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JANUARY 29, 2026

**To:** Municipal Planning Department / Chief Building Official  
Township of South Glengarry

**Subject:** *Engineering Review Letter – Sound Transmission and Acoustic Mitigation Measures*

**Proposed Indoor Shooting Range – Arcane Defense**

Dear Municipal Planner and Chief Building Official

Thank you for your feedback regarding the initial engineering review letter for the proposed indoor shooting range at Part Lot 8, Concession 9, near the intersection of 4th Line Road and Concession 10. This revised letter provides a detailed summary of the acoustic assessment, explains the mitigation of potential impacts to surrounding land uses, and specifically addresses concerns related to the nearby residence at 21914 Concession Road 10, located less than 100 meters from the proposed facility.

The indoor shooting range is designed using a “box-within-a-box” construction strategy to achieve extreme airborne noise and vibration isolation, with the primary firing range enclosure structurally and acoustically decoupled from the surrounding building. The inner shell incorporates the **Action Target PEPP panels** for indoor shooting range assembly, including ballistic wall systems and integrated acoustic absorption panels achieving Noise Reduction Coefficient (NRC) values **0.90**, significantly reducing reverberation and reflected impulse noise within the range. (see attached) This inner enclosure is isolated from the outer structure through resilient connections and air gaps to limit structure-borne transmission. The exterior building envelope consists of 250mm concrete masonry block (CMU) construction combined with continuous exterior mineral wool insulation, providing a composite Sound Transmission Class (STC) rating of approximately **50** for an equivalent reduction of **50 dBA**.

The STC may be considered to represent (roughly) the amount by which sound levels are reduced. (refer to *City of Vancouver Noise Control Manual – Section 6.5.4*)

Together, the high-absorption interior treatments, mass-loaded exterior walls, and decoupled assemblies are designed to attenuate peak impulse noise levels generated by firearm discharge, on the order of **148 dBA** at the firing line, to **14.8 dBA** outside of the firing range and lower at the building exterior, ensuring compliance with stringent environmental noise criteria and minimizing off-site acoustic impact.

## 1. Summary of Acoustic Assessment

The proposed indoor shooting range is designed with the following key acoustic mitigation features:

### Exterior Building Envelope

- Wall Construction: Reinforced concrete masonry unit (CMU) walls, 250 mm thick, with acoustic sealant and no penetrations below ceiling height.
- Roof Assembly: Pre Engineering wood trusses with densepack cellulose
- Sound Transmission Class (STC) Rating:  $STC \geq 60$  (exterior walls).
- Sound Transmission Class (STC) Rating:  $STC \geq 60$  (roof).

### Interior "Box" (Shooting Range Walls)

- Wall Construction: Reinforced concrete masonry unit (CMU) walls, 200 mm thick
- Ceiling Construction: Structural joists with suspended gypsum ceiling
- Interior Acoustic Treatments: Ballistic-rated acoustic panels and sound-absorbing materials ( $NRC \geq 0.90$ ) to control reverberation and reduce reflected noise energy. (Walls and Ceilings) (*refer to Figure 1*)

# PEPP

## PEPP PANELS FOR SOUND ABATEMENT

PEPP is a cleanable acoustic panel that can be attached directly to range wall and ceiling surfaces for attractive and effective sound control.

### Durable

PEPP can be used both indoor and outdoor. It is moisture-, impact-, bacteria-, and fungi-resistant. It is also resilient to oil, chemicals, flames, and sagging.

### High Performance

PEPP is Class A fire-rated per ASTM E84 and also has high STC and NRC ratings. NRC of 2" PEPP with the 1" cotton backing is .90. PEPP also has a SRT of 13.

### Configuration

Can be installed on both range wall and ceiling surfaces.

### Wipe-able

The non-fibrous and non-abrasive lightweight surface does not contain fiberglass and is easily cleanable.

### Strong

This sound-silencing material is resilient and flexible. PEPP is durable, tackable, and is made of a strong rigid material that can capture rounds without ricochet or splatter.

Figure 1

### Additional Mitigation Measures

- Doors and Vestibules: Double-door sound-lock vestibules at all firing area entrances, with gasketed and sealed assemblies ( $STC \geq 55$ ).
- Ventilation System: Duct silencers and vibration isolation to prevent structure-borne sound transmission.
- Site Layout: The building is oriented and landscaped to further minimize noise propagation toward nearby residences.

## 2. Impact on Nearby Residence (21914 Concession Road 10)

The proposed design ensures that noise emissions from the indoor shooting range will not adversely impact the nearby residence. Here's how:

- **Noise Attenuation:** The "box within a box" design, combined with the high STC ratings of the exterior and interior walls, ensures that firearm noise is contained and attenuated to levels well below typical municipal thresholds. Based on standard acoustic calculations for similar facilities, the predicted exterior noise level at the property line, including the location of 21914 Concession Road 10, is expected to be well below 45 dBA (daytime) and 40 dBA (nighttime) (*refer to Figure 2*), in compliance with NPC-300 and the Township's noise by-laws. These levels are conservative estimates and will be verified through detailed modeling during the design phase. (*refer to figure 3*)
- **Comparison to Ambient Noise:** Even without field measurements, the proposed design ensures that operational noise will be indistinguishable from typical rural ambient noise (e.g., farm equipment, moderate traffic). The noise generated from the shooting range will be lower than common rural activities and will not disrupt the quiet character of the area.
- **Regulatory Compliance:** The design complies with:
  - Ontario Building Code (OBC) sound transmission requirements.
  - Ministry of the Environment, Conservation and Parks (MECP) Environmental Noise Guidelines (NPC-300).
  - Township of South Glengarry Official Plan and Zoning By-law provisions for noise and land use compatibility.

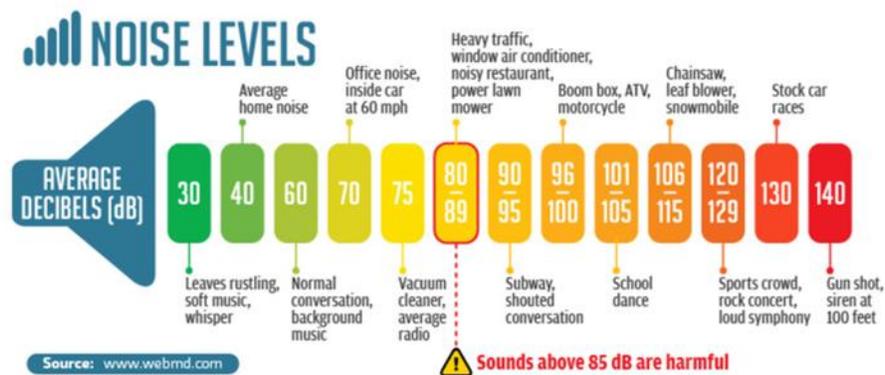


Figure 2

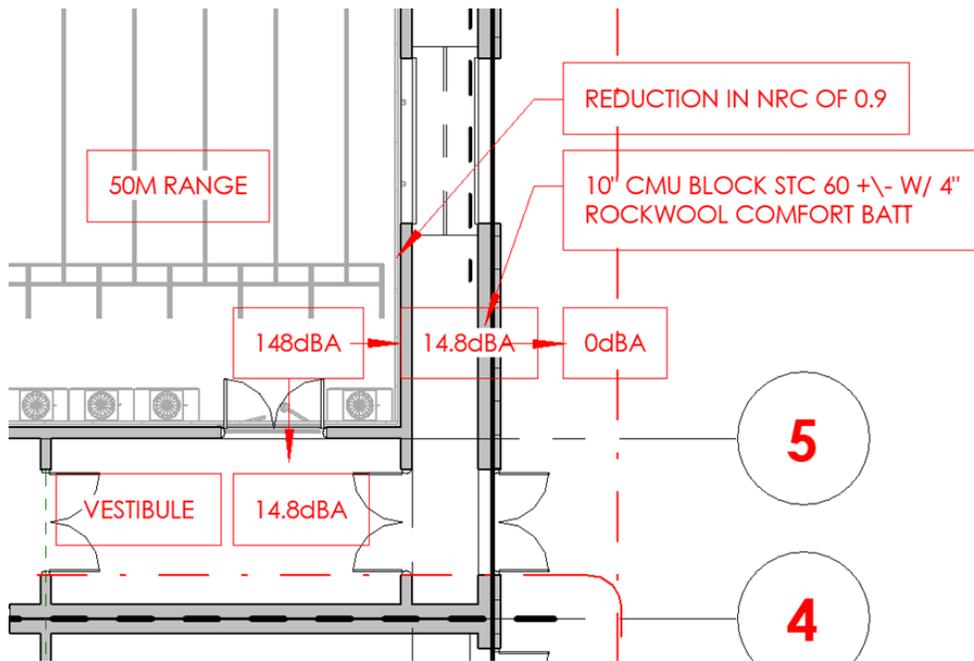


Figure 3

### 3. Conclusion

The proposed indoor shooting range is designed to operate quietly and responsibly, with no adverse impact on nearby residences or surrounding land uses. The "box within a box" design, high STC ratings, and additional mitigation measures ensure compliance with all applicable noise guidelines and by-laws.

We appreciate the opportunity to clarify these points and look forward to your feedback. Please let us know if you would like to schedule a meeting or if further details are required.

Respectfully submitted,

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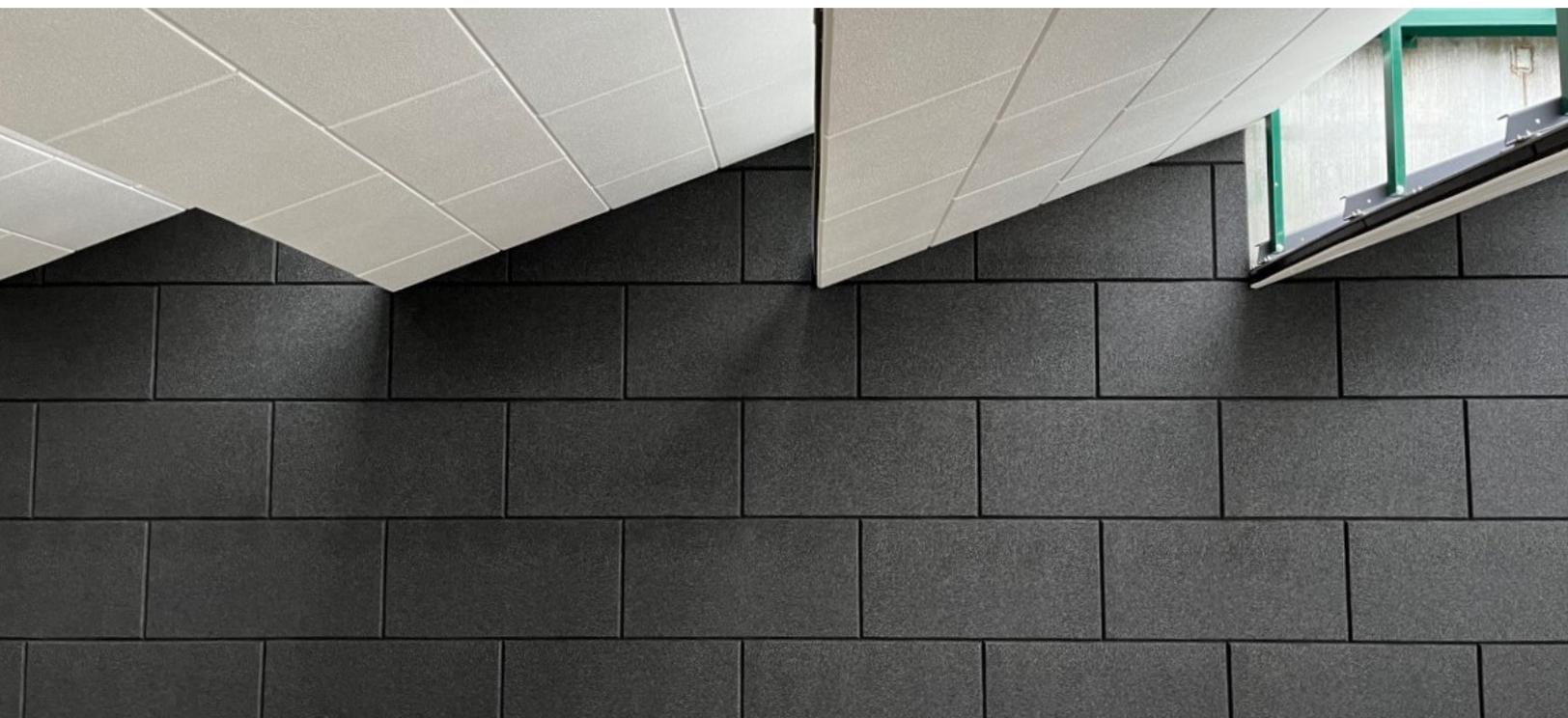


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- High STRC and NRC Sound Rating
- Non-Fibrous, Resistant Material
- Class A Fire Rated
- Lightweight and Easy-to-Clean
- Outdoor and Indoor Usage





# City of Vancouver Noise Control Manual



**Prepared for:**  
**Engineering Services**  
**City of Vancouver**



**Prepared by:**  
**Wakefield Acoustics Ltd.**  
**Victoria, B.C.**



#### 6.5.4 Rating the sound insulation performance of building elements – STC

To compare various window, door and wall constructions and select the appropriate construction for use in one's home, we need to know by how much noise levels will be reduced in passing through each façade element. However, as noted previously, the noise reduction provided by building elements varies with the frequency, generally improving with increasing frequency for elements that are free from gaps, cracks and openings. **Sound Transmission Class (STC)** is a single-number rating of the general sound insulation capacity of various building elements. It is obtained by comparing the noise reduction performance of building elements at various frequencies against a standard noise reduction curve. For our purposes, the STC may be considered to represent (roughly) the amount by which sound levels are reduced in passing through a building element. For example, where the outside noise level is 75 dBA and the building façade provides STC 35, then the indoor level (at least near the façade in question) will be roughly 40 dBA. While originally developed to address the transmission of familiar indoor sounds such as from speech, radio and TV, STC has been used to rate and compare both exterior and interior building elements and select appropriate window, door and wall constructions. Appendix B introduces a more recent single-number sound insulation rating (OITC) which has been developed for use with exterior facades.

#### 6.5.6 Guidelines for acceptable indoor noise levels

Before discussing how to improve the sound insulation of façade elements, it is helpful to know just what levels of interior noise are considered appropriate for residences. While the level of noise found acceptable within residences will vary from person to person depending on personality, lifestyle and state of health, the Canada Mortgage and Housing Corporation (CMHC) has established threshold levels that are considered to prevent any significant interference by external noise with essential activities such as speech and sleep and are widely used as guidelines in Canada (Reference 2). The CMHC's target noise levels for various indoor spaces – expressed in terms of the 24-hour equivalent sound level, or  $L_{eq}(24)$  – are as follows:

Bedrooms	35 dBA
Living, dining and recreation rooms	40 dBA
Kitchens, bathrooms, hallways, utility rooms	45 dBA
Outdoor Recreation areas	55 dBA

#### 6.5.7 Starting with windows

##### The weakest links

In most residences (newer or older) windows and/or glass doors form the weakest links in the noise insulation chain. To achieve substantial reductions in traffic noise it is then necessary to improve the sound insulation performance of windows to the point where they approach the performance of exterior walls. Since, within a given room, windows are generally, but not always, smaller than the walls, their STC rating does not usually need to be quite as high as the wall's to achieve a balanced design. Table 6.1 below indicates the incremental benefits of upgrading windows in various ways starting with typical unsealed, single-glazed windows. The benefits are expressed in terms of both the improvement in sound insulation rating (STC) and the approximate effect on the perceived loudness of the intrusive noise when heard indoors. Section drawings of several of the window types listed in Table 6.1 are provided in Figure 12 along with their representative STC ratings.