July 5, 2017

Kagan Shastri LLP
188 Avenue Road
Toronto, ON
M5R 2J1

Attn: Mr. Ira Kagan
C.C.: Mr. Kyle Bittman, Coletara Development

Re: 17 Ewen (Hamilton) Inc. - 17 Ewen Road Development
Building Design Features Aiding Future Mondelez Environmental Compliance Approvals (Revised)
Novus File No. 15-0007

1.0 Introduction

Novus Environmental Inc. (Novus) was retained by 17 Ewen (Hamilton) Inc. to conduct a noise impact assessment for their 10-storey student residence to be located at 17 Ewen Road, in Hamilton, Ontario.

The site is immediately to the north of the Mondelez Canada Inc. (Mondelez) facility located at 45 Ewen Road, which currently operates under Ministry of the Environment and Climate Change (MOECC) Environmental Compliance Approval (ECA) No. 3308-8RYMAM, dated September 27, 2013.

There are several building design features which are intended to reduce noise and air quality impacts from Mondelez operations, and to aid in Mondelez maintaining their existing ECA approvals and obtaining future approvals. This letter outlines those features.

The 17 Ewen Road development will be a privately-owned and operated student residence. Marked-up excerpts from the site plan application and elevations views of the development are provided in **Figures 1 through 4**, attached.

2.0 Noise

The 17 Ewen Road property has been designated as a Class 4 area in the Urban Hamilton Official Plan. Therefore, the Class 4 noise guideline limits under Publication NPC-300 apply to noise sensitive points of reception on the 17 Ewen Road development.

As shown in **Figure 1**, there are no outdoor amenity areas on the 17 Ewen Road development, either at grade or on rooftop terraces.

All of the exterior windows on the development are non-openable.

Specific windows have been identified which require Enclosed Noise Buffers (ENBs) as defined in Publication NPC-300. The MOECC was consulted on the design of the ENBs. The design of the ENBs was further refined in consultation with the MOECC in Marc 2017. Copies of the correspondence with the MOECC can be found in **Attachment A**.

The design consists of an external 2-pane sealed (inoperable) insulated glass unit window, which acts as the noise buffer window. The interior window will consist of a single 1/4" (6.3 mm) interior lite mounted in an aluminum sull sash. This sash will be attached to the main frame using specialty fasteners which will not be removable by the student occupants and which will require a maintenance key. The sull sash window (glazing and frame) will provide a minimum noise reduction of STC 29, which is equivalent to the STC rating of a regular exterior window meeting minimum Ontario Building Code thermal requirements.

The sash will only be removed by maintenance staff for inspection, cleaning, and repair, as required. It can also be temporarily removed for acoustic audits, when required. This requirement will be enshrined within revised Minutes of Settlement with Mondelez to ensure its continued use and legal enforceability. Similar window designs exist, and have been used at multiple noise sensitive buildings in and around the GTA.

As shown in **Attachment A**, the MOECC has confirmed that the revised design "is an acceptable receptor based "on building" noise control measure", and meets their requirements. Note that while the letter to the MOECC notes that "curtain wall" construction would be used the design has been adapted to a "window wall" construction. This will not affect the acoustical performance of the design.

The location of the required Enclosed Noise Buffer windows and the required STC of the exterior pane are shown in **Figures 2 through 4**, attached. Additional information on exterior window requirements can be found in **Attachment A**.

As defined in Publication NPC-300, with the receptor-based noise mitigation measures outlined above in place, the exterior planes of the Enclosed Noise buffer windows are not considered to be points of reception; however, the inner "sull sash" panes are. As shown in

Attachment A, the applicable guideline limits are met at the inner sull sash pane, meeting Publication NPC-300 requirements.

3.0 Air Quality

As all exterior windows on the development are non-openable, the only air quality Points of Impingement for the 17 Ewen Road development will be the two air intakes, which will be located as follows:

- Underground parking: at grade on the north side of the building
- Building: first floor, north side of building

See **Figures 1 and 3** for air intake locations.

The air intakes are located on the north side of the proposed development building, in sheltered locations, and close to ground. As a result, dispersion from significant Mondelez air quality sources will be maximized. All applicable Ontario Regulation 419/05 air quality standards will be met.

4.0 Closing

Should you have any questions or comments, please feel free to contact us.

Sincerely,
Novus Environmental Inc.

R. L. Scott Penton, P.Eng.
Principal.

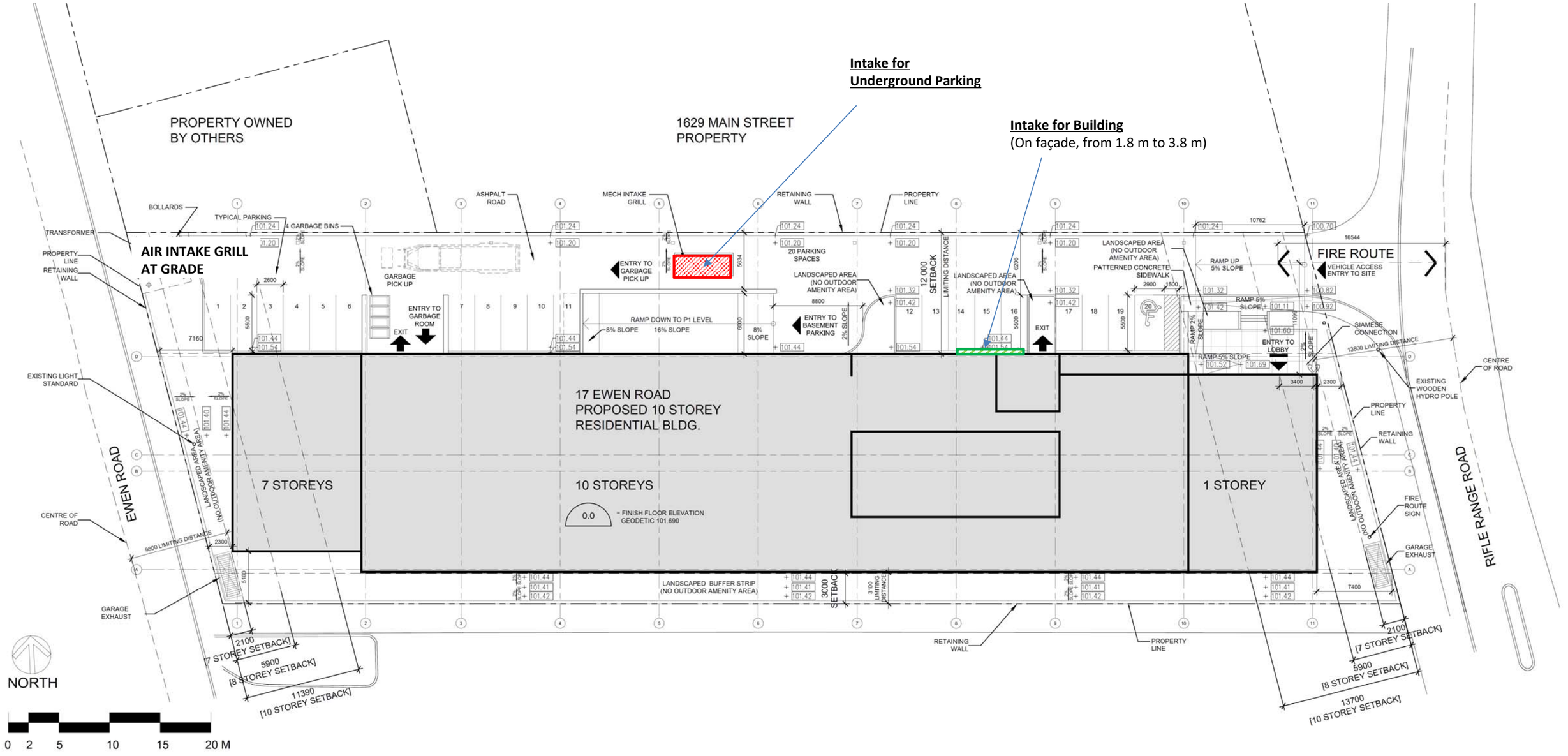


Figure No. **1**

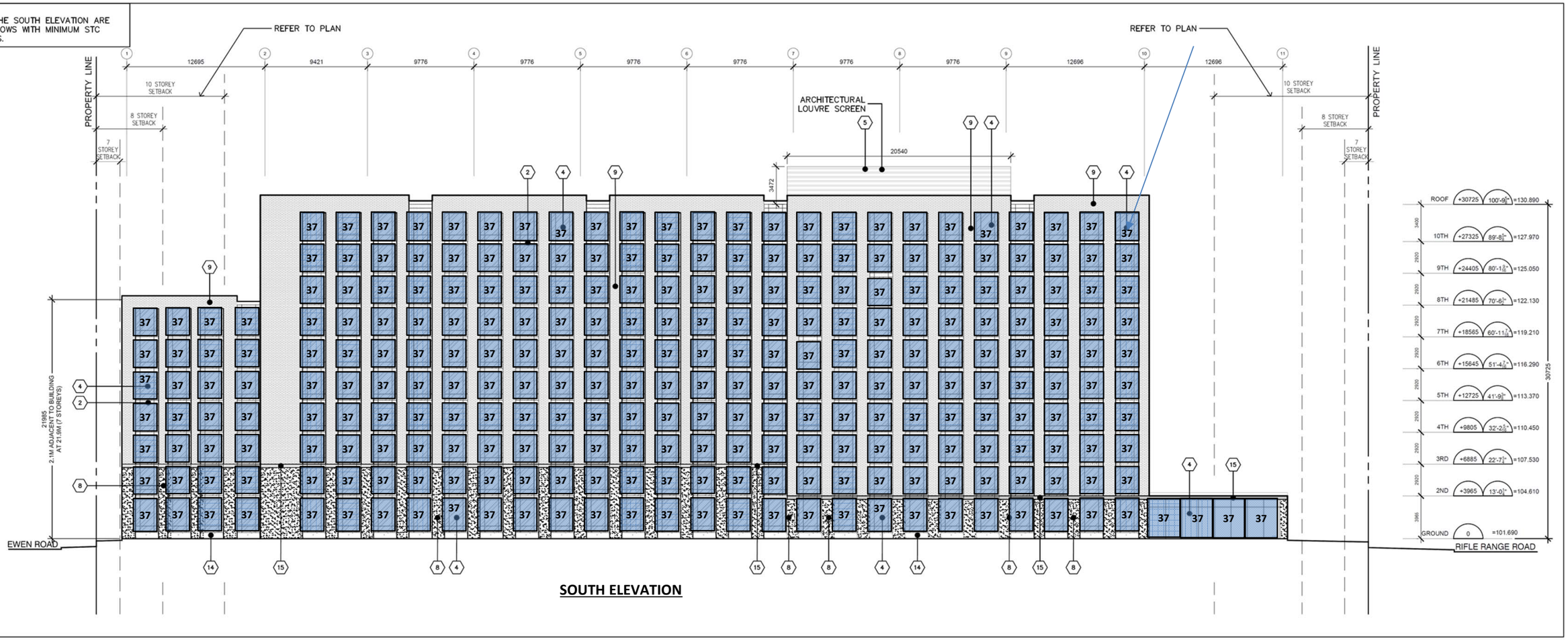
Excerpts From Site Plan A-101 May 2017

17 Ewen (Hamilton) Inc. - 17 Ewen Road Development

Scale:	See inset
Date:	17/06/01
File No.:	15-0007
Drawn By:	SLP

novus ENVIRONMENTAL

NOTE:
ALL WINDOWS ON THE SOUTH ELEVATION ARE NOISE BUFFER WINDOWS WITH MINIMUM STC 37 EXTERIOR PANES.



SOUTH ELEVATION

MATERIAL LEGEND

2	GLASS SPANDREL PANEL	9	PRECAST BRICKS (BLACK)
3	RESERVED	10	
4	NON–OPERABLE NOISE BUFFER WINDOW STC 37	11	RESERVED
5	MECHANICAL PENTHOUSE ARCHITECTURAL LOUVRES	12	WOOD EFFECT PANELS
6	NON–OPERABLE WINDOW	13	METAL DOOR
7	CANTILEVERED METAL CLAD CANOPY	14	ARCHITECTURAL EXPOSED CONCRETE
8	GRANITE (BLACK LEATHERED)	15	STAINLESS STEEL FASCIA

Notes:

- All windows on the Southern Façade must be Noise Buffer Windows with minimum STC 31 exterior panes per Minutes of Settlement.
- STC 37 windows have been selected in the design, meeting the requirement.

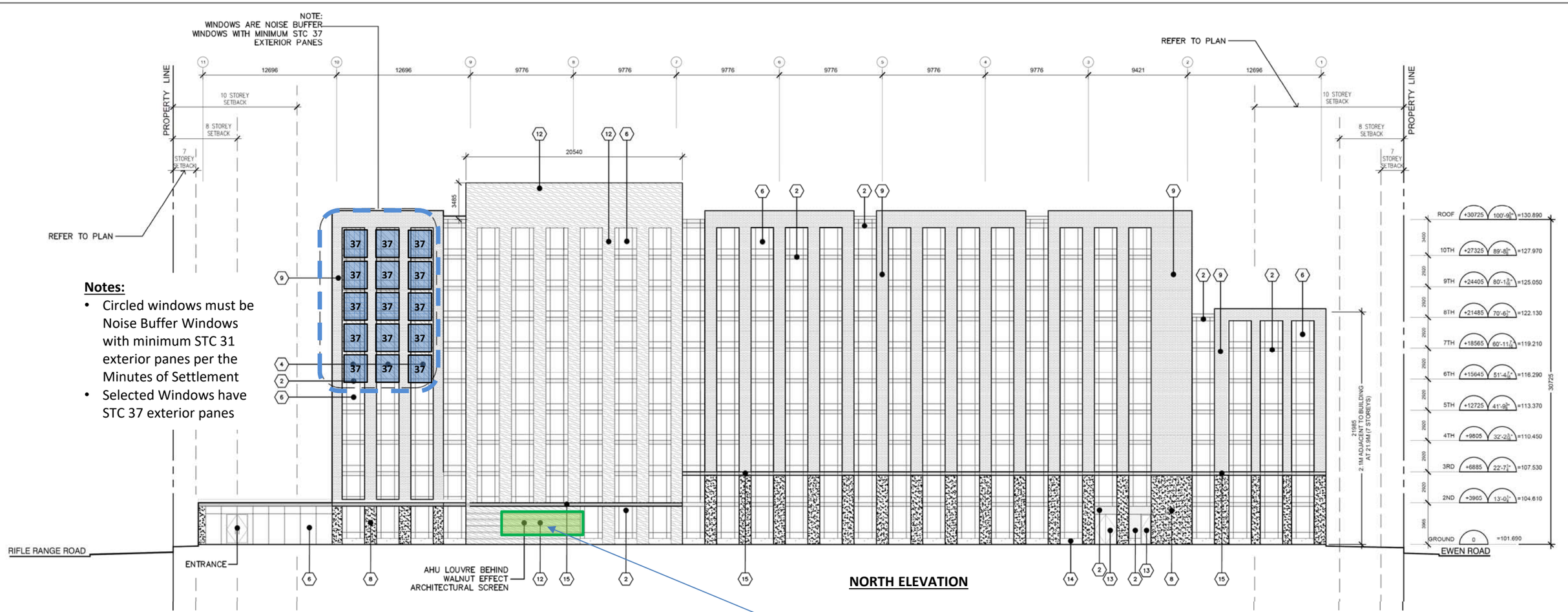
Figure No. **2**

Building Elevations Showing Locations of Buffer Windows – South Elevation

17 Ewen (Hamilton) Inc. - 17 Ewen Road Development

Scale: Approx 1: 300
Date: 17/06/01
File No.: 15-0007
Drawn By: SLP

novus ENVIRONMENTAL



NORTH ELEVATION

Notes:

- Circled windows must be Noise Buffer Windows with minimum STC 31 exterior panes per the Minutes of Settlement
- Selected Windows have STC 37 exterior panes

Notes:

- Location of Building Air Intake
- From 1.8 m to 3.8 m high

MATERIAL LEGEND

2 GLASS SPANDREL PANEL	9 PRECAST BRICKS (BLACK)
3 RESERVED	10
4 NON–OPERABLE NOISE BUFFER WINDOW STC 37	11 RESERVED
5 MECHANICAL PENTHOUSE ARCHITECTURAL LOUVRES	12 WOOD EFFECT PANELS
6 NON–OPERABLE WINDOW	13 METAL DOOR
7 CANTILEVERED METAL CLAD CANOPY	14 ARCHITECTURAL EXPOSED CONCRETE
8 GRANITE (BLACK LEATHERED)	15 STAINLESS STEEL FASCIA

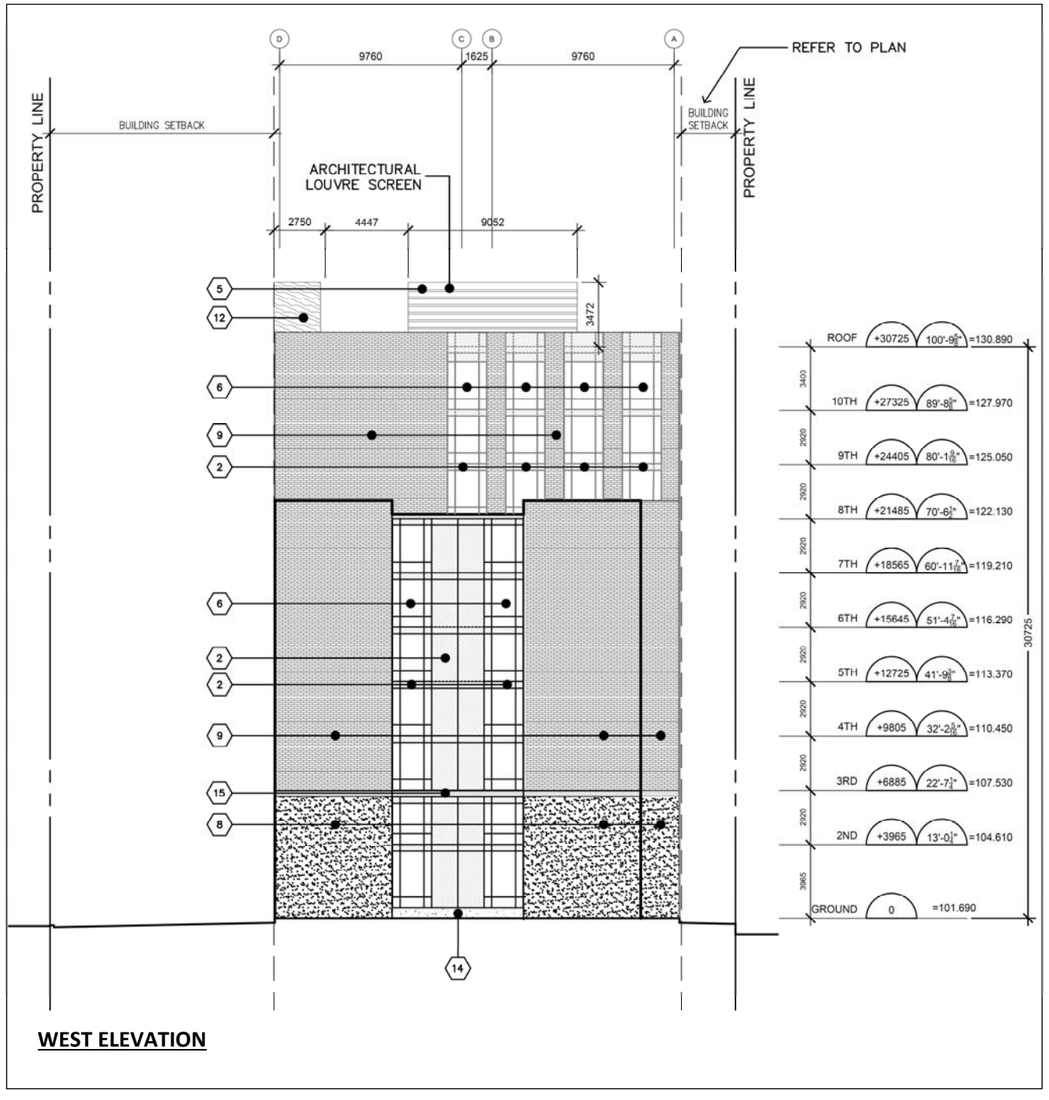
Figure No. **3**

Building Elevations Showing Locations of Buffer Windows – North Elevation

17 Ewen (Hamilton) Inc. - 17 Ewen Road Development

Scale: Approx 1: 300
Date: 17/06/01
File No.: 15-0007
Drawn By: SLP

novus ENVIRONMENTAL



WEST ELEVATION

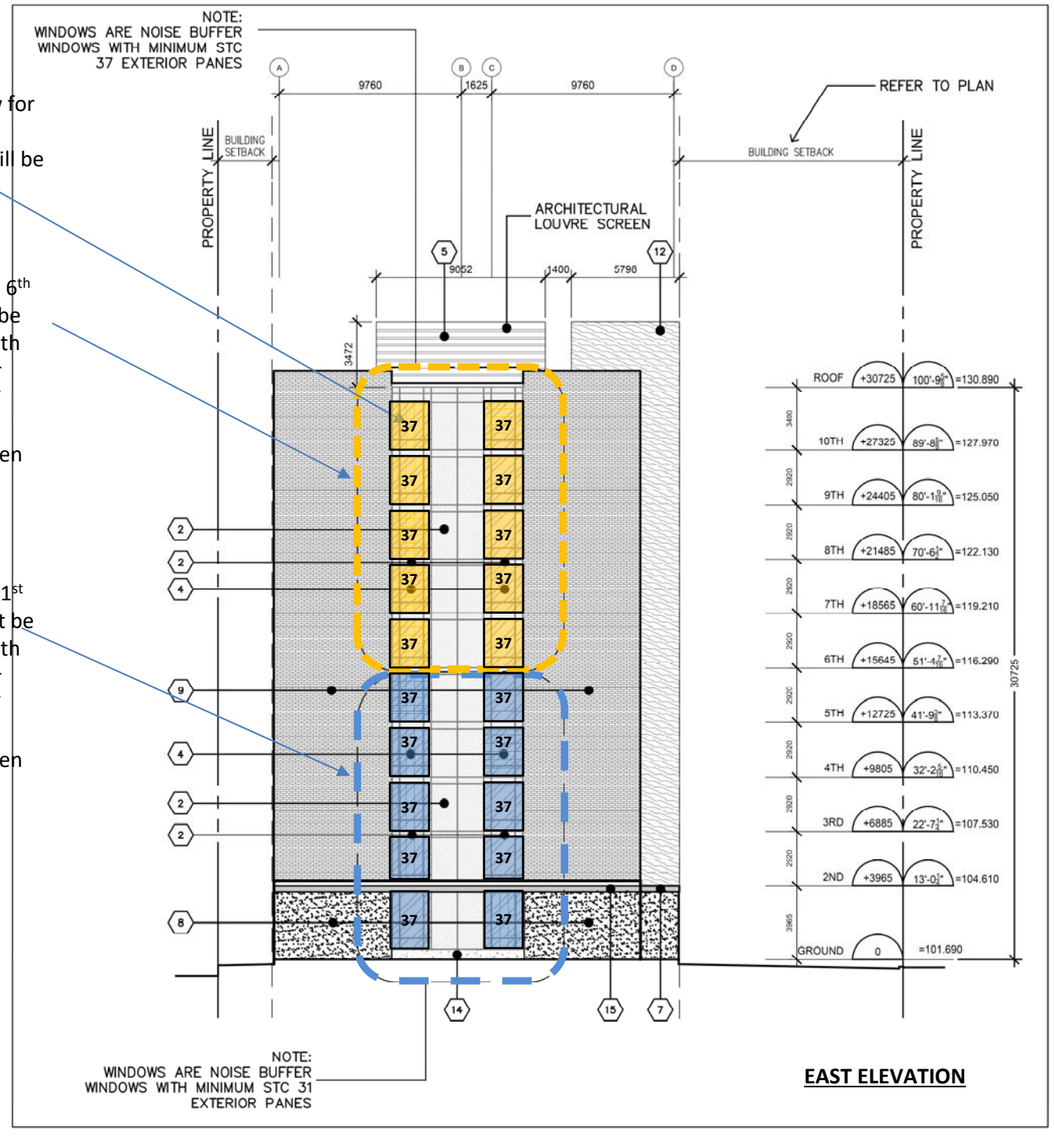
Notes:

- Selected Buffer Window for Acoustic Audit
- Interior Window Only will be openable

Notes:

- Circled windows here on 6th through 10th floors must be Noise Buffer Windows with minimum STC 37 exterior panes per the Minutes of Settlement
- STC 37 Windows have been chosen

- Circled windows here on 1st through to 5th floors must be Noise Buffer Windows with minimum STC 31 exterior panes per the Minutes of Settlement
- STC 37 Windows have been chosen



EAST ELEVATION

MATERIAL LEGEND

2	GLASS SPANDREL PANEL	9	PRECAST BRICKS (BLACK)
3	RESERVED	10	
4	NON–OPERABLE NOISE BUFFER WINDOW STC 37 STC 37	11	RESERVED
5	MECHANICAL PENTHOUSE ARCHITECTURAL LOUVRES	12	WOOD EFFECT PANELS
6	NON–OPERABLE WINDOW	13	METAL DOOR
7	CANTILEVERED METAL CLAD CANOPY	14	ARCHITECTURAL EXPOSED CONCRETE
8	GRANITE (BLACK LEATHERED)	15	STAINLESS STEEL FASCIA

Figure No. **4**

Building Elevations Showing Locations of Buffer Windows – West and East Elevations

17 Ewen (Hamilton) Inc. - 17 Ewen Road Development

Scale: Approx 1: 300
Date: 17/06/01
File No.: 15-0007
Drawn By: SLP

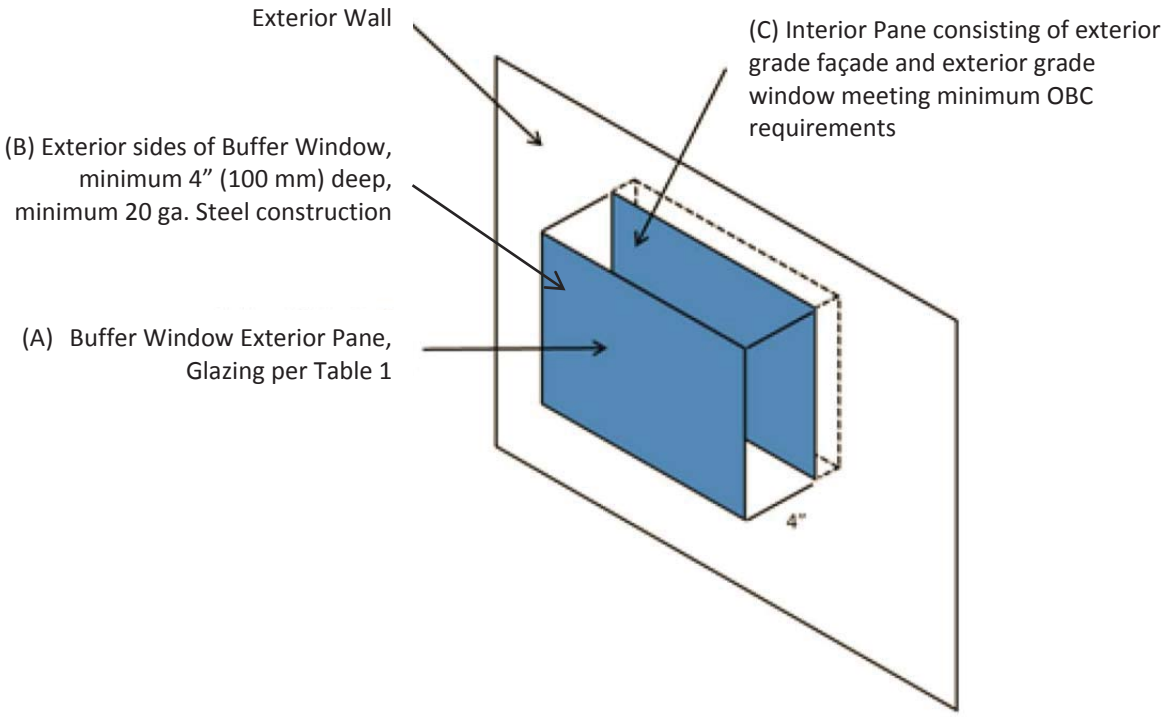
novus ENVIRONMENTAL

Attachment A

SCHEDULE "C"

BUFFER WINDOW DESCRIPTION

Figure 1: Buffer Window Design



MOECC Correspondence

Scott Penton

From: Merza, Header (MOECC) <Header.Merza@ontario.ca>
Sent: Tuesday, April 18, 2017 1:45 PM
To: Scott Penton
Cc: Danny Baldwin; Kyle Bittman; Greason, Ian (MOECC); Martella, Anthony (MOECC)
Subject: 17 Ewen Road - Window Design Memo
Attachments: 17 Ewen Window Design Update to MOECC 170313 Final.pdf

Scott,

This is to advise that the window design shown in Figure No. 6 "Revised Enclosed Noise Buffer Window Design" of your Technical Memorandum dated March 13, 2017 (copy attached) is an acceptable receptor based "on building" noise control measure.

If you have any questions, please call me at (416)327-6575.

Regards,

Header Merza, P.Eng.
Senior Noise Engineer
Approval Services Unit – Team 4
Environmental Approvals Branch

Ministry of the Environment and Climate Change
Operations Division
135 St. Clair Avenue West, 1st Floor
Toronto ON M4V 1P5
Tel: (416)327-6575 Fax: (416)314-8452
E-mail: header.merza@ontario.ca

From: Scott Penton [mailto:scottp@novusenv.com]
Sent: March 14, 2017 10:22 AM
To: Merza, Header (MOECC)
Cc: Danny Baldwin; Kyle Bittman
Subject: 17 Ewen Road - Window Design Memo

Header, as discussed, please see the attached. If you have any questions, please feel free to give me a call or send me an email.

Regards,
Scott

R. L. Scott Penton, P.Eng.
Principal
t 226.706.8080 x 203 | **c** 519.362.3538 | scottp@novusenv.com

Technical Memorandum

Date: March 13, 2017

To: Header Merza, Ministry of the Environment and Climate Change header.merza@ontario.ca

CC: Danny Baldwin, Coletara Developments dbaldwin@coletara.com
Kyle Bittman, Coletara Developments kbittman@coletara.com

Re: Coletara Developments - 17 Ewen Road Development
Suggested Revisions to Enclosed Noise Buffer Window Design
Novus File No. 15-0007

1.0 Introduction

Header,

As you know, Novus Environmental Inc. (Novus) was retained to conduct a noise impact assessment for a 10-storey student residence to be located at 17 Ewen Road, in Hamilton, Ontario. The project has since been taken over by Coletara Development Inc. Our noise assessment in support of the re-zoning for the development was documented in the Novus report entitled "Environmental Noise Assessment, Proposed 10 Storey Student Residence, 17 Ewen Road, Hamilton, Ontario", dated August 7, 2014. The report included a number of recommendations for noise mitigation measures. A copy of the report was previously sent to you via email.

A key part of the mitigation design involves the use of enclosed noise buffer windows on certain facades, to control stationary noise from Mondelez Cadbury operations, who operate a facility immediately to the south of the development.

The purpose of this memo is to discuss the current proposed design for the enclosed buffer windows, for your review.

2.0 Description of the Current Site Plan

Excerpts from the current site plan and elevation views are shown in **Figures 1 and 2**, attached. The development remains a 10-storey student residence, set back 3.0 m from the southern property line.

There are no Outdoor Living Areas or common outdoor amenity areas, including balconies or rooftop outdoor amenity areas. The only points of reception are the façade windows connected to noise sensitive spaces such as bedrooms and living rooms.

3.0 Noise Requirements

The City of Hamilton has provided a Class 4 designation for the 17 Ewen Road property. As such, the following limits would generally apply:

- Continuous Noise:
  - Daytime: 60 dBA L_{eq} (1-hr) dBA, in the plane of noise-sensitive windows;
  - Night-time: 55 dBA L_{eq} (1-hr) dBA, in the plane of noise-sensitive windows;

- Impulsive Noise:
  - Daytime: 60 dBA L_{LM} dBAI, for frequent impulses in the plane of noise-sensitive windows;
  - Night-time: 55 dBAI L_{LM} dBAI, for frequent impulses in the plane of noise-sensitive windows;

During unloading of tanker trucks, there are frequent impulsive noises (more than 9 per hour) from mallet hammer hits on the side of the tanker cars, meant to dislodge flour and other powders inside the tanks. Unloading only takes place once per day during daytime hours; regardless, as agreed to with Mondelez, in order to address any uncertainty in timing and to allow room for operational changes, the impulsive noise night-time limit of 55 dBAI has been used as a conservatism.

4.0 Predicted Sound Levels

Predicted impulsive and non-impulsive sound levels are shown in **Figures 3 and 4**. Worst-case maximum sound levels at the exterior façade are summarized in **Table 1** below:

Table 1: Worst-Case Unmitigated Façade Levels

Type of Noise	Location	1/1-Octave Band Levels (dB)								Overall	
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBZ	dBA
Impulsive Noise	South Façade	63.3	64.8	71.8	76.5	67.0	64.5	56.8	47.2	78.7	75.2
	East Façade	62.8	63.6	70.6	75.3	65.7	63.1	55.4	45.7	77.5	73.9
	North Façade	57.4	57.2	62.6	65.3	53.2	47.9	37.5	24.2	68.2	63.4
Non-Impulsive Noise	South Façade	66.3	61.8	60.0	59.7	56.4	51.3	44.1	30.0	69.2	61.1
	East Façade	64.9	59.0	58.1	58.4	55.0	49.7	42.2	26.0	67.5	59.6
	North Façade	59.7	53.4	50.0	47.5	42.0	34.2	24.2	5.8	61.2	48.3

The impulsive noise from tanker unloading is the dominant noise source on-site and drives the mitigation requirements.

5.0 Proposed Window Design

The previous design involved a noise buffer window places external to the building façade, located a minimum of 4" away from the interior protected window. The concept sketch previously reviewed and accepted by the MOECC can be found in **Figure 5**.

As the building design has progressed, the new developer has engaged an engineering consultant to find the best engineered solution currently in manufacture. This has required moving away from "window wall" constructions to a "curtain wall" type construction. Additional issues were raised with the previous design as to condensation, potential mold growth within the buffer window space, and the lack of an ability to inspect, maintain and annually clean the windows.

The proposed window design is shown in **Figure 6**, addresses these concerns. The design consists of an external 2-pane sealed (inoperable) insulated glass unit window, which acts as the buffer window. The minimum buffer window STC rating will be STC 35, with STC 37 windows used in some locations on the east elevation as shown in **Figure 2c**.

The interior window will consist of a single 1/4" (6.3 mm) interior lite mounted in an aluminum sull sash. This sash will be attached to the main frame using specialty fasteners which will not be removable by the student occupants and which will require a maintenance key. The sull sash will also be sealed to the frame using rubber gaskets, to ensure an air-tight and water-tight fit. The sull sash window (glazing and frame) will provide a minimum noise reduction of STC 29, which is equivalent to the STC rating of a regular exterior window meeting minimum Ontario Building Code thermal requirements.

The sash will only be removed by maintenance staff for inspection, cleaning, and repair, as required. This requirement will be enshrined within revised Minutes of Settlement with Mondelez Cadbury to ensure its continued use and legal enforceability. Similar window designs exist, and have been used at multiple noise sensitive buildings in and around the GTA. An example would be at some existing medical facilities.

The following table shows the predicted worst-case sound levels both at the exterior side of the sull sash lite, and indoors within the room. The calculations are provided in Attachment A.

Table 2: Predicted Sound Levels Within Enclosed Noise Buffer and Indoors

Type of Noise	Location	1/1-Octave Band Levels (dB)								Overall	
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	NC	dBA
South Facade											
Impulsive Noise	Level Outside Buffer Window	63.3	64.8	71.8	76.5	67.0	64.5	56.8	47.2	--	75.2
	Level at Exterior of Sull Sash Window	56.1	50.0	57.2	54.4	40.7	40.8	31.3	21.8	--	53.8
	Level In Bedroom	45.4	31.9	37.3	29.9	12.2	15.2	0.0	0.0	NC 26	31.4
Non-Impulsive Noise	Level Outside Buffer Window	66.3	61.8	60.0	59.7	56.4	51.3	44.1	30.0	--	61.1
	Level at Exterior of Sull Sash Window	59.1	47.0	45.4	37.6	30.1	27.6	18.6	4.6	--	41.0
	Level In Bedroom	48.4	28.9	25.5	13.1	1.6	2.0	0.0	0.0	NC 17	23.9
East Façade											
Impulsive Noise	Level Outside Buffer Window	62.8	63.6	70.6	75.3	65.7	63.1	55.4	45.7	--	73.9
	Level at Exterior of Sull Sash Window	58.3	51.5	57.0	55.4	42.0	39.4	33.0	23.3	--	54.3
	Level In Bedroom	47.6	33.3	37.2	30.9	13.4	13.8	1.5	0.0	NC 28	31.9
Non-Impulsive Noise	Level Outside Buffer Window	64.9	59.0	58.1	58.4	55.0	49.7	42.2	26.0	--	59.6
	Level at Exterior of Sull Sash Window	60.4	46.9	44.5	38.5	31.3	26.0	19.8	3.6	--	41.2
	Level In Bedroom	49.7	28.7	24.7	14.0	2.7	0.4	0.0	0.0	NC 19	24.8
North Façade											
Impulsive Noise	Level Outside Buffer Window	57.4	57.2	62.6	65.3	53.2	47.9	37.5	24.2	--	63.4
	Level at Exterior of Sull Sash Window	53.2	45.4	51.0	46.2	29.9	27.2	15.0	1.8	--	46.1
	Level In Bedroom	42.5	27.3	31.1	21.7	1.4	1.6	0.0	0.0	NC 18	24.9
Non-Impulsive Noise	Level Outside Buffer Window	59.7	53.4	50.0	47.5	42.0	34.2	24.2	5.8	--	48.3
	Level at Exterior of Sull Sash Window	55.5	41.6	38.4	28.4	18.7	13.5	1.7	0.0	--	34.1
	Level In Bedroom	44.8	23.5	18.5	3.9	0.0	0.0	0.0	0.0	NC 15	19.7

As you can see from the calculation results, the 55 dBAI limit is met at the exterior side of the sull sash. The resulting indoor sound levels are significantly lower. While the MOECC does not have an interior noise limit for stationary noise, ASHRAE suggests that noise from indoor ventilation systems in bedrooms not exceed a Noise Criteria level of NC 35; this standard is met (Maximum predicted NC level of NC 28). Similarly, the MOECC applies a 40 dBA indoor noise limit for transportation noise; while it does not directly apply to stationary noise, is indicative of what would normally be considered acceptable; that standard is also met (max predicted indoor noise level of 32 dBAI). During the majority of the time, when unloading is not occurring, sound levels will be even lower.

6.0 Closing

Based on our review, we believe the proposed window designs will meet the MOECC's requirements for an enclosed noise buffer under NPC-300, and will provide an adequate indoor environment for the student residents. We hope that you can confirm as such.

Should you have any questions or comments, please feel free to contact us.

Sincerely,
Novus Environmental Inc.

R. L. Scott Penton, P.Eng.
Principal.

Figures

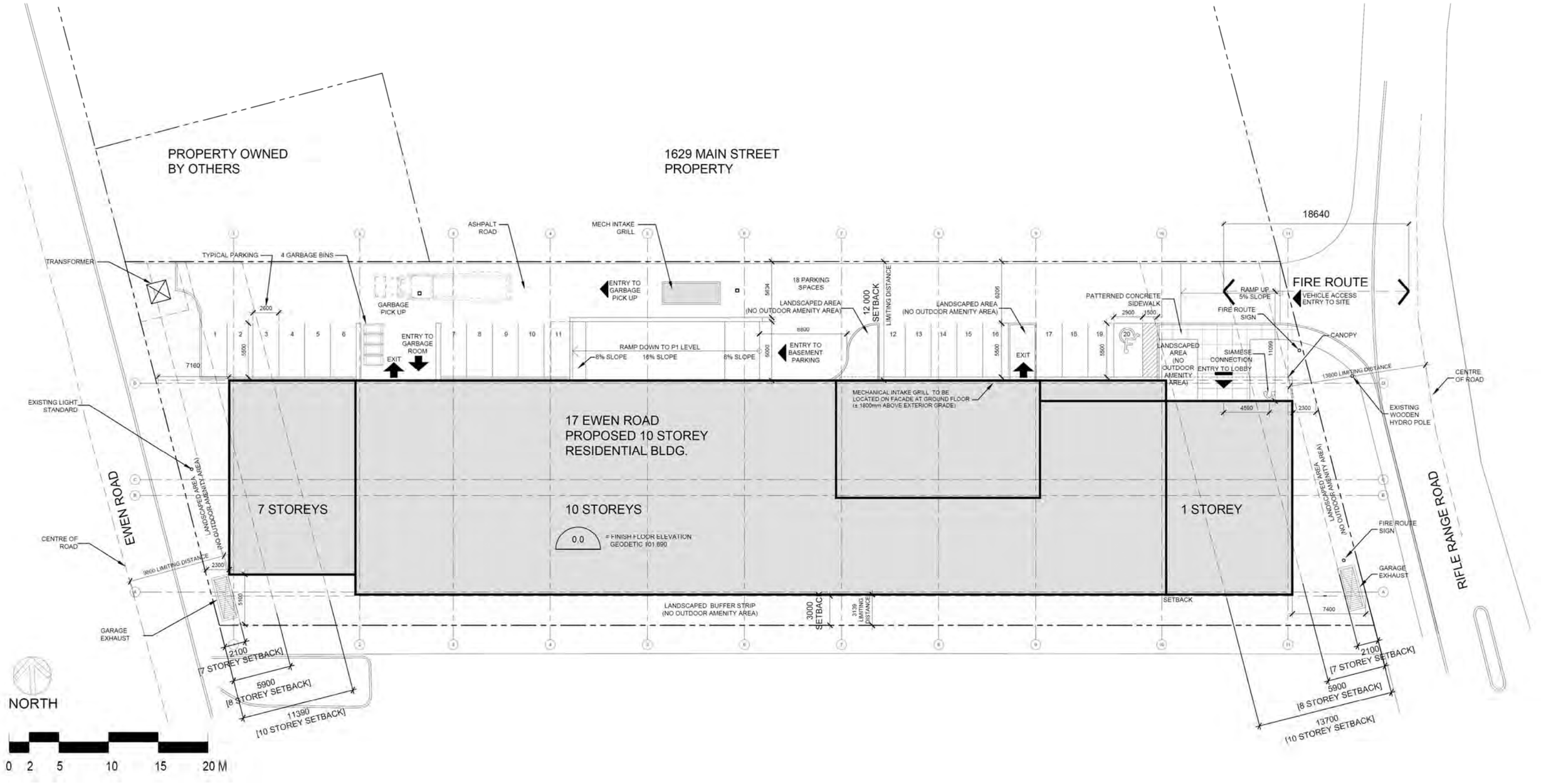


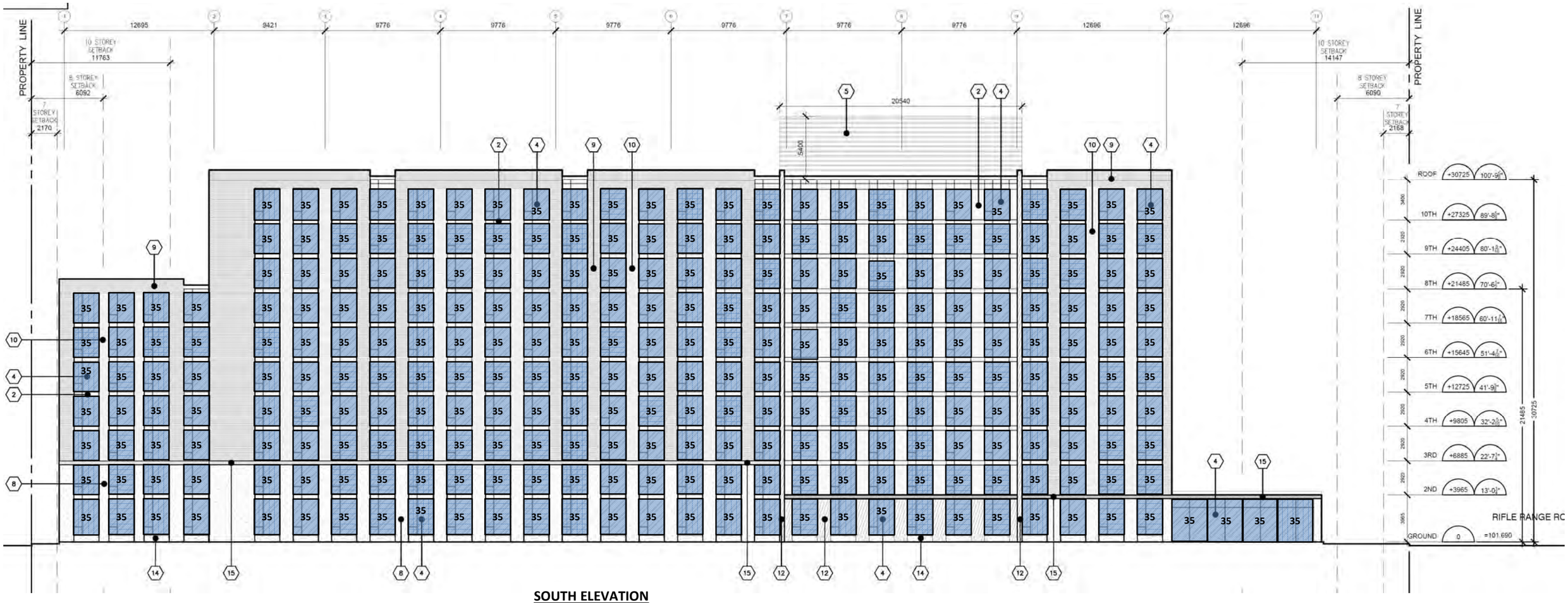
Figure No. **1**

Excerpts From Site Plan

Rise Developments - 17 Ewen Road

Scale: See inset
Date: 16/02/21
File No.: 15-0007
Drawn By: SLP

novus ENVIRONMENTAL



SOUTH ELEVATION

Notes:

- All windows on the Southern Façade must be Noise Buffer Windows with minimum STC 35 exterior panes.

MATERIAL LEGEND

2 GLASS SPANDREL PANEL
4 NON-OPERABLE NOISE BUFFER WINDOW STC 35
5 MECHANICAL PENTHOUSE ARCHITECTURAL LOUVRES
8 GRANITE
9 PRECAST BRICK PANEL (CHARCOAL)
10 PRECAST BRICK PANEL (LIGHT GREY)
12 WOOD EFFECT" PANELS
14 ARCHITECTURAL EXPOSED CONCRETE
15 STANLESS STEEL FASCIA

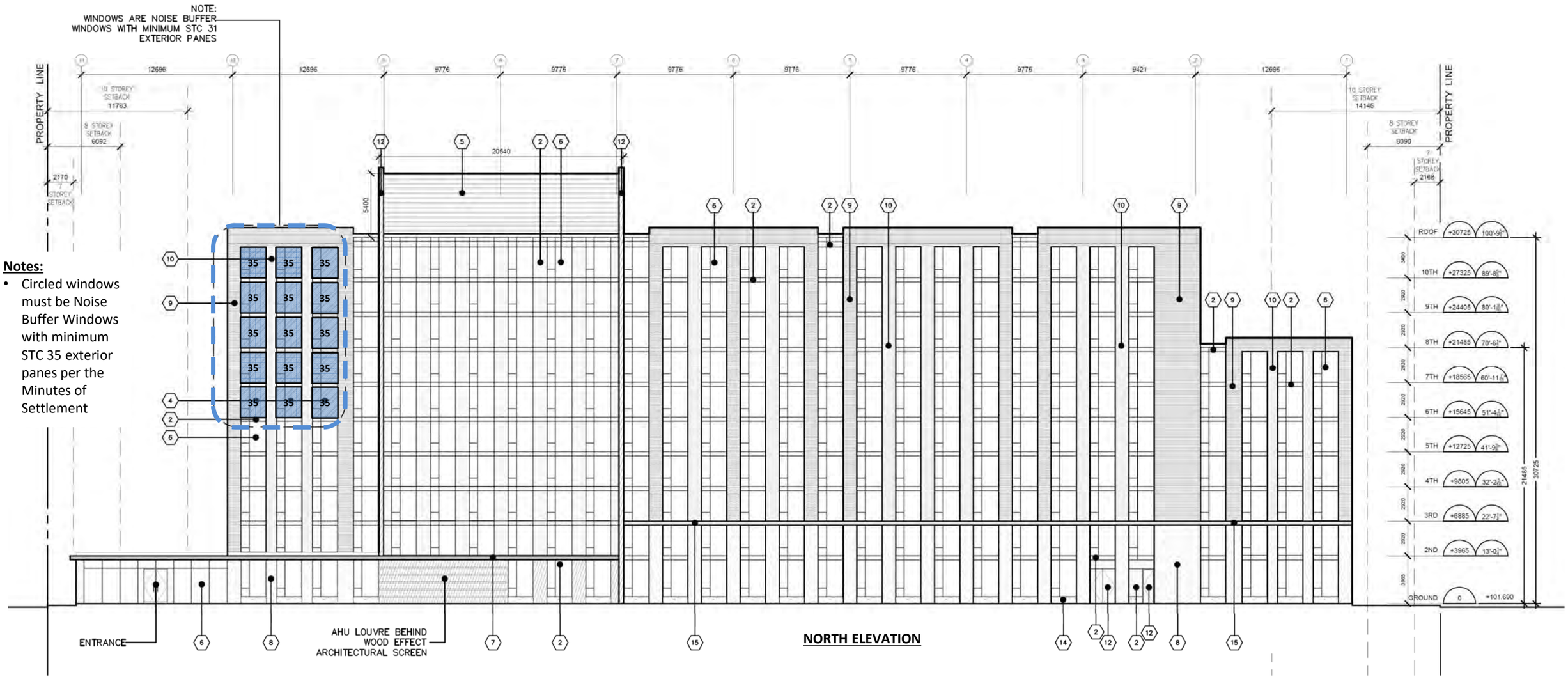
Figure No. **2a**

Building Elevations Showing Locations of Buffer Windows – South Elevation

Rise Developments - 17 Ewen Road

Scale: Approx 1: 300
Date: 16/02/21
File No.: 15-0007
Drawn By: SLP

novus ENVIRONMENTAL



NORTH ELEVATION

Notes:

- Circled windows must be Noise Buffer Windows with minimum STC 35 exterior panes per the Minutes of Settlement

MATERIAL LEGEND

2. GLASS SPANDREL PANEL
4. NON-OPERABLE NOISE BUFFER WINDOW STC 35
5. MECHANICAL PENTHOUSE ARCHITECTURAL LOUVRES
6. NON-OPERABLE WINDOW
7. CANTILEVERED METAL CLAD CANOPY
8. GRANITE
9. PRECAST BRICK PANEL (CHARCOAL)
10. PRECAST BRICK PANEL (LIGHT GREY)
12. WOOD EFFECT" PANELS
14. ARCHITECTURAL EXPOSED CONCRETE
15. STANLESS STEEL FASCIA

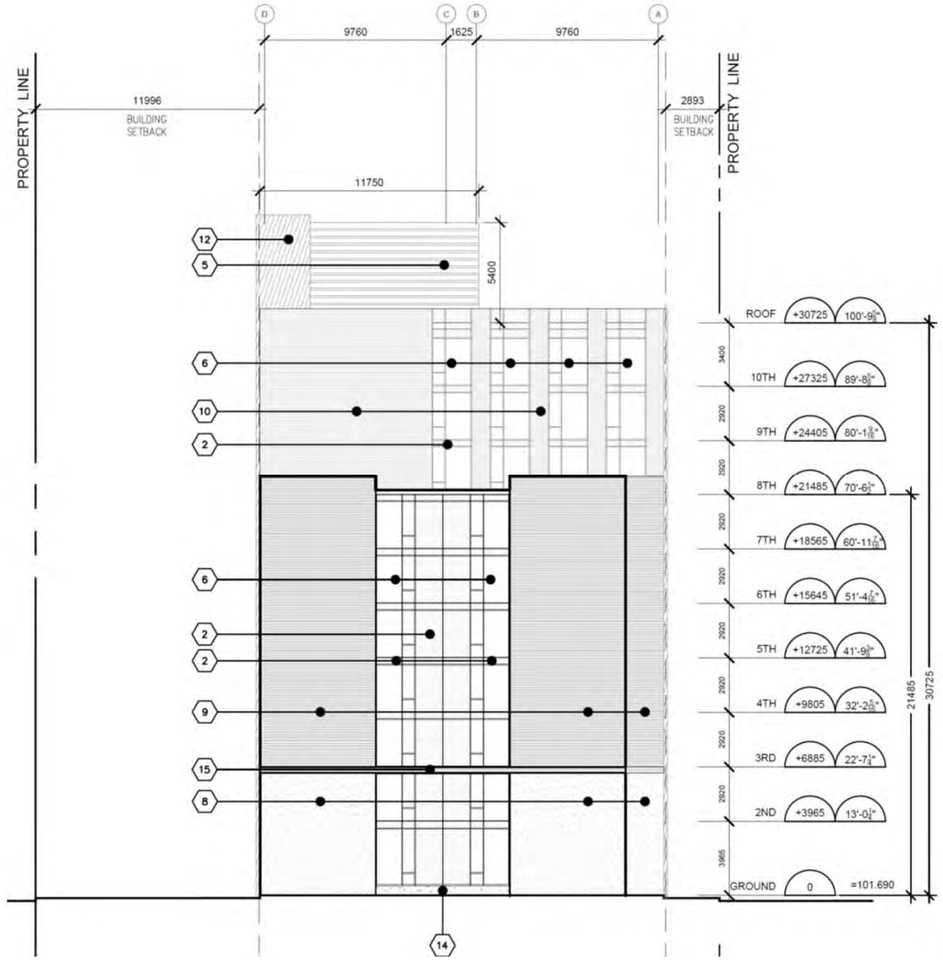
Figure No. **2b**

Building Elevations Showing Locations of Buffer Windows – North Elevation

Rise Developments - 17 Ewen Road

Scale: Approx 1: 300
Date: 16/02/21
File No.: 15-0007
Drawn By: SLP

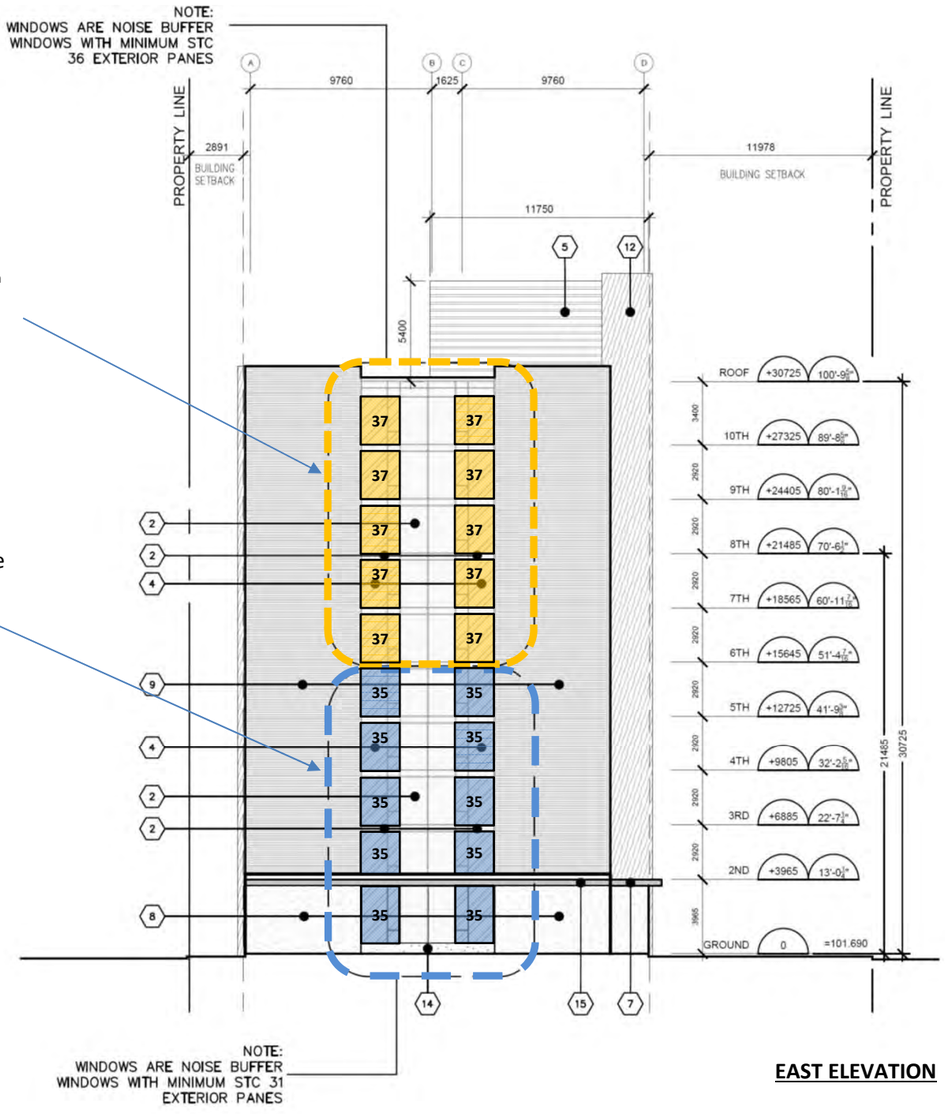
novus ENVIRONMENTAL



WEST ELEVATION

Notes:

- Circled windows here on 6th through 10th floors must be Noise Buffer Windows with minimum STC 37 exterior panes per the Minutes of Settlement
- Circled windows here on 1st through to 5th floors must be Noise Buffer Windows with minimum STC 35 exterior panes per the Minutes of Settlement



EAST ELEVATION

MATERIAL LEGEND

2	GLASS SPANDREL PANEL	
4	NON-OPERABLE NOISE BUFFER WINDOW	STC 35 / STC 37
5	MECHANICAL PENTHOUSE ARCHITECTURAL LOUVRES	
6	NON-OPERABLE WINDOW	
7	CANTILEVERED METAL CLAD CANOPY	
8	GRANITE	
9	PRECAST BRICK PANEL (CHARCOAL)	
10	PRECAST BRICK PANEL (LIGHT GREY)	
12	WOOD EFFECT" PANELS	
14	ARCHITECTURAL EXPOSED CONCRETE	
15	STANLESS STEEL FASCIA	

Figure No. **2c**

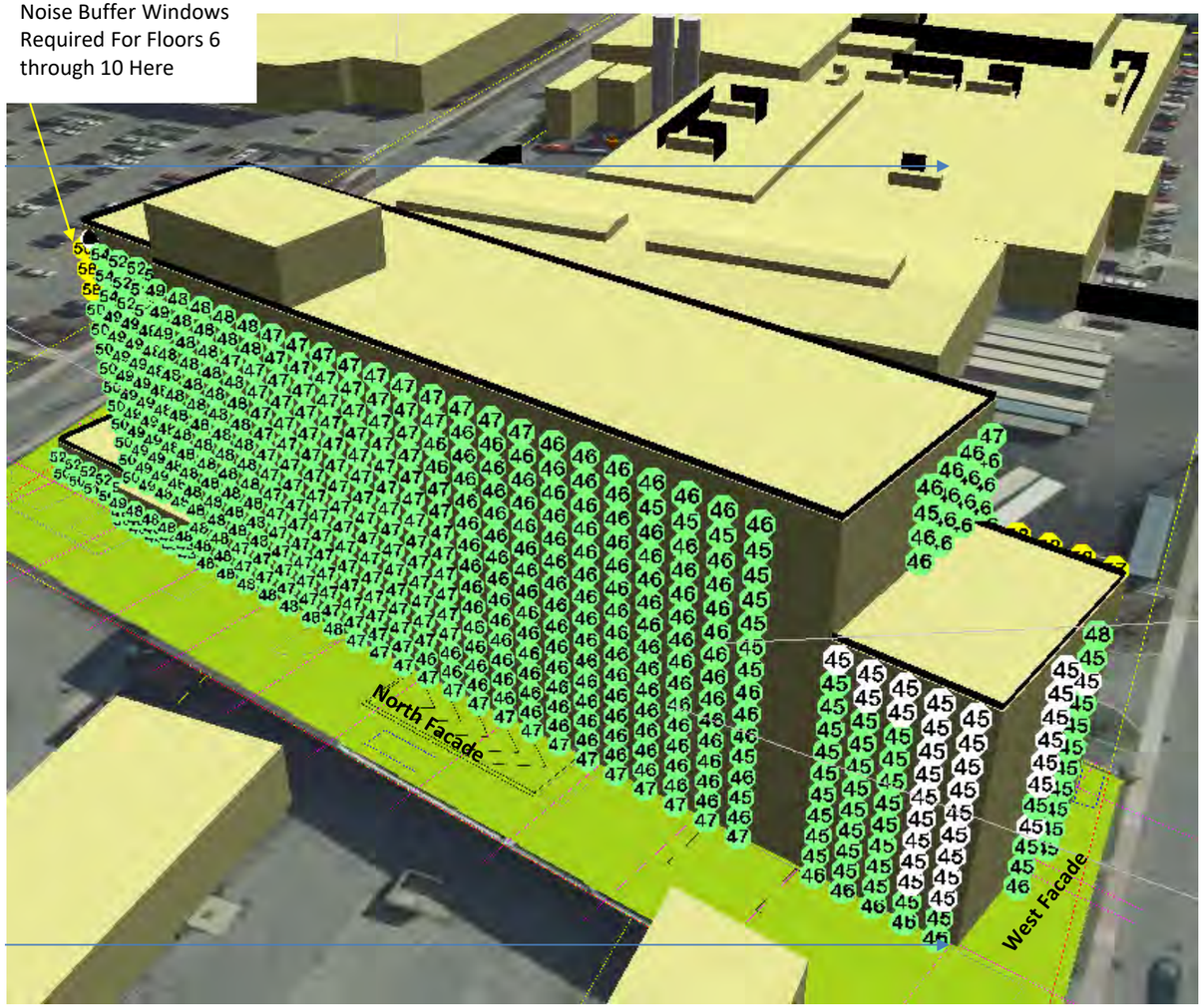
Building Elevations Showing Locations of Buffer Windows – West and East Elevations

Rise Developments - 17 Ewen Road

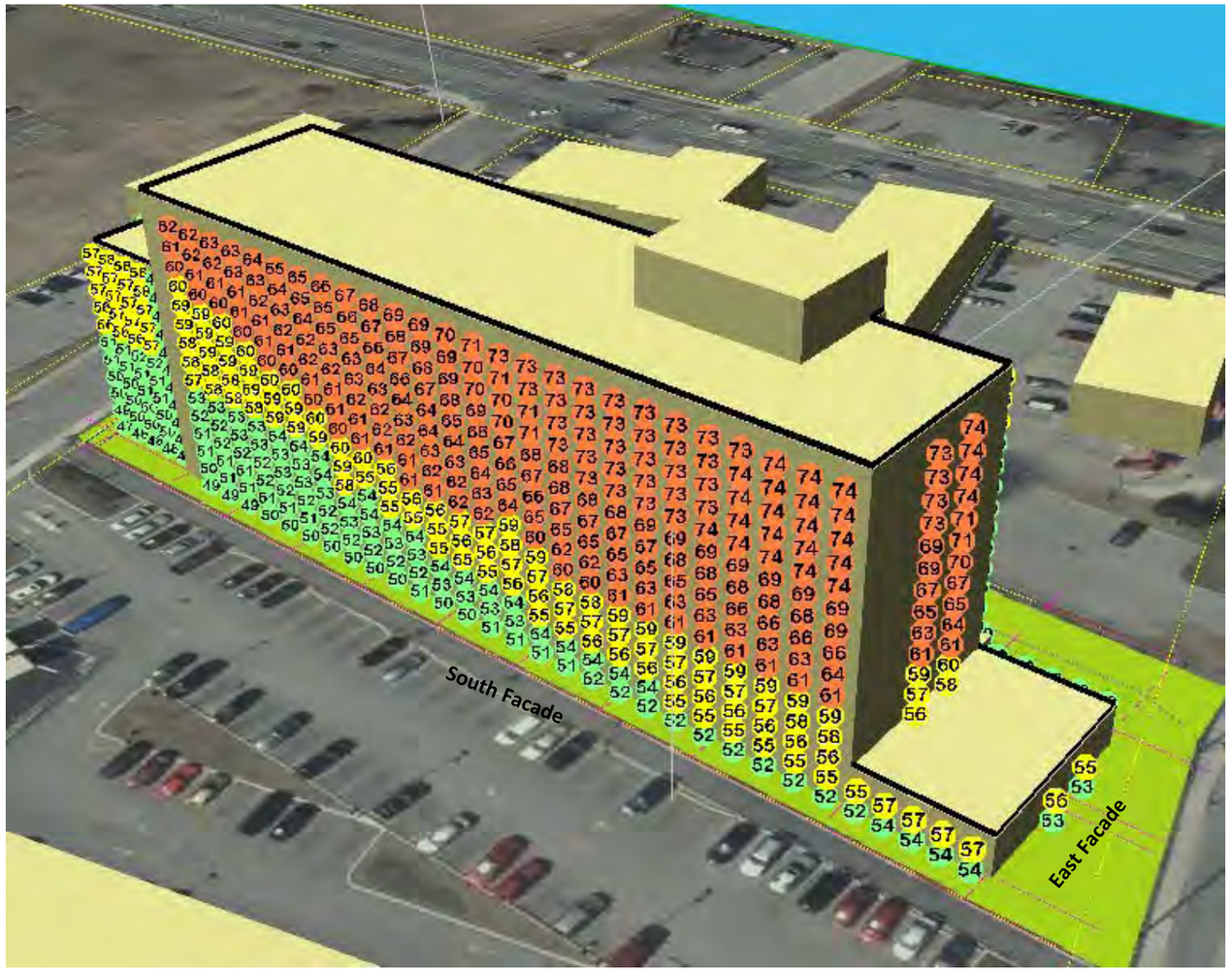
Scale: Approx 1: 300
Date: 16/02/21
File No.: 15-0007
Drawn By: SLP

novus ENVIRONMENTAL

Noise Buffer Windows Required For Floors 6 through 10 Here



View From Northwest



View From Southeast

LEGEND

- >= 45
- >= 55
- >= 60

Noise Buffer Windows Required For All Windows On The Southern And Eastern Facades Per Minutes of Settlement

Non-Impulsive Noise

Figure No. **3**

Updated Noise Modelling Results – Impulsive Noise

Rise Developments - 17 Ewen Road

Scale: n/a
Date: 17/03/13
File No.: 15-0007
Drawn By: SLP

novus ENVIRONMENTAL

View From Northwest

View From Southeast

LEGEND

- >= 45
- >= 55
- >= 60

Noise Buffer Windows Required For All Windows On The Southern And Eastern Facades Per Minutes of Settlement

Figure No. **4**

Updated Noise Modelling Results – Non-Impulsive Noise

Rise Developments - 17 Ewen Road

Scale: n/a
Date: 17/03/13
File No.: 15-0007
Drawn By: SLP

novus ENVIRONMENTAL

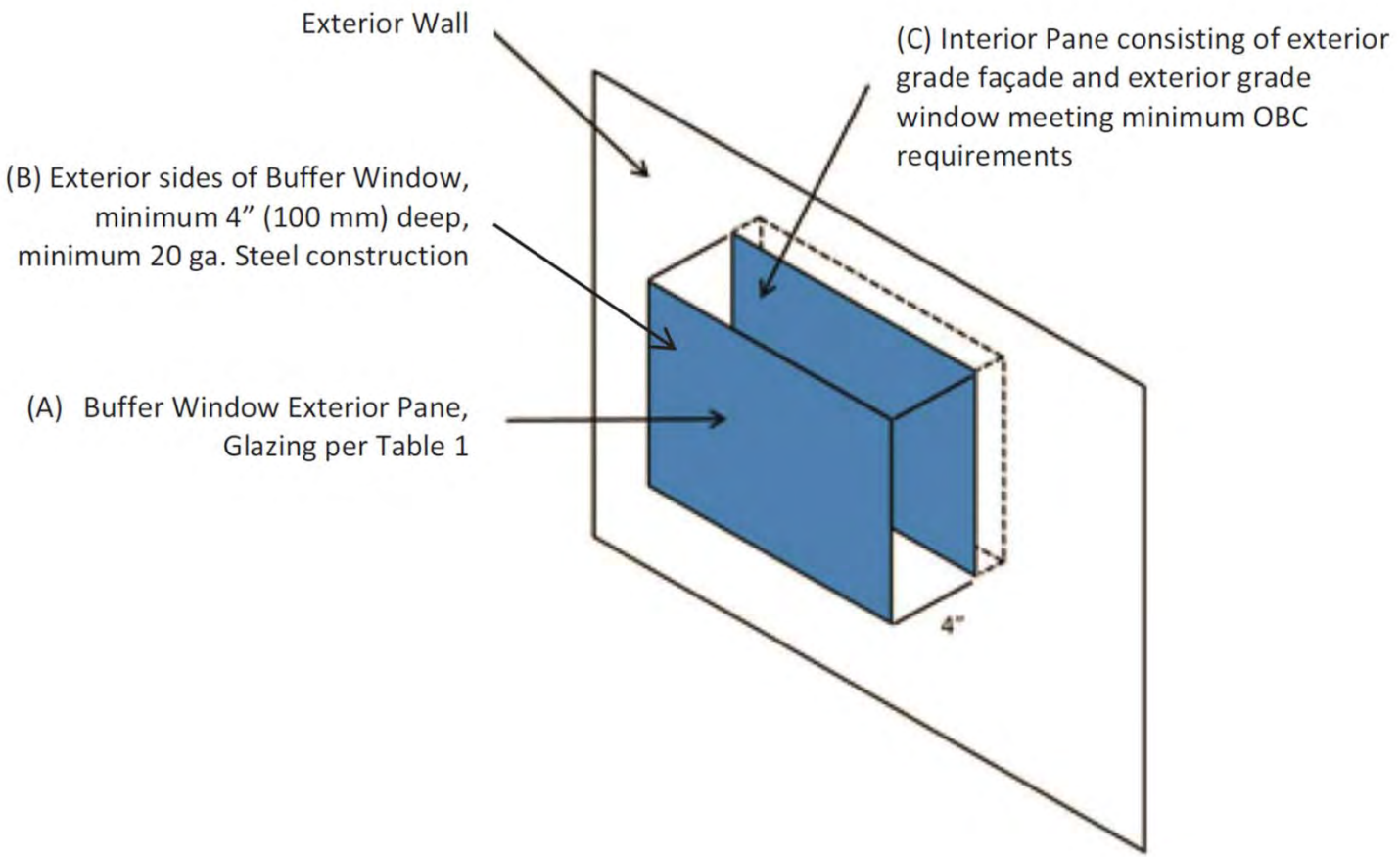


Figure No. **5**

Previous Enclosed Noise Buffer Window Design

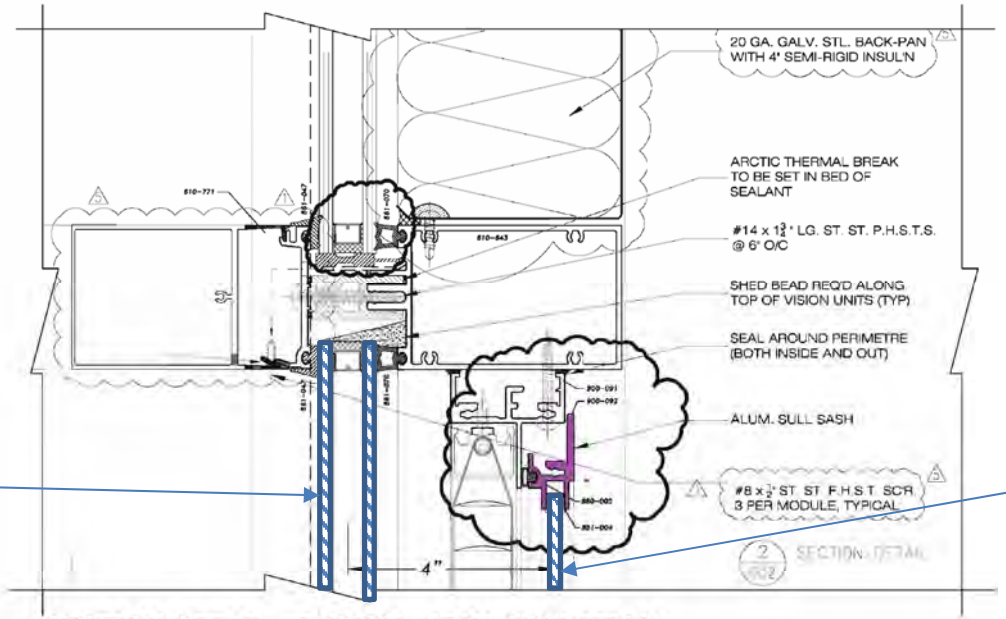
Coletara Developments - 17 Ewen Road

Scale:	n/a
Date:	17/03/13
File No.:	15-0007
Drawn By:	SLP

novus ENVIRONMENTAL

Double-Pane Exterior Buffer Window

Single Pane Interior Sull Sash Window

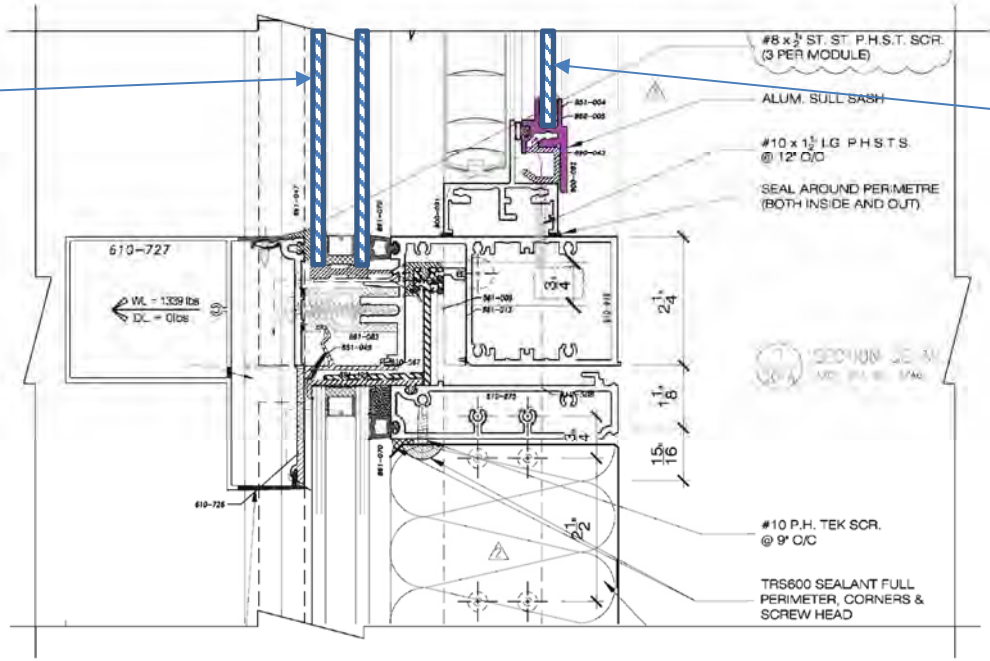


SECTION DETAIL - TYPICAL HEAD CONDITION

Scale: N.T.S.

Double-Pane Exterior Buffer Window

Single Pane Interior Sull Sash Window



SECTION DETAIL - TYPICAL SILL CONDITION

Scale: N.T.S.

novus ENVIRONMENTAL

Scale:	n/a
Date:	17/03/13
File No.:	15-0007
Drawn By:	SLP

Figure No. **6**

Revised Enclosed Noise Buffer Window Design

Coletara Developments – 17 Ewen Road

Attachment A

South Facade, Impulsive

Enclosed Noise Buffer - 4" deep
Sealed

Receiving Room
Interior Window Space

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume	5.25
Width	2.1	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)	10.5
Height	2.5	m high								
Depth	0.1	m deep	2.1	0.1	2.5	11.0	0.2	0.2	0.5	

		Description Comment		Material Selection	Area (^2)	NRC	63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	Sound Absorption 500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	Remaining	151. REF. Glass, 3/32" ordinary window	10.5	0.16	2.57	3.68	2.63	1.89	1.26	0.74	0.42	0.34
	W2	Sides	0	156. REF. Steel	0.5	0.09	0.02	0.03	0.05	0.05	0.05	0.04	0.01	0.05
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	Remaining	209. Steel	0.2	0.48	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.02
	F2		0											
Ceilings:	C1	Ceiling	Remaining	323. Steel	0.2	0.09	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.00
	C2		0											
	C3													
						a	2.61	3.72	2.72	1.98	1.35	0.80	0.44	0.41
						R2	3.38	5.52	3.56	2.40	1.53	0.86	0.46	0.42

Façade Source Data
Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

		5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scenario	Name	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		Incidence Angle		
1	W-C Impulsive South Façade C21	63.3	64.8	71.8	76.5	67.0	64.5	56.8	47.2	78.7	75.2		0 - 90	0	656
2	W-C Impulsive East Façade A21	62.8	63.6	70.6	75.3	65.7	63.1	55.4	45.7	77.5	73.9		60 - 90	3	656
3	W-C Impulsive North Façade C9	57.4	57.2	62.6	65.3	53.2	47.9	37.5	24.2	68.2	63.4		60 - 90	3	654
4										9.0	7.0				
5	W-C Cont South Façade C21	66.3	61.8	60.0	59.7	56.4	51.3	44.1	30.0	69.2	61.1		0 - 90	0	656
6	W-C Cont East Façade A21	64.9	59.0	58.1	58.4	55.0	49.7	42.2	26.0	67.5	59.6		60 - 90	3	656
7	W-C Cont North Façade C9	59.7	53.4	50.0	47.5	42.0	34.2	24.2	5.8	61.2	48.3		60 - 90	3	654
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 1

W-C Impulsive South Façade C21

TL					Area	STC
Material 1	624	Select:	GLASS Saflex 2c: 2-pane, 1/4" - 1/2" AS - 1/4" (sealed) (RAL-TL85-294)	Remaining	4.79	35
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:				
Material 4		Select:				

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	20	25	21	32	38	36	50	54
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**13**	**19**	**20**	**29**	**35**	**35**	**39**	**39**

Sound Pressure Level (dB)

Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA			
	63.3	64.8	71.8	76.5	67	64.5	56.8	47.2	78.7	75.2	<--------	Free Field Sound Level at window	
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56	
	0	0	0	0	0	0	0	0			<--------	Angle of incidence correction per BPN-56	1
Lp1	66.3	67.8	74.8	79.5	70.0	67.5	59.8	50.2	81.7	78.2	<--------	Resulting sound level at façade	2
TL	12.8	18.6	20.0	29.0	35.0	34.7	39.2	39.4					3
													4
Lp2	56.1	50.0	57.2	54.4	40.7	40.8	31.3	21.8	61.2	**53.8**	<--------	Resulting sound level at Enclosed Window	

Receiving Bedroom

Receiving Room

10 ft x 10 ft bedroom

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume
Width	3.0	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)
Height	3.0	m high							
Depth	3.0	m deep	3.0	3.0	3.0	36.0	9.0	9.0	27.0

		Description Comment		Material Selection	Area (^2)	NRC	Sound Absorption 63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	Remaining	151. REF. Glass, 3/32" ordinary window	5.3	0.16	1.29	1.84	1.31	0.95	0.63	0.37	0.21	0.17
	W2	Sides	0	316. REF. Gypsum board, 0.5" thick	31.0	0.07	6.29	8.99	3.10	1.55	1.24	2.17	2.79	2.23
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	Remaining	201. ABS. Carpet 3/8" thick on concrete	9.0	0.21	0.57	0.81	0.72	1.89	2.34	2.43	3.33	2.66
	F2		0											
Ceilings:	C1	Ceiling	Remaining	316. REF. Gypsum board, 0.5" thick	9.0	0.07	1.83	2.61	0.90	0.45	0.36	0.63	0.81	0.65
	C2		0											
	C3													
						a	9.97	14.25	6.03	4.84	4.57	5.60	7.14	5.71
						R2	12.23	19.35	6.79	5.31	4.99	6.24	8.23	6.39

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

		5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scenario	Name	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		Incidence Angle		
1	WINDOW LEVEL FROM PREVIOUS	56.1	50.0	57.2	54.4	40.7	40.8	31.3	21.8	61.2	53.8		0 - 90	0	
2										9.0	7.0				
3										9.0	7.0				
4										9.0	7.0				
5										9.0	7.0				
6										9.0	7.0				
7										9.0	7.0				
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 1

WINDOW LEVEL FROM PREVIOUS

TL				Remaining	Area	STC
Material 1	609	Select:	GLASS Saflex 1a: 1 pane 1/4" (RAL-TL85-169)		4.79	31
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:			0.00	
Material 4		Select:				

GAPS

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	17	24	26	31	34	29	35	39
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**12**	**18**	**23**	**28**	**33**	**29**	**34**	**36**

Sound Pressure Level (dB)

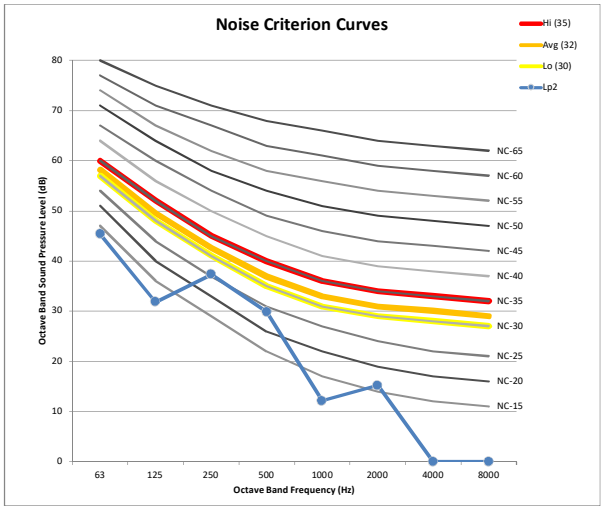
Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		
	56.10561023	50.03257025	57.173162	54.4207901	40.701195	40.849081	31.281314	21.7903157	61.2	53.8	<---------	Free Field Sound Level at window
	3	3	3	3	3	3	3	3			<---------	Façade Correction (per BPN-56
	0	0	0	0	0	0	0	0			<---------	Angle of incidence correction per BPN-56
Lp1	59.1	53.0	60.2	57.4	43.7	43.8	34.3	24.8	64.2	56.8	<---------	Resulting sound level at façade
TL	12.1	18.3	23.0	28.5	32.7	29.0	34.0	36.5				
Lp2	45.4	31.9	37.3	29.9	12.2	15.2	0.0	0.0	46.3	**31.4**	<---------	Resulting sound level Indoors

1
2
3
4

NC	< 15	< 15	**26**	24	< 15	17	< 15	< 15	<--------- NC Level met in each octave band

Highlighted level is NC rating of noise

Target	105. Motel/Motel Individual rooms or suites							
Lo (30)	57	48	41	35	31	29	28	27
Avg (32)	58	50	43	37	33	31	30	29
Hi (35)	60	52	45	40	36	34	33	32



Enclosed Noise Buffer - 4" deep
Sealed

South Facade, Non-Impulsive

Receiving Room

Interior Window Space

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume	5.25
Width	2.1	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)	10.5
Height	2.5	m high								
Depth	0.1	m deep	2.1	0.1	2.5	11.0	0.2	0.2	0.5	

		Description Comment		Material Selection	Area (^2)	NRC	63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	Sound Absorption 500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	*Remaining*	151. REF. Glass, 3/32" ordinary window	10.5	0.16	2.57	3.68	2.63	1.89	1.26	0.74	0.42	0.34
	W2	Sides	0	156. REF. Steel	0.5	0.09	0.02	0.03	0.05	0.05	0.05	0.04	0.01	0.05
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	*Remaining*	209. Steel	0.2	0.48	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.02
	F2		0											
Ceilings:	C1	Ceiling	*Remaining*	323. Steel	0.2	0.09	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.00
	C2		0											
	C3													
						a	2.61	3.72	2.72	1.98	1.35	0.80	0.44	0.41
						R2	3.38	5.52	3.56	2.40	1.53	0.86	0.46	0.42

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

		5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scenario	Name	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		Incidence Angle		
1	W-C Impulsive South Façade C21	63.3	64.8	71.8	76.5	67.0	64.5	56.8	47.2	78.7	75.2		0 - 90	0	656
2	W-C Impulsive East Façade A21	62.8	63.6	70.6	75.3	65.7	63.1	55.4	45.7	77.5	73.9		60 - 90	3	656
3	W-C Impulsive North Façade C9	57.4	57.2	62.6	65.3	53.2	47.9	37.5	24.2	68.2	63.4		60 - 90	3	654
4										9.0	7.0				
5	W-C Cont South Façade C21	66.3	61.8	60.0	59.7	56.4	51.3	44.1	30.0	69.2	61.1		0 - 90	0	656
6	W-C Cont East Façade A21	64.9	59.0	58.1	58.4	55.0	49.7	42.2	26.0	67.5	59.6		60 - 90	3	656
7	W-C Cont North Façade C9	59.7	53.4	50.0	47.5	42.0	34.2	24.2	5.8	61.2	48.3		60 - 90	3	654
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 5

W-C Cont South Façade C21

TL					*Area*	STC
Material 1	624	Select:	GLASS Saflex 2c: 2-pane, 1/4" - 1/2" AS - 1/4" (sealed) (RAL-TL8S-294)	*Remaining*	4.79	35
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:				
Material 4		Select:				

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	20	25	21	32	38	36	50	54
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**13**	**19**	**20**	**29**	**35**	**35**	**39**	**39**

Sound Pressure Level (dB)

Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA			
	66.3	61.8	60	59.7	56.4	51.3	44.1	30	69.2	61.1	<--------	Free Field Sound Level at window	
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56	
	0	0	0	0	0	0	0	0			<--------	Angle of incidence correction per BPN-56	1
Lp1	69.3	64.8	63.0	62.7	59.4	54.3	47.1	33.0	72.2	64.1	<--------	Resulting sound level at façade	2
TL	12.8	18.6	20.0	29.0	35.0	34.7	39.2	39.4					3
													4
Lp2	59.1	47.0	45.4	37.6	30.1	27.6	18.6	4.6	59.6	**41.0**	<--------	Resulting sound level at Enclosed Window	

Receiving Bedroom

Receiving Room

10 ft x 10 ft bedroom

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume
Width	3.0	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)
Height	3.0	m high	3.0	3.0	3.0	36.0	9.0	9.0	27.0
Depth	3.0	m deep							

		Description Comment		Material Selection	Area (^2)	NRC	Sound Absorption 63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	Remaining	151. REF. Glass, 3/32" ordinary window	5.3	0.16	1.29	1.84	1.31	0.95	0.63	0.37	0.21	0.17
	W2	Sides	0	316. REF. Gypsum board, 0.5" thick	31.0	0.07	6.29	8.99	3.10	1.55	1.24	2.17	2.79	2.23
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	Remaining	201. ABS. Carpet 3/8" thick on concrete	9.0	0.21	0.57	0.81	0.72	1.89	2.34	2.43	3.33	2.66
	F2		0											
Ceilings:	C1	Ceiling	Remaining	316. REF. Gypsum board, 0.5" thick	9.0	0.07	1.83	2.61	0.90	0.45	0.36	0.63	0.81	0.65
	C2		0											
	C3													
						a	9.97	14.25	6.03	4.84	4.57	5.60	7.14	5.71
						R2	12.23	19.35	6.79	5.31	4.99	6.24	8.23	6.39

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

Scenario	Name	5 63 Hz	6 125 Hz	7 250 Hz	8 500 Hz	9 1000 Hz	10 2000 Hz	11 4000 Hz	12 8000 Hz	13 dB	14 dBA	15	16 Incidence Angle	17	18
1	WINDOW LEVEL FROM PREVIOUS	59.1	47.0	45.4	37.6	30.1	27.6	18.6	4.6	59.6	41.0		0 - 90	0	
2										9.0	7.0				
3										9.0	7.0				
4										9.0	7.0				
5										9.0	7.0				
6										9.0	7.0				
7										9.0	7.0				
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 1

WINDOW LEVEL FROM PREVIOUS

TL				Remaining	Area	STC
Material 1	609	Select:	GLASS Saflex 1a: 1 pane 1/4" (RAL-TL85-169)		4.79	31
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:			0.00	
Material 4		Select:				

GAPS

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	17	24	26	31	34	29	35	39
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**12**	**18**	**23**	**28**	**33**	**29**	**34**	**36**

Sound Pressure Level (dB)

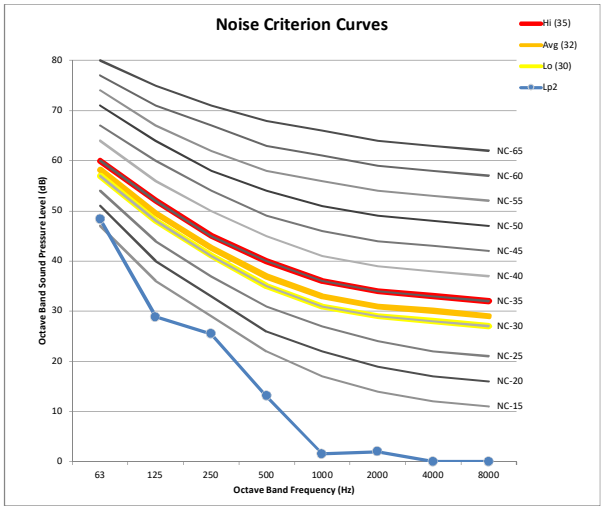
Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		
	59.10561023	47.03257025	45.373162	37.6207901	30.101195	27.649081	18.581314	4.59031567	59.6	41.0	<--------	Free Field Sound Level at window
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56
	0	0	0	0	0	0	0	0			<--------	Angle of incidence correction per BPN-56
Lp1	62.1	50.0	48.4	40.6	33.1	30.6	21.6	7.6	62.6	44.0	<--------	Resulting sound level at façade
TL	12.1	18.3	23.0	28.5	32.7	29.0	34.0	36.5				
Lp2	48.4	28.9	25.5	13.1	1.6	2.0	0.0	0.0	48.4	**23.9**	<--------	Resulting sound level Indoors

1
2
3
4

NC	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
	17	< 15	< 15	< 15	< 15	< 15	< 15	< 15	<-------- NC Level met in each octave band

Highlighted level is NC rating of noise

Target	105. Motel/Motel Individual rooms or suites							
Lo (30)	57	48	41	35	31	29	28	27
Avg (32)	58	50	43	37	33	31	30	29
Hi (35)	60	52	45	40	36	34	33	32



Enclosed Noise Buffer - 4" deep
Sealed

East Facade, Impulsive

Receiving Room

Interior Window Space

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume	5.25
Width	2.1	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)	10.5
Height	2.5	m high								
Depth	0.1	m deep	2.1	0.1	2.5	11.0	0.2	0.2	0.5	

		Description Comment		Material Selection	Area (^2)	NRC	63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	Sound Absorption 500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	*Remaining*	151. REF. Glass, 3/32" ordinary window	10.5	0.16	2.57	3.68	2.63	1.89	1.26	0.74	0.42	0.34
	W2	Sides	0	156. REF. Steel	0.5	0.09	0.02	0.03	0.05	0.05	0.05	0.04	0.01	0.05
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	*Remaining*	209. Steel	0.2	0.48	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.02
	F2		0											
Ceilings:	C1	Ceiling	*Remaining*	323. Steel	0.2	0.09	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.00
	C2		0											
	C3													
						a	2.61	3.72	2.72	1.98	1.35	0.80	0.44	0.41
						R2	3.38	5.52	3.56	2.40	1.53	0.86	0.46	0.42

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

		5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scenario	Name	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		Incidence Angle		
1	W-C Impulsive South Façade C21	63.3	64.8	71.8	76.5	67.0	64.5	56.8	47.2	78.7	75.2		0 - 90	0	656
2	W-C Impulsive East Façade A21	62.8	63.6	70.6	75.3	65.7	63.1	55.4	45.7	77.5	73.9		60 - 90	3	656
3	W-C Impulsive North Façade C9	57.4	57.2	62.6	65.3	53.2	47.9	37.5	24.2	68.2	63.4		60 - 90	3	654
4										9.0	7.0				
5	W-C Cont South Façade C21	66.3	61.8	60.0	59.7	56.4	51.3	44.1	30.0	69.2	61.1		0 - 90	0	656
6	W-C Cont East Façade A21	64.9	59.0	58.1	58.4	55.0	49.7	42.2	26.0	67.5	59.6		60 - 90	3	656
7	W-C Cont North Façade C9	59.7	53.4	50.0	47.5	42.0	34.2	24.2	5.8	61.2	48.3		60 - 90	3	654
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 2

W-C Impulsive East Façade A21

TL					*Area*	STC
Material 1	630	Select:	GLASS Saflex 3b: 2-pane, 1/4" Lam. 3/8" AS - 3/16" (sealed) (RAL-TL85-189)	*Remaining*	4.79	37
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:				
Material 4		Select:				

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	22	27	24	34	39	42	49	53
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**13**	**19**	**22**	**30**	**35**	**38**	**39**	**39**

Sound Pressure Level (dB)

Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA			
	62.8	63.6	70.6	75.3	65.7	63.1	55.4	45.7	77.5	73.9	<--------	Free Field Sound Level at window	
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56	
	3	3	3	3	3	3	3	3			<--------	Angle of incidence correction per BPN-56	1
Lp1	68.8	69.6	76.6	81.3	71.7	69.1	61.4	51.7	83.5	79.9	<--------	Resulting sound level at façade	2
TL	13.0	18.9	21.9	29.8	35.4	37.8	39.1	39.4					3
													4
Lp2	58.3	51.5	57.0	55.4	42.0	39.4	33.0	23.3	62.3	**54.3**	<--------	Resulting sound level at Enclosed Window	

Receiving Bedroom

Receiving Room

10 ft x 10 ft bedroom

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume
Width	3.0	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)
Height	3.0	m high							
Depth	3.0	m deep	3.0	3.0	3.0	36.0	9.0	9.0	27.0

		Description Comment		Material Selection	Area (^2)	NRC	63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	Sound Absorption 500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	Remaining	151. REF. Glass, 3/32" ordinary window	5.3	0.16	1.29	1.84	1.31	0.95	0.63	0.37	0.21	0.17
	W2	Sides	0	316. REF. Gypsum board, 0.5" thick	31.0	0.07	6.29	8.99	3.10	1.55	1.24	2.17	2.79	2.23
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	Remaining	201. ABS. Carpet 3/8" thick on concrete	9.0	0.21	0.57	0.81	0.72	1.89	2.34	2.43	3.33	2.66
	F2		0											
Ceilings:	C1	Ceiling	Remaining	316. REF. Gypsum board, 0.5" thick	9.0	0.07	1.83	2.61	0.90	0.45	0.36	0.63	0.81	0.65
	C2		0											
	C3													
						a	9.97	14.25	6.03	4.84	4.57	5.60	7.14	5.71
						R2	12.23	19.35	6.79	5.31	4.99	6.24	8.23	6.39

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

		5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scenario	Name	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		Incidence Angle		
1	WINDOW LEVEL FROM PREVIOUS	58.3	51.5	57.0	55.4	42.0	39.4	33.0	23.3	62.3	54.3		0 - 90	0	
2										9.0	7.0				
3										9.0	7.0				
4										9.0	7.0				
5										9.0	7.0				
6										9.0	7.0				
7										9.0	7.0				
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 1

WINDOW LEVEL FROM PREVIOUS

TL				Area	STC
Material 1	609	Select:	GLASS Saflex 1a: 1 pane 1/4" (RAL-TL85-169)	Remaining 4.79	31
Material 2	502	Select:	METAL: Aluminum - 1/16"	0 0.46	25
Material 3		Select:			
Material 4		Select:			

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	17	24	26	31	34	29	35	39
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**12**	**18**	**23**	**28**	**33**	**29**	**34**	**36**

Sound Pressure Level (dB)

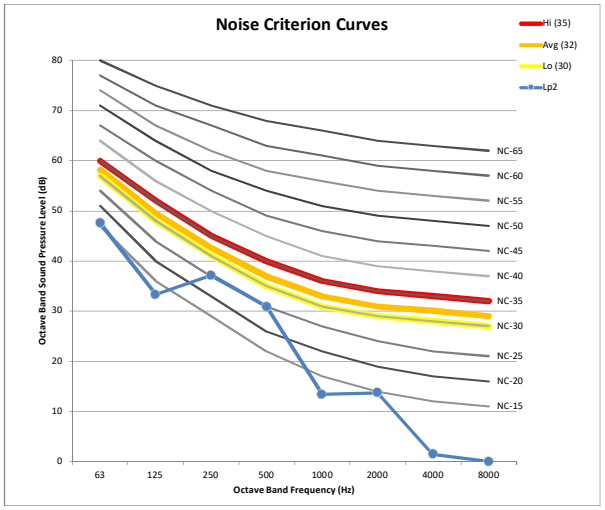
Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		
	58.32075776	51.48687	57.0291698	55.4269061	41.976757	39.390681	32.966382	23.3260166	62.3	54.3	<--------	Free Field Sound Level at window
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56
	0	0	0	0	0	0	0	0			<--------	Angle of incidence correction per BPN-56
Lp1	61.3	54.5	60.0	58.4	45.0	42.4	36.0	26.3	65.3	57.3	<--------	Resulting sound level at façade
TL	12.1	18.3	23.0	28.5	32.7	29.0	34.0	36.5				
Lp2	47.6	33.3	37.2	30.9	13.4	13.8	1.5	0.0	48.2	**31.9**	<--------	Resulting sound level Indoors

1
2
3
4

NC	16	< 15	**26**	25	< 15	< 15	< 15	< 15

<-------- NC Level met in each octave band
Highlighted level is NC rating of noise

Target	105. Motel/Motel Individual rooms or suites							
Lo (30)	57	48	41	35	31	29	28	27
Avg (32)	58	50	43	37	33	31	30	29
Hi (35)	60	52	45	40	36	34	33	32



Enclosed Noise Buffer - 4" deep
Sealed

East Facade, Non-Impulsive

Receiving Room

Interior Window Space

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume	5.25
Width	2.1	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)	10.5
Height	2.5	m high								
Depth	0.1	m deep	2.1	0.1	2.5	11.0	0.2	0.2	0.5	

		Description Comment		Material Selection	Area (^2)	NRC	63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	Sound Absorption 500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	*Remaining*	151. REF. Glass, 3/32" ordinary window	10.5	0.16	2.57	3.68	2.63	1.89	1.26	0.74	0.42	0.34
	W2	Sides	0	156. REF. Steel	0.5	0.09	0.02	0.03	0.05	0.05	0.05	0.04	0.01	0.05
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	*Remaining*	209. Steel	0.2	0.48	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.02
	F2		0											
Ceilings:	C1	Ceiling	*Remaining*	323. Steel	0.2	0.09	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.00
	C2		0											
	C3													
						a	2.61	3.72	2.72	1.98	1.35	0.80	0.44	0.41
						R2	3.38	5.52	3.56	2.40	1.53	0.86	0.46	0.42

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area (^2)
Width	2.1	m wide	
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

Scenario	Name	5 63 Hz	6 125 Hz	7 250 Hz	8 500 Hz	9 1000 Hz	10 2000 Hz	11 4000 Hz	12 8000 Hz	13 dB	14 dBA	15	16 Incidence Angle	17	18
1	W-C Impulsive South Façade C21	63.3	64.8	71.8	76.5	67.0	64.5	56.8	47.2	78.7	75.2		0 - 90	0	656
2	W-C Impulsive East Façade A21	62.8	63.6	70.6	75.3	65.7	63.1	55.4	45.7	77.5	73.9		60 - 90	3	656
3	W-C Impulsive North Façade C9	57.4	57.2	62.6	65.3	53.2	47.9	37.5	24.2	68.2	63.4		60 - 90	3	654
4										9.0	7.0				
5	W-C Cont South Façade C21	66.3	61.8	60.0	59.7	56.4	51.3	44.1	30.0	69.2	61.1		0 - 90	0	656
6	W-C Cont East Façade A21	64.9	59.0	58.1	58.4	55.0	49.7	42.2	26.0	67.5	59.6		60 - 90	3	656
7	W-C Cont North Façade C9	59.7	53.4	50.0	47.5	42.0	34.2	24.2	5.8	61.2	48.3		60 - 90	3	654
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 6

W-C Cont East Façade A21

TL					*Area*	STC
Material 1	630	Select:	GLASS Saflex 3b: 2-pane, 1/4" Lam. 3/8" AS - 3/16" (sealed) (RAL-TL85-189)	*Remaining*	4.79	37
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:				
Material 4		Select:				

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	22	27	24	34	39	42	49	53
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**13**	**19**	**22**	**30**	**35**	**38**	**39**	**39**

Sound Pressure Level (dB)

Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA			
	64.9	59	58.1	58.4	55	49.7	42.2	26	67.5	59.6	<--------	Free Field Sound Level at window	
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56	
	3	3	3	3	3	3	3	3			<--------	Angle of incidence correction per BPN-56	1
Lp1	70.9	65.0	64.1	64.4	61.0	55.7	48.2	32.0	73.5	65.6	<--------	Resulting sound level at façade	2
TL	13.0	18.9	21.9	29.8	35.4	37.8	39.1	39.4					3
													4
Lp2	60.4	46.9	44.5	38.5	31.3	26.0	19.8	3.6	60.7	**41.2**	<--------	Resulting sound level at Enclosed Window	

Receiving Bedroom

Receiving Room

10 ft x 10 ft bedroom

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume
Width	3.0	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)
Height	3.0	m high	3.0	3.0	3.0	36.0	9.0	9.0	27.0
Depth	3.0	m deep							

		Description Comment		Material Selection	Area (^2)	NRC	Sound Absorption 63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	Remaining	151. REF. Glass, 3/32" ordinary window	5.3	0.16	1.29	1.84	1.31	0.95	0.63	0.37	0.21	0.17
	W2	Sides	0	316. REF. Gypsum board, 0.5" thick	31.0	0.07	6.29	8.99	3.10	1.55	1.24	2.17	2.79	2.23
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	Remaining	201. ABS. Carpet 3/8" thick on concrete	9.0	0.21	0.57	0.81	0.72	1.89	2.34	2.43	3.33	2.66
	F2		0											
Ceilings:	C1	Ceiling	Remaining	316. REF. Gypsum board, 0.5" thick	9.0	0.07	1.83	2.61	0.90	0.45	0.36	0.63	0.81	0.65
	C2		0											
	C3													
						a	9.97	14.25	6.03	4.84	4.57	5.60	7.14	5.71
						R2	12.23	19.35	6.79	5.31	4.99	6.24	8.23	6.39

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

		5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scenario	Name	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		Incidence Angle		
1	WINDOW LEVEL FROM PREVIOUS	60.4	46.9	44.5	38.5	31.3	26.0	19.8	3.6	60.7	41.2		0 - 90	0	
2										9.0	7.0				
3										9.0	7.0				
4										9.0	7.0				
5										9.0	7.0				
6										9.0	7.0				
7										9.0	7.0				
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 1

WINDOW LEVEL FROM PREVIOUS

TL				Remaining	Area	STC
Material 1	609	Select:	GLASS Saflex 1a: 1 pane 1/4" (RAL-TL85-169)		4.79	31
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:				
Material 4		Select:				

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	17	24	26	31	34	29	35	39
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**12**	**18**	**23**	**28**	**33**	**29**	**34**	**36**

Sound Pressure Level (dB)

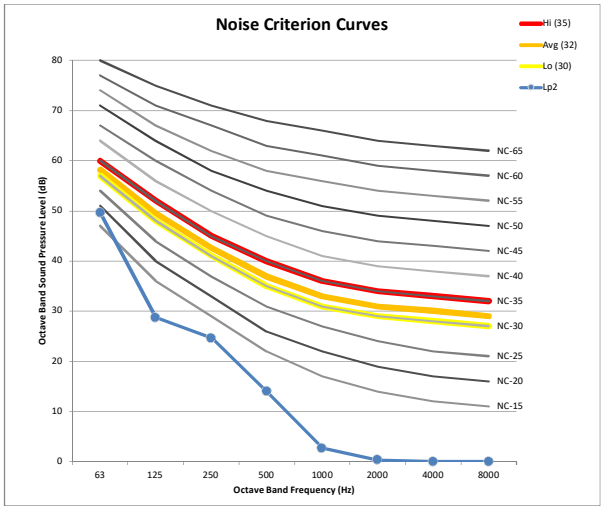
Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		
	60.42075776	46.88687	44.5291698	38.5269061	31.276757	25.990681	19.766382	3.62601664	60.7	41.2	<--------	Free Field Sound Level at window
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56
	0	0	0	0	0	0	0	0			<--------	Angle of incidence correction per BPN-56
Lp1	63.4	49.9	47.5	41.5	34.3	29.0	22.8	6.6	63.7	44.2	<--------	Resulting sound level at façade
TL	12.1	18.3	23.0	28.5	32.7	29.0	34.0	36.5				
Lp2	49.7	28.7	24.7	14.0	2.7	0.4	0.0	0.0	49.7	**24.8**	<--------	Resulting sound level Indoors

1
2
3
4

NC	**19**	< 15	< 15	< 15	< 15	< 15	< 15	< 15

<-------- NC Level met in each octave band
Highlighted level is NC rating of noise

Target	105. Motel/Motel Individual rooms or suites							
Lo (30)	57	48	41	35	31	29	28	27
Avg (32)	58	50	43	37	33	31	30	29
Hi (35)	60	52	45	40	36	34	33	32



Enclosed Noise Buffer - 4" deep
Sealed

North Facade, Impulsive

Receiving Room

Interior Window Space

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume	5.25
Width	2.1	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)	10.5
Height	2.5	m high								
Depth	0.1	m deep	2.1	0.1	2.5	11.0	0.2	0.2	0.5	

		Description Comment		Material Selection	Area (^2)	NRC	63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	Sound Absorption 500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	*Remaining*	151. REF. Glass, 3/32" ordinary window	10.5	0.16	2.57	3.68	2.63	1.89	1.26	0.74	0.42	0.34
	W2	Sides	0	156. REF. Steel	0.5	0.09	0.02	0.03	0.05	0.05	0.05	0.04	0.01	0.05
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	*Remaining*	209. Steel	0.2	0.48	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.02
	F2		0											
Ceilings:	C1	Ceiling	*Remaining*	323. Steel	0.2	0.09	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.00
	C2		0											
	C3													
						a	2.61	3.72	2.72	1.98	1.35	0.80	0.44	0.41
						R2	3.38	5.52	3.56	2.40	1.53	0.86	0.46	0.42

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

		5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scenario	Name	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		Incidence Angle		
1	W-C Impulsive South Façade C21	63.3	64.8	71.8	76.5	67.0	64.5	56.8	47.2	78.7	75.2		0 - 90	0	656
2	W-C Impulsive East Façade A21	62.8	63.6	70.6	75.3	65.7	63.1	55.4	45.7	77.5	73.9		60 - 90	3	656
3	W-C Impulsive North Façade C9	57.4	57.2	62.6	65.3	53.2	47.9	37.5	24.2	68.2	63.4		60 - 90	3	654
4										9.0	7.0				
5	W-C Cont South Façade C21	66.3	61.8	60.0	59.7	56.4	51.3	44.1	30.0	69.2	61.1		0 - 90	0	656
6	W-C Cont East Façade A21	64.9	59.0	58.1	58.4	55.0	49.7	42.2	26.0	67.5	59.6		60 - 90	3	656
7	W-C Cont North Façade C9	59.7	53.4	50.0	47.5	42.0	34.2	24.2	5.8	61.2	48.3		60 - 90	3	654
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 3

W-C Impulsive North Façade C9

TL					*Area*	STC
Material 1	624	Select:	GLASS Saflex 2c: 2-pane, 1/4" - 1/2" AS - 1/4" (sealed) (RAL-TL85-294)	*Remaining*	4.79	35
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:				
Material 4		Select:				

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	20	25	21	32	38	36	50	54
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**13**	**19**	**20**	**29**	**35**	**35**	**39**	**39**

Sound Pressure Level (dB)

Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA			
	57.4	57.2	62.6	65.3	53.2	47.9	37.5	24.2	68.2	63.4	<--------	Free Field Sound Level at window	
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56	
	3	3	3	3	3	3	3	3			<--------	Angle of incidence correction per BPN-56	1
Lp1	63.4	63.2	68.6	71.3	59.2	53.9	43.5	30.2	74.2	69.4	<--------	Resulting sound level at façade	2
TL	12.8	18.6	20.0	29.0	35.0	34.7	39.2	39.4					3
													4
Lp2	53.2	45.4	51.0	46.2	29.9	27.2	15.0	1.8	56.2	**46.1**	<--------	Resulting sound level at Enclosed Window	

Receiving Bedroom

Receiving Room

10 ft x 10 ft bedroom

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume
Width	3.0	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)
Height	3.0	m high	3.0	3.0	3.0	36.0	9.0	9.0	27.0
Depth	3.0	m deep							

		Description Comment		Material Selection	Area (^2)	NRC	Sound Absorption 63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	Remaining	151. REF. Glass, 3/32" ordinary window	5.3	0.16	1.29	1.84	1.31	0.95	0.63	0.37	0.21	0.17
	W2	Sides	0	316. REF. Gypsum board, 0.5" thick	31.0	0.07	6.29	8.99	3.10	1.55	1.24	2.17	2.79	2.23
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	Remaining	201. ABS. Carpet 3/8" thick on concrete	9.0	0.21	0.57	0.81	0.72	1.89	2.34	2.43	3.33	2.66
	F2		0											
Ceilings:	C1	Ceiling	Remaining	316. REF. Gypsum board, 0.5" thick	9.0	0.07	1.83	2.61	0.90	0.45	0.36	0.63	0.81	0.65
	C2		0											
	C3													
						a	9.97	14.25	6.03	4.84	4.57	5.60	7.14	5.71
						R2	12.23	19.35	6.79	5.31	4.99	6.24	8.23	6.39

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

		5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scenario	Name	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		Incidence Angle		
1	WINDOW LEVEL FROM PREVIOUS	53.2	45.4	51.0	46.2	29.9	27.2	15.0	1.8	56.2	46.1		0 - 90	0	
2										9.0	7.0				
3										9.0	7.0				
4										9.0	7.0				
5										9.0	7.0				
6										9.0	7.0				
7										9.0	7.0				
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 1

WINDOW LEVEL FROM PREVIOUS

TL					Area	STC
Material 1	609	Select:	GLASS Saflex 1a: 1 pane 1/4" (RAL-TL85-169)	Remaining	4.79	31
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:			0.00	
Material 4		Select:				

GAPS

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	17	24	26	31	34	29	35	39
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**12**	**18**	**23**	**28**	**33**	**29**	**34**	**36**

Sound Pressure Level (dB)

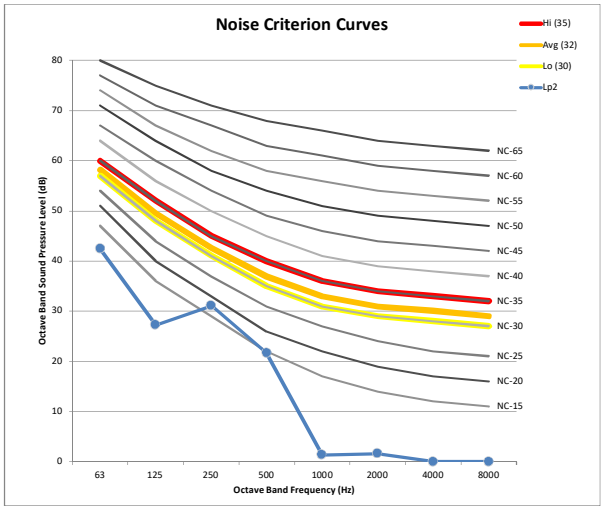
Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		
	53.20561023	45.43257025	50.973162	46.2207901	29.901195	27.249081	14.981314	1.79031567	56.2	46.1	<--------	Free Field Sound Level at window
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56
	0	0	0	0	0	0	0	0			<--------	Angle of incidence correction per BPN-56
Lp1	56.2	48.4	54.0	49.2	32.9	30.2	18.0	4.8	59.2	49.1	<--------	Resulting sound level at façade
TL	12.1	18.3	23.0	28.5	32.7	29.0	34.0	36.5				
Lp2	42.5	27.3	31.1	21.7	1.4	1.6	0.0	0.0	42.9	**24.9**	<--------	Resulting sound level Indoors

1
2
3
4

NC	< 15	< 15	**18**	< 15	< 15	< 15	< 15	< 15

<-------- NC Level met in each octave band
Highlighted level is NC rating of noise

Target	105. Motel/Motel Individual rooms or suites							
Lo (30)	57	48	41	35	31	29	28	27
Avg (32)	58	50	43	37	33	31	30	29
Hi (35)	60	52	45	40	36	34	33	32



Enclosed Noise Buffer - 4" deep
Sealed

North Facade, Non-Impulsive

Receiving Room

Interior Window Space

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume	5.25
Width	2.1	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)	10.5
Height	2.5	m high								
Depth	0.1	m deep	2.1	0.1	2.5	11.0	0.2	0.2	0.5	

		Description Comment		Material Selection	Area (^2)	NRC	63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	Sound Absorption 500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	*Remaining*	151. REF. Glass, 3/32" ordinary window	10.5	0.16	2.57	3.68	2.63	1.89	1.26	0.74	0.42	0.34
	W2	Sides	0	156. REF. Steel	0.5	0.09	0.02	0.03	0.05	0.05	0.05	0.04	0.01	0.05
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	*Remaining*	209. Steel	0.2	0.48	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.02
	F2		0											
Ceilings:	C1	Ceiling	*Remaining*	323. Steel	0.2	0.09	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.00
	C2		0											
	C3													
						a	2.61	3.72	2.72	1.98	1.35	0.80	0.44	0.41
						R2	3.38	5.52	3.56	2.40	1.53	0.86	0.46	0.42

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

		5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scenario	Name	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		Incidence Angle		
1	W-C Impulsive South Façade C21	63.3	64.8	71.8	76.5	67.0	64.5	56.8	47.2	78.7	75.2		0 - 90	0	656
2	W-C Impulsive East Façade A21	62.8	63.6	70.6	75.3	65.7	63.1	55.4	45.7	77.5	73.9		60 - 90	3	656
3	W-C Impulsive North Façade C9	57.4	57.2	62.6	65.3	53.2	47.9	37.5	24.2	68.2	63.4		60 - 90	3	654
4										9.0	7.0				
5	W-C Cont South Façade C21	66.3	61.8	60.0	59.7	56.4	51.3	44.1	30.0	69.2	61.1		0 - 90	0	656
6	W-C Cont East Façade A21	64.9	59.0	58.1	58.4	55.0	49.7	42.2	26.0	67.5	59.6		60 - 90	3	656
7	W-C Cont North Façade C9	59.7	53.4	50.0	47.5	42.0	34.2	24.2	5.8	61.2	48.3		60 - 90	3	654
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 7

W-C Cont North Façade C9

TL					*Area*	STC
Material 1	624	Select:	GLASS Saflex 2c: 2-pane, 1/4" - 1/2" AS - 1/4" (sealed) (RAL-TL8S-294)	*Remaining*	4.79	35
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:				
Material 4		Select:				

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	20	25	21	32	38	36	50	54
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**13**	**19**	**20**	**29**	**35**	**35**	**39**	**39**

Sound Pressure Level (dB)

Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA			
	59.7	53.4	50	47.5	42	34.2	24.2	5.8	61.2	48.3	<--------	Free Field Sound Level at window	
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56	
	3	3	3	3	3	3	3	3			<--------	Angle of incidence correction per BPN-56	1
Lp1	65.7	59.4	56.0	53.5	48.0	40.2	30.2	11.8	67.2	54.3	<--------	Resulting sound level at façade	2
TL	12.8	18.6	20.0	29.0	35.0	34.7	39.2	39.4					3
													4
Lp2	55.5	41.6	38.4	28.4	18.7	13.5	1.7	0.0	55.8	**34.1**	<--------	Resulting sound level at Enclosed Window	

Receiving Bedroom

Receiving Room

10 ft x 10 ft bedroom

			Length	Length	Vertical Height	Wall Area	Floor Area	Ceiling Area	Room Volume
Width	3.0	m wide	()	()	()	(^2)	(^2)	(^2)	(^3)
Height	3.0	m high	3.0	3.0	3.0	36.0	9.0	9.0	27.0
Depth	3.0	m deep							

		Description Comment		Material Selection	Area (^2)	NRC	Sound Absorption 63 Hz (sabins)	125 Hz (sabins)	250 Hz (sabins)	500 Hz (sabins)	1000 Hz (sabins)	2000 Hz (sabins)	4000 Hz (sabins)	8000 Hz (sabins)
Walls:	W1	Interior Window	Remaining	151. REF. Glass, 3/32" ordinary window	5.3	0.16	1.29	1.84	1.31	0.95	0.63	0.37	0.21	0.17
	W2	Sides	0	316. REF. Gypsum board, 0.5" thick	31.0	0.07	6.29	8.99	3.10	1.55	1.24	2.17	2.79	2.23
	W3													
	W4													
	W5													
	W6													
Floors:	F1	Floor	Remaining	201. ABS. Carpet 3/8" thick on concrete	9.0	0.21	0.57	0.81	0.72	1.89	2.34	2.43	3.33	2.66
	F2		0											
Ceilings:	C1	Ceiling	Remaining	316. REF. Gypsum board, 0.5" thick	9.0	0.07	1.83	2.61	0.90	0.45	0.36	0.63	0.81	0.65
	C2		0											
	C3													
						a	9.97	14.25	6.03	4.84	4.57	5.60	7.14	5.71
						R2	12.23	19.35	6.79	5.31	4.99	6.24	8.23	6.39

Façade Source Data

Mondelez Operations

Size of Exposed Façade

			Area
Width	2.1	m wide	(^2)
Height	2.5	m high	5.3

FREE FIELD SOUND LEVEL

Scenario	Name	5 63 Hz	6 125 Hz	7 250 Hz	8 500 Hz	9 1000 Hz	10 2000 Hz	11 4000 Hz	12 8000 Hz	13 dB	14 dBA	15	16 Incidence Angle	17	18
1	WINDOW LEVEL FROM PREVIOUS	55.5	41.6	38.4	28.4	18.7	13.5	1.7	0.0	55.8	34.1		0 - 90	0	
2										9.0	7.0				
3										9.0	7.0				
4										9.0	7.0				
5										9.0	7.0				
6										9.0	7.0				
7										9.0	7.0				
8										9.0	7.0				

Calculation

Composite?: Y

Use Outdoor Sound Level Scenario: 1

WINDOW LEVEL FROM PREVIOUS

TL				Remaining	Area	STC
Material 1	609	Select:	GLASS Saflex 1a: 1 pane 1/4" (RAL-TL85-169)		4.79	31
Material 2	502	Select:	METAL: Aluminum - 1/16"	0	0.46	25
Material 3		Select:			0.00	
Material 4		Select:				

GAPS

Transmission Loss (dB)

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Material 1	17	24	26	31	34	29	35	39
Material 2	3	9	15	21	27	29	29	29
Material 3	0	0	0	0	0	0	0	0
Material 4	0	0	0	0	0	0	0	0
Composite	**12**	**18**	**23**	**28**	**33**	**29**	**34**	**36**

Sound Pressure Level (dB)

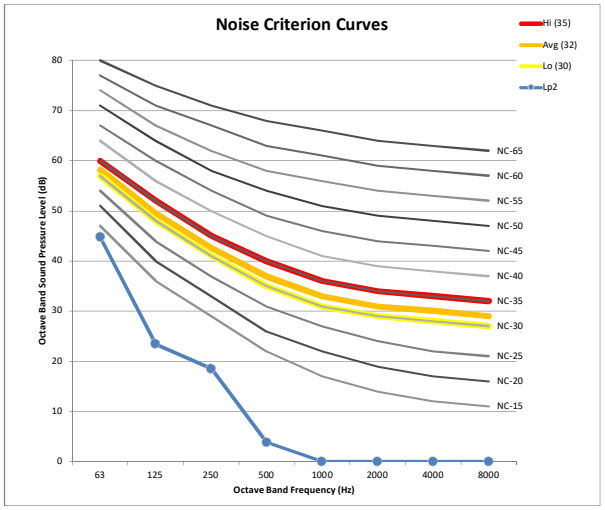
Summary	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB	dBA		
	55.50561023	41.63257025	38.373162	28.4207901	18.701195	13.549081	1.6813142	0	55.8	34.1	<--------	Free Field Sound Level at window
	3	3	3	3	3	3	3	3			<--------	Façade Correction (per BPN-56
	0	0	0	0	0	0	0	0			<--------	Angle of incidence correction per BPN-56
Lp1	58.5	44.6	41.4	31.4	21.7	16.5	4.7	3.0	58.8	37.1	<--------	Resulting sound level at façade
TL	12.1	18.3	23.0	28.5	32.7	29.0	34.0	36.5				
Lp2	44.8	23.5	18.5	3.9	0.0	0.0	0.0	0.0	44.8	**19.7**	<--------	Resulting sound level Indoors

1
2
3
4

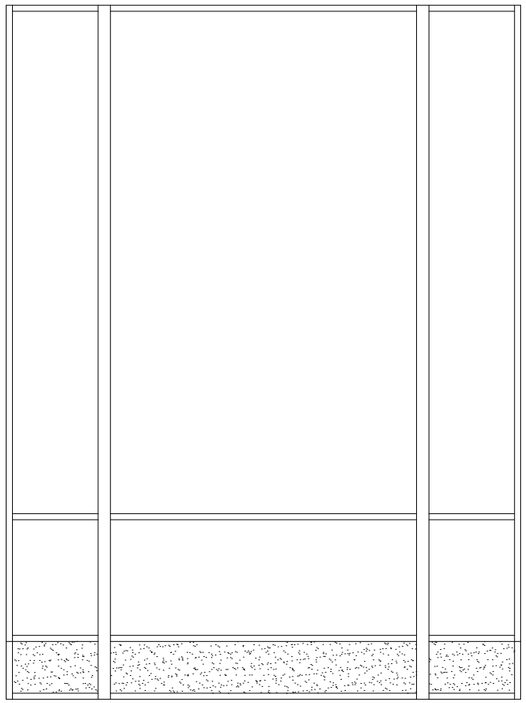
NC	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15

<-------- NC Level met in each octave band
Highlighted level is NC rating of noise

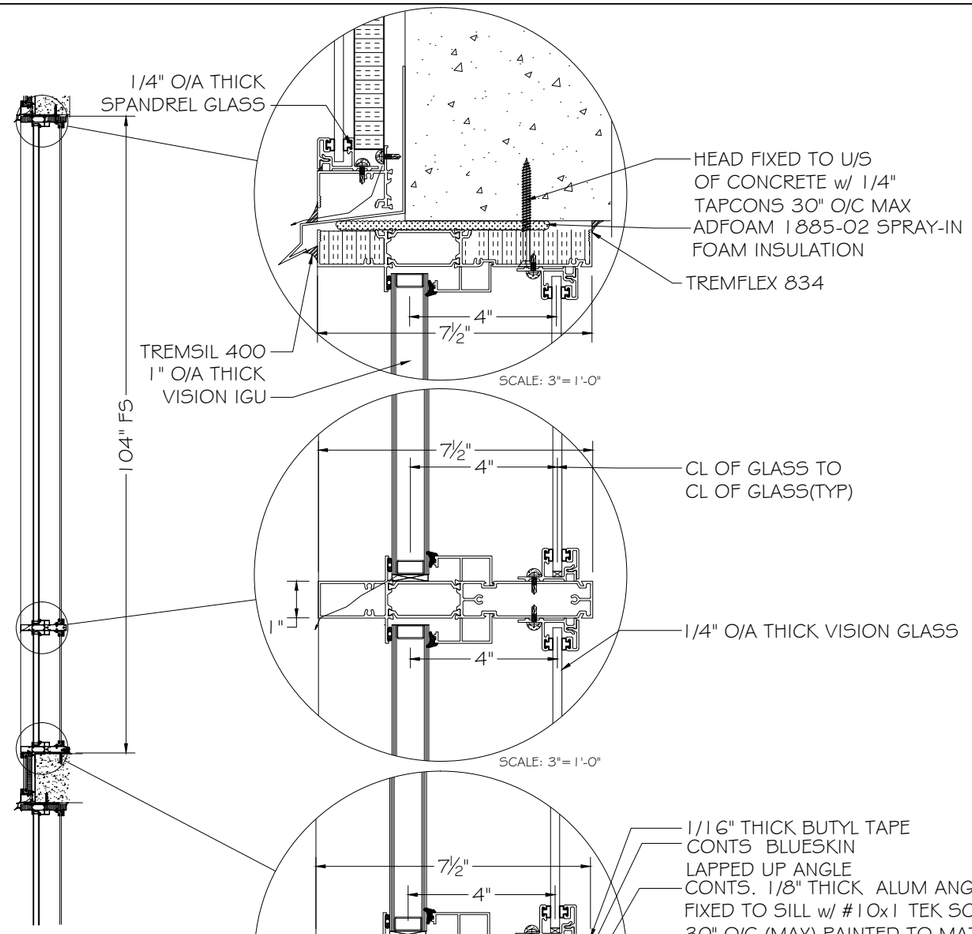
Target	105. Motel/Motel Individual rooms or suites							
Lo (30)	57	48	41	35	31	29	28	27
Avg (32)	58	50	43	37	33	31	30	29
Hi (35)	60	52	45	40	36	34	33	32



Final Window Design

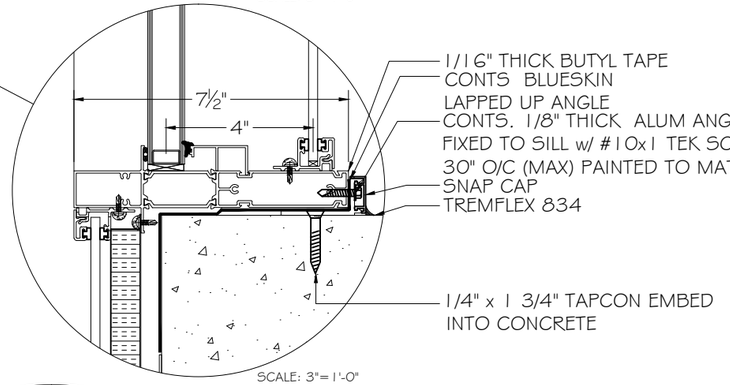


1 / WS1 TYPICAL WINDOW ELEVATION (5875 SERIES)
SCALE: 1/2"=1'-0"

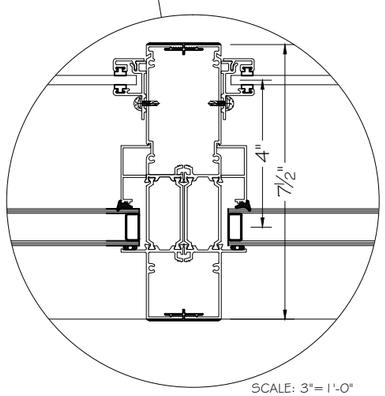


SCALE: 3"=1'-0"

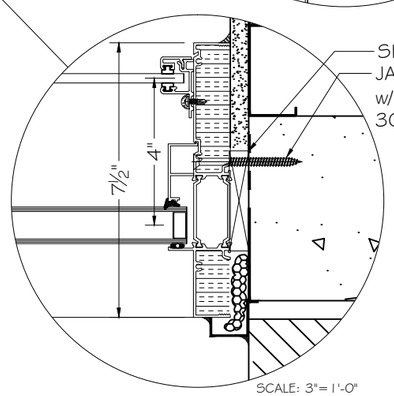
SCALE: 3"=1'-0"



SCALE: 3"=1'-0"



SCALE: 3"=1'-0"



SCALE: 3"=1'-0"

REV	DATE	ISSUE OR REVISION

ENGINEER SEAL

NORSTAR WINDOWS & DOORS LTD.
17 EWEN ROAD
HAMILTON, ON.

BYPASS SPANDREL and SULL SASH DETAILS (option A)

ARCHITECT			CONTRACTOR	
			COLETARA	
BY	JOB #	DATE	SCALE	DWG No
EB		4.25 2017	AS SHOWN	WS1