

Cleveland Clinic Designs For A Worst-Case Scenario

October 7, 2013 by Anne DiNardo, Senior Editor

When [Cleveland Clinic](#) decided to add an ultra-high resolution 7T MRI scanner to its main campus in downtown Cleveland, it didn't just have to figure out how to transport and install an 80,000-pound magnet. It first had to build the right facility to house



such a powerful machine.

to the magnet from any vibration and/or radio frequency interference (RFI) from outside sources. To sidestep these issues, the team started with vibration testing at the site, which is located on an urban campus with buses and trucks running nearby. When the results couldn't definitively tell whether vibrations would affect the magnet or not, the decision was made to design the foundation for the "worst-case scenario," Everhard says.



That meant creating a slab independent of the building foundation and on separate footings. "It's kind of a standalone pedestal that the magnet sits on," he says.

Since the magnet couldn't be moved once it was in place, [CMM Inc.](#) (Cleveland), the builder and engineering consultants on the project, suggested installing an additional concrete block equal in weight to the magnet but underneath it. In that worst case, Everhard says, the concrete block could be lifted on pneumatic pads, essentially floating the magnet and isolating it from any movement transferred through the ground. While most MRI facilities address the potential for RFI interference by using a copper skin to enclose the MRI room, the Cleveland Clinic facility

uses a heavier gauge copper because of the sensitivity of the magnet. In addition, anything that went into the room, including sprinkler lines, duct work, and the ceiling grid, had to be made of aluminum or non-iron materials.

The building was completed in January 2013, but a shortage of liquid helium that's necessary to cool the magnet delayed delivery from its German manufacturer until July. Since the magnet couldn't just be rolled through the front door, an opening was created in the roof and a large crane lowered it in. Then the copper skin was set back in place and the roof hatch sealed up. The whole operation took less than a day.

After the magnet room was completed, the MRI vendor spent nearly a month calibrating and fine-tuning it before the clinic took occupancy.

Dr. Mark Lowe, director, high field MRI, at Cleveland Clinic, says the facility will be used for biomedical research in neurologic, musculoskeletal, and cardiac imaging, with immediate plans to study multiple sclerosis, Parkinson's disease, and epilepsy.