



Executive Summary – BRB PET/MRI Construction Vibration and Noise Testing

As we understand it, OHSU intends to perform construction work in BRB for a variety of tenant improvements. Nearby users are concerned about noise and vibration impacts to adjacent sensitive animal and human occupancies. In order to determine whether – and to what extent – these activities might affect adjacencies, the Contractor (Skanska) arranged to perform in situ testing of a few of the techniques.

We visited the building during construction simulation activities in Corridor C105 the morning of Friday 15 December 2017. During testing, the contractor engaged in six different general activities: (A) VCT removal; (B) hammering using 4-lb sledge; (C) hammering using 16-lb sledge; (D) concrete saw cutting; (E) rotohammering into the top of the 1st floor deck; and (F) concrete chipping. Vibration and noise data were gathered in two series: (1) at six locations on the basement level, plus an additional noise location in MRB; and (2) six locations at the first floor. The locations were chosen to be representative of several kinds of receivers: immediate adjacencies (both lateral and vertical); nearby-but-not-immediate adjacencies (e.g., rooms down the hall on the same floor or below); distant spaces at considerable setback; and others.

- **Vibration impacts to vertical adjacencies (on the floor below) are limited; however, noise impacts are significant to humans.** There is no evidence that construction vibrations travel well down to the first floor. Noise impacts from use of the sledge- or rotohammers were significant directly below the work and occurred even at distant lateral setbacks. While not shown in detail, spot-checks of ultrasound revealed no observable ultrasonic intrusion. Because of how animals hear, **impacts to animals are not expected.** For more, see our write-ups on [Audiograms for a few Common Lab Animals](#), [A Human vs. Rodent Hearing Comparison](#); and excerpts from our AALAS Special Lecture on [Vibration and Noise in Animal Research Buildings](#).
- **Vibration impacts to lateral adjacencies (at the 1st floor) are significant up to one structural bay away; noise impacts are significant even at distant setbacks.** Vibrations would be strongly felt and annoying to humans, while some instruments, including MRIs, would experience interference. At close adjacencies (one partition), **noise levels are high enough to be OSHA-actionable and would require occupants to wear hearing protection.** Even at distances including two or more partitions between the work and receptor, the noise levels are still high enough to interfere with speech intelligibility.
- **At the basement level, we recommend removing people located within 20' laterally of work above on the 1st floor deck.** While we don't generally expect animals to be affected, use of the 16-lb sledgehammer presents a potential risk. **For short-term exposures, we expect that it will be less disturbing to the animals to keep them in place rather than relocating them.**
- **At the 1st floor,** vibration and noise impacts to nearby offices and labs are expected to be significant. Impact sounds, particularly sledge- and rotohammering travel well throughout the 1st floor. **We suggest either (1) removing nearby personnel; (2) restricting hours of operation; or (3) providing alternative "quiet" workspaces for nearby occupants to retreat to when sound becomes problematic.**