

Barry's Bootcamp Yorkville: Room-within-a-room Acoustic Design



HGC Engineering is an Ontario-based consulting engineering firm specializing exclusively in noise, vibration and acoustical engineering. Since our establishment in 1994, we have quietly grown and acquired a worldwide reputation in the measurement, assessment and mitigation of noise and vibration problems.

Introduction and Project Objectives

Barry's Bootcamp is a fitness studio founded in Hollywood and known for their all-in-one 60-minute cardio and strength training workout. The company reached out to HGC Engineering to help them with the acoustical aspects of their lease agreements and the designs of their Toronto studio location in a commercial podium of a luxury condominium at 100 Bloor Street West.

Given the prestigious and upscale location of the gym in Toronto's Yorkville neighbourhood, it was expected that the fit-out of this new Barry's Bootcamp would have high standards with regards to acoustical design. What was unexpected, however, was that these high standards would be codified into the lease agreement—Barry's Bootcamp was required to meet these stringent demands at adjacent commercial and residential spaces (see table 1 below):

To put this into perspective, "Noise Criteria (NC)" levels are typically specified for steady background sound from ventilation equipment, and the maximum "slow-weighted" value is consistent with typical steady office targets, with slightly higher "fast-weighted" levels for brief variations in those

sounds. Similarly, for vibration, the continuous vibration level given is the same as the ANSI and ISO standard level for residential daytime, and the brief impulsive level is the same as the standard level for offices. These stringent requirements not only cover steady noise and

vibration such as that of music in the studio, but also impulsive noise and vibration (e.g., such as those derived from driving beats or dropping weights onto the floor).

Level of Complexity and Project Challenges

In general, fitting-out fitness centres from an acoustical perspective next to noise-sensitive spaces is challenging. The nature of synchronized, rhythmic activities such as running on treadmills or impulses such as dropped weights, requires a combination of an adequately stiff base floor, plus additional isolation of the working floor to prevent vibration transmission, as well as isolation of both structural and airborne paths of the associated sound, predominantly music and amplified vocal coaching.

Often times, these requirements require extensive structural upgrades to the space



Barry's Bootcamp Yorkville

Table 1: Sound and Vibration Criteria: 100 Bloor St. W., Toronto

Parameter	Level
Maximum Fast-weighted Sound, NC	NC-45
Maximum Slow Steady Sound, NC	NC-40
Impulsive Vibration, microinches/second	16000
Continuous Vibration, microinches/second	8000

and are thus cost prohibitive. As well, the ideal approaches often conflict with other constraints of the tenancy (accessibility, ventilation, etc.)

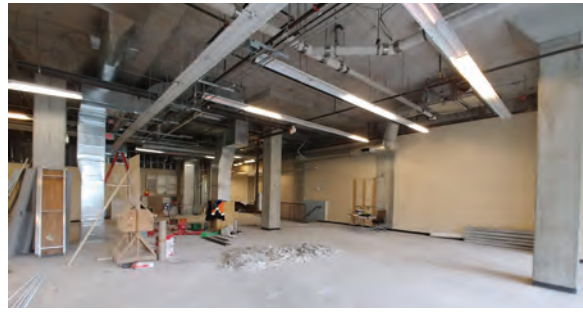
In addition to the general challenges of fitness centre fit-outs, there were the specific challenges associated with this project. Barry's Bootcamp intended to use a full-spectrum audio system with sub-woofers, which in turn produce significantly loud, low-frequency sound; this type of sound tends to transmit easily across inadequately isolated or contained spaces. Furthermore, the main fitness space was directly adjacent to a retail space housing a luxury apparel boutique and their internal office spaces—the distance between the studio and the boutique is as close as 11 feet. Directly above the studio is a serene roof garden, intended for the tranquil enjoyment by residents of the nearby condominium sharing the same podium.

A non-technical challenge of this project was that Barry's Bootcamp's preferred architects, DxU Architects, were based out of Chicago. This is in addition to key Barry's Bootcamp personnel being based in Los Angeles. There was clearly a need for someone to facilitate the connection between these key stakeholders and the local contractors.

Technical Excellence & Innovation: "A Room-within-a-room" Acoustic Design

HGC Engineering's acoustical experience and expertise was used to determine that a combination of measures were necessary for the Barry's Bootcamp fit-out to meet the noise and vibration criteria specified in the lease agreement.

Naturally, the most challenging aspect of the fit-out was the fitness studio itself, where the highly amplified music and strongly rhythmic cardio activity was to take place. For this, we recommended a "room-within-a-room" configuration. This entailed installing a floating concrete floor where the floor is lifted up via springs, as well as building robust drywall partitions on all sides of the studio, including an



Fitness space before fit-out

isolated drywall ceiling. clips with rubber mounts. This approach was also carried out for the mounting of the loudspeakers and subwoofers within the studio, because controlling noise and vibration is often best when applied at the source. Similarly, for the potential for dropping weights in the studio; past experience confirms that a thick rubber surface with good local compression is necessary to obtain high efficiency from the floating floor at reducing the impulse vibrations. A 30 mm thick weight room rubber sports tile was included as the surface flooring in the studio.

Another unique challenge of the fit-out was the number of potential flanking paths spanning across demising assemblies. This included various ducts, beams, conduits, sprinkler pipes, and columns in the studio. Sound could leak into these paths from the exposure of the ducts, pipes, concrete, and even the air conditioning equipment located in the ceiling space of the studio. We recommended various treatments including enclosing these exposed items via insulated drywall enclosures and mass-loaded insulated wrapping; adding silencers to ducts; and vibration isolation of piping, ducts, and the air conditioning equipment to prevent the sound from transmitting back to the structure and hence the neighboring spaces.

Finally, there was the issue of doors. The studio would not be very useful without access, but doorways are holes in the enclosure. STC-rated acoustic doors were used for the main and secondary accesses to the studio from the reception and back-of-house corridor. As well, there was an emergency exit to the corridor between the luxury apparel boutique and Barry's Bootcamp, and leakage via this doorway was also



Floating floor being laid down



Raised Slab

addressed using an acoustically rated door.

A major factor to realizing the design was working out the details and coordinating with the design team and ultimately the contractors. DxU Architects of Chicago have worked extensively with Barry’s Bootcamp installations throughout the US and

are familiar with many of the techniques; however, each site presents its own unique conditions and local contractors. Much of the acoustic design information and details were conveyed to the design and contractor teams via the architects and client, despite their remote locations. HGC Engineering was key in facilitating the link between the two teams. Feedback from the contractors via submittals or questions was also administered by the architects, and HGC Engineering provided reviews and responses through those channels, closing the loop.

**Meeting Client Needs
Project Achievements**

The combination of the above measures decoupled the studio from the surrounding building and tenants, limiting noise travelling beyond the studio. The isolated floating floor in particular served to reduce vibration transmissions to the rest of the building from rhythmic workouts.

In May 2019, we performed acoustic measurements at the Barry’s Bootcamp main studio, as well as the adjacent retail boutique back offices, noted as the closest and most critical receptor location. The results of these measurements are outlined in Table 2 below:

Despite the fact that the sound and vibration levels in the main Barry’s Bootcamp studio were well over NC-75 (99 dBA) and 30,423 μ -in/, respectively (measured only for reference), the levels at the adjacent retail boutique tenancy were well under the criteria of NC-45/NC-40 and 16,000/8,000 μ -in/s. In the case of vibration levels, a 97% reduction was achieved, resulting in levels approximately ten times lower than the prescribed criterion. In more tangible terms—Barry’s Bootcamp patrons are able to run, jump, and drop weights to the loud, heart-pumping music that is part of their signature, while the adjacent spaces are unaffected.

**Contribution to Social and
Environmental Quality of Life**

In urban areas such as Toronto, where space is limited and accessibility to nearby amenities is a key priority, a need is arising for traditionally incompatible land uses and occupancies to be situated in close proximity to one another. That comes with a myriad of potential environmental concerns, not least of which is the potential for noise and vibration intrusions. Often times, incompatibilities due to these concerns leads to incapacitating conditions for the originator of the noise—in the case of gyms, this can result in the need for relocation, reduced music levels, and/or limits on allowable activities (i.e. no dropping weights), as well as potential litigation. For neighbours, this can mean waking up at 6 am due to vibration from a nearby weight-lifting class.

However, these restrictions and compromises on quality of living need not exist. Through custom, well-planned, and innovative acoustical design, these uses can be made compatible, allowing for the diverse, compact urban communities.

Table 2: Measured Sound and Vibration at 100 Bloor St. W., Toronto

Location	Sound (NC)			Vibration (micro-inch/s)
	Fast	Slow	Comment	Max
Criteria	NC-45	NC-40		16,000 μ -in/s (impulse) 8,000 μ -in/s (contin)
Retail Boutique Office	NC-45	NC-38	HVAC, BBC Inaudible	843 μ -in/s (max)
Main Studio	Average: NC-75* (99 dBA)		Music, Trainer	30,432 μ -in/s (max)

