CASE STUDY 1 – Structural Narrative

Office Fit-Out

Project Description

Case Study 1 illustrates a Level 1 Alteration in a prior code office building. This high-rise building is comprised of 9-stories plus a cellar, with a gross floor area of 8,800 sf per floor and a total building area of 88,000 sf. The building was completed in 1971 under the 1968 NYC Building Code. Per the existing certificate of occupancy, its dominant occupancy is Group B (Group E under the 1968 code), its construction type is I-B (I-C under the1968 code), and the building is fully sprinklered. The building has two exit stairs and two elevators. Its structural system is a steel frame supporting cast-in-place concrete floor slabs. As defined by the NYC Administrative Code, the building is considered a prior code building.

The case study's architectural scope includes the partial renovation of the 6th floor and full renovation of the 7th floor for a commercial office tenant. There is no change in use, occupancy, or egress. The occupant load will be maintained at 70 persons per floor, per the existing certificate of occupancy.

Scope of Work

The structural scope consists of:

- increased floor load at specific areas marked for safes and data-center equipment racks,
- review of attachments for new hung MEP duct and conduit; and
- new floor penetrations for electric risers.

EBC Structural Code Review

The code review for Case Study 1 includes the following sections.

- **Increase in Floor Area** (EBC 703.2).
  - Increase in Floor Area: The floor area is not changing.
- **Increases in load demand/capacity ratio** (EBC 703.3, 703.4).
  - Demand/Capacity: There is no overall increase in the demand/capacity ratio per EBC 703.3.
  - Demand/Capacity: There is an increase in demand/capacity ratio for structural elements per EBC 703.4.1.
  - Foundations: There is no increase in demand/capacity ratio for foundation elements or new foundations elements per EBC 703.4.2.

- **Other Requirements** (EBC 703.5, 703.6, 703.7).
  - Stability: There are no changes that affect stability per EBC 703.5.
  - Seismic Analysis: The existing structural elements are exempt from BC continuity and seismic detailing per EBC 703.6.
  - Seismic Detailing: The existing building is exempt from seismic separation requirements per EBC 703.7.
- **Condition Assessments** (EBC 704).
  - Initial Condition Assessment: An initial condition assessment is triggered by the increase in demand/capacity ratio, per EBC 704.2. See drawing S-010, which is for the owner's use but shall be provided to the Department on request.
  - Detailed Condition Assessment: A detailed condition assessment is triggered by the structural alteration, per EBC 704.3. See drawing S-020, which must be filed with the structural drawing set.
  - No structural damage was observed.
- **Determination of Existing Materials and Structural Systems** (EBC 707 & Appendix H)
  - Construction Date: In consideration of EBC H101.2.1, the existing certificate of occupancy indicates that the building was constructed in 1971.
  - Field Data: The gross geometry of the steel beams and concrete slabs was measured on site per EBC 704.2.2, EBC 704.3.2, and EBC H101.2.3.
  - Material Properties: Lower-bound material strength for the steel was taken from Table H103.2 per EBC H101.2.2. Per EBC H101.2.3, no testing or confirmation is required.
  - Material Properties: Lower-bound material strengths for the concrete and rebar were taken from Tables H103.4 and H103.4.1 per EBC H101.2.2. The rebar size and spacing, and the concrete strength, were adjusted based on results of testing (probing to observe rebar, core-testing for material strength).

Recommendations

- The detailed assessment required by EBC 704.3 should be in the form of drawings within the filed structural set.
  - The information that provides the basis for design is included directly with the design drawings.
- The initial assessment required by EBC 704.2 should be in drawings, following the same general format as the detailed assessment.