

# Design example of mid-story-isolated skyscraper with the viscous dampers to reduce the response acceleration in lower part of the building

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## Abstract

This paper introduces a design case of 230-meter-tall mid-story-isolation skyscraper in Roppongi, Tokyo. Since the response reduction by seismic isolation on buildings over 200-meter-tall is smaller than general low-rise buildings, these buildings hardly adopted mid-story-isolation structure. Mid-story-isolation buildings are adopted to reduce the response in the upper part of the building, but in actually, the response acceleration is often largest just below the isolation story. In this paper, we introduce the architectural and structural planning for adopting a mid-isolation structure for a skyscraper building and solution methods in this project. The realization of this building presents new possibilities for skyscrapers and mid-story isolation buildings.

**Keywords:** Skyscraper; mid-story-isolation; viscous material shear wall; oil damper; steel damper.

## 1 Introduction

The Roppongi 3-Chome East Side Project plans to recover the unity of urban areas divided by the construction of the Metropolitan Expressway and the "Izumi Garden" developed on the east side of this site. Although this project is a single building by application, it consists of two isolation skyscrapers; office tower and residential building, etc. In this paper, we introduce the plan of the office tower which is the largest building in this project and located in the center of the site. The office tower is a mid-story isolation skyscraper, and its height is about 230 m, a very large scale for a seismic isolation structure. We will describe in detail the architectural and structural tasks and the solutions in this project in case of isolating the high-rise building at the mid-story.



Figure 1 Plot plan