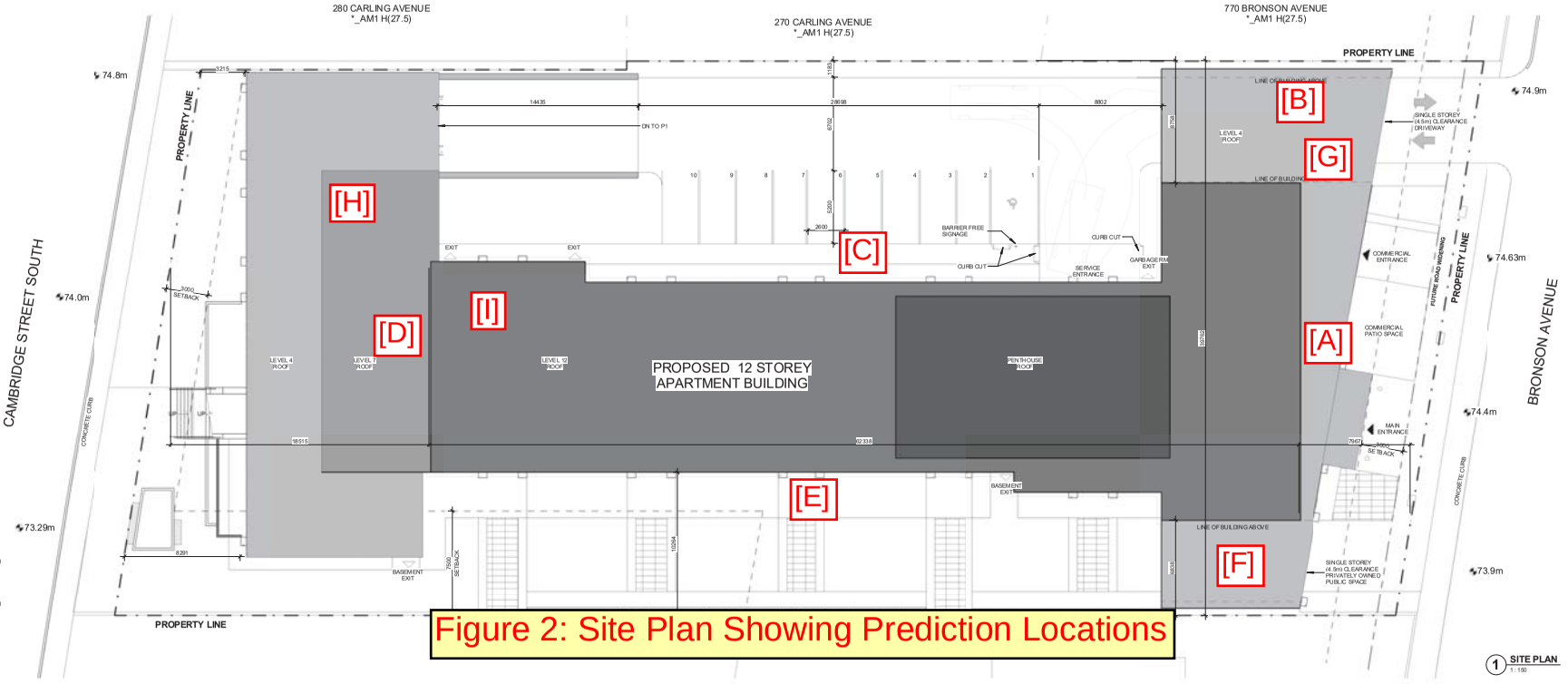

Figure 2: Site Plan Showing Prediction Locations

C:\Users\rhicks\Documents\15076_774 Bronson_rhicks.rvt

Project North

True North

No.	Date	Revision

srm ARCHITECTS INC.

Project No.	15076
Issue Date	
Drawn by	MS
Checked by	RH
Plot Date / Time	11/20/2015 10:54:47 AM

774 BRONSON AVENUE, OTTAWA

SITE PLAN

Drawing Scale	1 : 150
Status	PRELIMINARY
Drawing No.	A1.1
Revision No.	

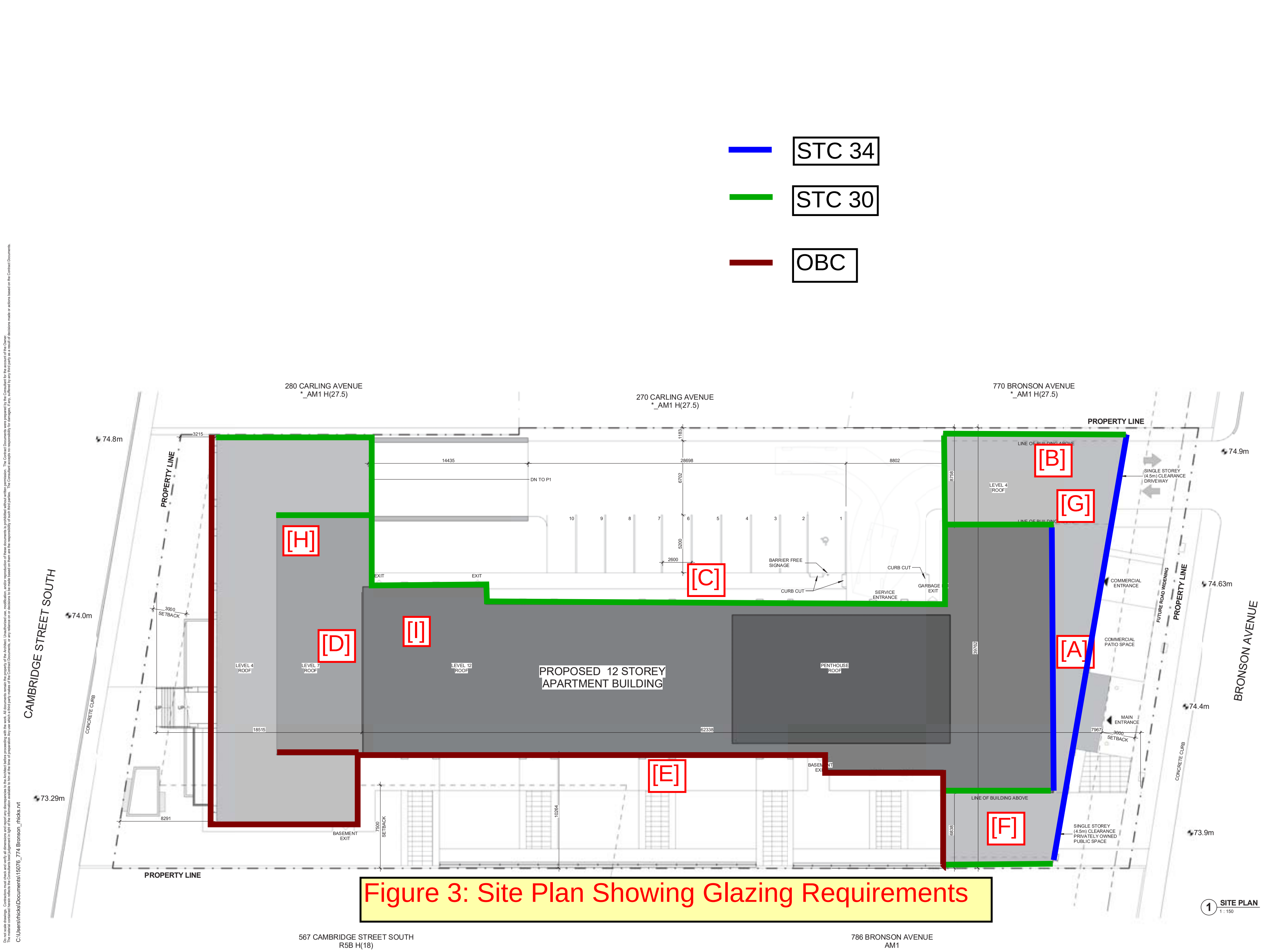

Figure 3: Site Plan Showing Glazing Requirements

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Project No: 15076
Drawn by: MS
Checked by: RH
Plot Date / Time: 11/26/2015 10:54:47 AM

No.	Date	Revision

774 BRONSON AVENUE, OTTAWA

SITE PLAN

PRELIMINARY

Drawing Scale: 1 : 150

Drawing No.: **A1.1**