



State Renaissance Court - building successfully on top of the New York City subway

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While large, urban residential buildings are the norm in New York, approximately 90% of this unique 8 story building sits on top of the Hoyt Schermerhorn Subway Transit Station running below the site. The 158-unit, nearly 200,000 s/f complex is the first building to be constructed almost entirely on top of a New York City subway tunnel since seismic considerations were introduced into New York City's building codes.

While building over an existing subway tunnel isn't a new idea, constructing a residential building whose vertical support will be provided by the existing subway structure - without the first floor being rigidly affixed to the subway structure itself - is.

This mixed-use apartment building occupies a site which extends 447 feet along Schermerhorn St. in Brooklyn, New York. The building is 90 feet wide out of which 75 feet spans over the subway tunnel and only 15 feet beyond it. Typically, structures extended over the subway tunnels are framed with cantilevers. For the State Renaissance such framing was not possible; the site footprint and the building's massive scale did not coincide geometrically. Since nearly all of the vertical support for the new building comes from the NYC Subway structures located underground, State Renaissance required unprecedented acoustic, vibration and seismic engineering, using seismic isolators and diaphragms.

The idea of seismic isolation is not new; however, to the writer's best knowledge, it has never been used for a building in the northeast. Such a design has never been done for a building in New York City or for a structure located on top of a New York City subway.

Using BIM, 3D modeling was performed with Engineering Software, then checked using different software packages.

The State Renaissance project represents a new and innovative building in New York City. Supported directly on top of the roof of an existing subway tunnel, the 1st floor was designed as a floating platform, much like a tabletop, that rests on a complex network of isolators. Not fully decoupled from seismic ground motions, the structure was anchored into a reaction block, requiring special torsion and deflection calculations, which included model analysis and soil structure interaction.

It's no wonder that The State Renaissance Court has been named a winner for the 2008 Excellence in Structural Engineering Awards given by the National Council of Structural Engineers Associations. Amazingly, the vibrations and rumbles of subway trains can be felt and heard when standing on the sidewalk near the building but is not felt or heard inside the building.

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