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SIMPSON GUMPERTZ & HEGER



Engineering of Structures
and Building Enclosures

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One State Street, 28th Floor
New York, NY 10004

Project 200714 – Investigation of Structural Fire Damage to Existing Structure,
70 Mulberry Street, New York, NY

Dear Mr. Grant:

At your request, Simpson Gumpertz & Heger Associates, Inc., P.C. (SGH) performed a visual structural assessment and building code review of the above-mentioned building in order to assess the scope of required repairs and potential code-required upgrades. For our code review, we relied on observations and photos from our site survey on 20 May 2020. Our findings are summarized herein.

1. BACKGROUND

1.1 Building Description

The building located at 70 Mulberry Street is five-stories with a full basement as shown in Photo 1. According to available public records, the building was constructed prior to 1895 and has a maximum of 13,350 sq ft per floor. The building houses a dance studio, a senior center, and storage for a museum. The primary structural system of the building is load-bearing brick masonry exterior walls with wood floor and roof framing that is supported by a series of interior steel girders and cast-iron columns. The first floor features structural steel floor framing with terracotta flat arches spanning between the steel beams. The building is a walk-up style with no elevator.



Photo 1: 70 Mulberry Street

1.2 Fire Event

On 23 January 2020, a fire broke out in the building. The fire reportedly started on the fifth floor of the building.

1.3 Extent of Damage

On 20 May 2020, Nathaniel B. Smith, P.E. of SGH visited the site to observe the damage to the building. We focused our observations on the structural systems. Damage and distress to the building was observed to include:

- Roof:
 - The roof structure was missing and had reportedly collapsed during the fire.
- 5th Floor:
 - Exterior masonry walls. Portions of the walls had collapsed or had been removed after the fire.
 - Floor Framing: Portions of the floor framing reportedly collapsed during the fire as a result of the roof collapse. Other areas of wood floor framing and wood subfloor were significantly charred.
- 4th Floor:
 - A portion of wooden floor framing had collapsed at the south end of the building.
- 3rd Floor:
 - No visible fire-related structural damages. Portion of floor framing at northeast corner of building removed to facilitate demolition.
- 2nd Floor:
 - No visible fire-related structural damages. Portion of floor framing at northeast corner of building removed to facilitate demolition.
- 1st Floor:
 - Portions of the underside of the terra-cotta flat-arch slab were spalled.
 - Steel floor beams were corroded in many areas.
- Basement:
 - The mortar in the stone masonry foundation wall was deteriorated in many areas.

The observed damage described above is generally contained to areas that experienced direct fire exposure although we did observe deterioration and distress in other areas of the building. In

addition to the noted structural damage, there was widespread water damage to interior finishes throughout the building.

We understand that the New York City Department of Buildings (DOB) issued a full vacate order after the fire and also issued a violation, No. FEU10301PN, directing partial demolition of the building from the roof down to the third floor. Demolition had begun prior to our site visit.

Necessary structural repairs to the building include rebuilding the roof structure, rebuilding the fourth and fifth floor framing, rebuilding portions of the exterior brick masonry at the third through fifth floors, repairing or replacing portions of the terracotta flat-slab at the first floor, addressing corrosion of the first-floor steel framing, and repointing the stone masonry foundation walls. In addition to the structural repairs, we observed apparent biological growth on some of the wood floor framing at Floors 2 and 3 that would need to be addressed as part of any repair program.

Additionally, we observed some distress to the brownstone elements on the exterior of the first floor of the building that typically included some cracks and spalls of the brownstone elements. The majority of the distress appeared to occur at locations of prior repairs.

2. CODE REVIEW

We reviewed pertinent provisions of the applicable New York City building codes to determine the possible extent of code-required building upgrades based on different potential repair scenarios.

The need for code upgrades is based on various thresholds dependent upon the extent and value of repairs required to the building. In general, the current version of the New York City Building Code will require some level of code upgrade regardless of the extent of repairs, and other levels of code-required upgrades are dependent upon the value of repair work performed in a 12-month period compared to the value of the building.

2.1 Applicable Codes

- 2014 New York City Administrative Code (2014 NYCAC)
- 2014 New York City Building Code (2014 NYCBC)
- 1968 Building Code of the City of New York (1968 BCCNY)
- 1938 Building Code of the City of New York (1938 BCCNY)
- 1916 Code of Ordinances of the City of New York

2.2 Repair Cost Estimate

Based on our conversations with The LiRo Group (LiRo), estimated repair cost for the building is approximately \$675 per sq ft for interior work, (not including any temporary stabilization work required to perform the repairs), and about half of that, (\$350 per sq ft), for the roof and cellar areas. We understand that these unit costs are based on restoring the building to its pre-fire condition and do not include code upgrades for the entire building. The building has an overall square footage of about 58,825 sq. ft, (not including the cellar or roof). The cellar is about

13,360 sq ft, and the roof is about 10,900 sq ft. Given these unit costs and square footages, the total estimated repair cost is approximately \$48,198,000, which does not include soft costs (i.e., design fees, construction management fees, permitting, etc.). LiRo also told us that the estimated replacement cost for the building is approximately \$46,000,000 (excluding soft costs), which considers constructing an entirely new building of the same size to current building code requirements.

2.3 Assessed Valuation of the Building

The 1968 BCCNY specifies that certain code upgrades are required depending on the value of the repairs performed in a 12-month period compared to the cost of the building. The thresholds that trigger certain code upgrades occur when repair costs exceed 30% and 60% of the building's value. If the 30% threshold is reached, certain upgrades must be made within the repair areas per the 1968 BCCNY (in addition to required upgrades per the 2014 NYCBC). If the 60% threshold is exceeded, the building must be brought into compliance with the 1968 BCCNY (in addition to required upgrades per the 2014 NYCBC).

The 1968 BCCNY specifies that the value of the building used for calculations of the above thresholds (30% and 60%) are based on 125% of the current assessed valuation as corrected by the State Equalization Rate. Per the current 2019-20 tax year, the listed assessed value of the property is \$3,729,150 based on the NYC Department of Finance assessment, and Manhattan has a State Equalization Rate of 0.35. The assessed value once adjusted is \$10,654,714, and therefore, a value of \$13,318,393 (125% of assessed value) should be used when determining the overall cost of the repairs compared to the building's value. The 1968 BCCNY also allows the use of the current replacement cost of the building, provided that satisfactory evidence of current replacement cost is submitted to the commissioner. The current replacement cost as displayed from the Department of Finance is \$8,287,000.

The estimated repair costs, (\$48,198,000), far exceed both the adjusted assessed value, (\$13,318,393), and listed replacement value, (\$8,287,000), of the building. Therefore, the building will need to be brought into compliance with the 1968 BCCNY at a minimum.

2.4 Required Upgrades

2.4.1 2014 NYCBC Required Upgrades

Section 28-101.4.3 of the 2014 New York City Administrative Code (2014 NYCAC) permits reference to the 1968 New York City Building Code (1968 BCCNY) when performing work on an existing building with the following relevant exceptions, which must comply with the 2014 New York City Building Code (2014 NYCBC):

- All fuel gas, plumbing, and mechanical work will need to be performed in accordance with the 2014 NYCBC.
- Fire Protection Systems. The requirements of Chapter 9 of the 2014 NYCBC (listed below) are applicable to the entire building. Each portion of the building is required to be individually classified based on the use of that space. The building is then allowed to be classified as nonseparated occupancies, meaning that fire separation of occupancies is not required, if the entire building is protected in accordance with the most stringent

requirements shown below. Separated occupancies require fire separation between occupancies, but each occupancy can be protected by fire protection systems as required for the individual occupancies.

- Automatic Fire Sprinkler System would be required for the first-floor assembly use listed on the Certificate of Occupancy per the 2014 NYCBC.
- Additionally, an automatic sprinkler system is required to be installed throughout A-3 occupancies (Dance School / Studio, Senior Center) where any one of the following conditions occur per Section 903.2.1.3:
 - The fire area exceeds 12,000 sq ft OR
 - The fire area has an occupant load of 300 or more OR
 - The aggregate occupant load of all fire areas occupied by Group A, located on any given floor other than the level of exit discharge, is 300 or more.
- As such, an automatic sprinkler system would be required on any floor of the building with an assembly (A-3) occupancy and occupant load of 300 or more.
- An automatic sprinkler system is also required to be installed throughout all buildings containing a group S-1 Storage occupancy (i.e., museum storage) where any one of following conditions occur per Section 903.2.9)
 - The Group S-1 fire area exceeds 12,000 sq ft.
 - The building is greater than 1,000 sq ft in area and the main use or dominant occupancy group is S-1.
 - A Group S-1 fire area is located more than three stories above grade plane.
 - The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 sq ft.
- If the storage is classified as S-2, a sprinkler would need to be installed throughout the building if the dominant use is S-2 or throughout any S-2 occupancy greater than 5,000 sq ft.
- As an education occupancy (E) as shown on the certificate of occupancy (G), a sprinkler system would not be required as the fire area (floor area) is less than 20,000 sq ft and is not located below grade.

Based on the Certificate of Occupancy, Stories 2 through 5 were classified as a school. However, assuming the use of those floors is not a K through 12 educational facility, the proper 2014 NYCBC classification for this occupancy would likely be Business occupancy (B). Per the 2014 NYCBC, a business occupancy that is a non-high-rise building, (this building is non-high-rise), does not require sprinkler protection.

As the requirements above specify, the need for and extent of an automatic sprinkler system beyond the first floor of the building is based on the ultimate use of the interior spaces of the building.

- A Class III standpipe system is required to be installed throughout the building per Section 905.3.1 because it exceeds two stories in height and each story exceeds

10,000 sq ft. If the building is fully equipped with an automatic sprinkler system, a Class I standpipe system is permitted to be installed.

- Portable fire extinguishers are required in Assembly and Storage Occupancies per NYCBC 906.1.
- Fire Alarm System.
 - A manual and automatic fire alarm system that activates a voice communication occupant notification system is required to be installed in Group A occupancies with an occupant load of 300 or more per Section 907.2.1.
 - A manual and automatic fire alarm system is required in a Business occupancy where one of the following conditions exists:
 - The combined Group B occupant load of all floors is 500 or more.
 - The Group B occupant load is more than 100 persons above or below the lowest level of exit discharge.
- There are no requirements for a fire alarm system in a non-high-rise S-1 storage occupancy per 907.2.
- Where a fire alarm system is required, smoke detectors connected to the fire alarm system are required in mechanical equipment rooms, electrical rooms, transformer rooms, telephone equipment rooms, elevator machine rooms, and elevator lobbies per Section 907.2.

Based on the Certificate of Occupancy, Stories 2 through 5 were classified as a school. However, assuming the use of those floors is not a K through 12 educational facility, the proper 2014 NYCBC classification for this occupancy would be a Business Occupancy (B). Per the 2014 NYCBC, a business occupancy requires a fire alarm system based on the total number of occupants, or the number of occupants located above or below the lowest level of exit discharge.

At a minimum, the first floor of the building would require a fire alarm system.

- Fire department connections are required on the ground floor, at least every 300 ft, on every side of the building that abuts a public way per 912.2.1. However, there is an exception for buildings that do not exceed 300 ft of frontage. Based on the provided architectural drawings, the building is 103 ft of frontage on Bayard Street and 145 ft of frontage on Mulberry street for a total of 248 ft. Therefore, the building would be permitted to have one fire department connection as long as it was on Mulberry Street, located within 15 ft of Bayard Street. Otherwise, two fire department connections are required, one on each street.
- If the automatic sprinkler system requires a fire pump, the pump is to be located in a 1-hr fire-resistance rated room per Section 913.2. If the fire pump is placed in a mechanical room that is 2-hr rated, additional separation for the fire pump is not required.
- Accessibility. The requirements listed below per Chapter 11 of the 2014 NYCBC are applicable to the entire building. Alterations made to paths of travel are required to be

accessible, unless the alteration is deemed disproportionately costly (exceeds 20% of the cost of the alteration to the primary function area).

- At least one accessible route is required to connect each accessible level in multilevel buildings per Section 1104.4. The accessible route is to coincide with or be located in the same area as a general circulation path.
 - All public entrances are required to be accessible.
 - An elevator is required to be installed in the building per ADA requirements since the building exceeds 3 stories and exceeds 3,000 sq ft per story.
 - The 2010 ADA specifies that the altered portion of the facility be readily accessible to all individuals, which could include the installation of an elevator to access all stories. However, the disproportionality clause of ADA specifies that if the cost of installation exceeds 20% of the cost of the alteration to the primary functional area, then the elevator installation would not be required. Given the overall estimated cost of repairs, this clause is likely not applicable.
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- All elevators, escalators, and conveyors must meet the requirements of the 2014 NYCBC.
 - Security grilles (i.e., roll-down gates) are required to comply with the 2014 NYCBC.
 - Energy efficiency work including complying with the New York City Energy Code.
 - Roof recovering and replacement (per 2014 NYCBC 1510.1 through 1510.6).
 - The new roof will be subject to Local Laws 92 and 94 for Green Roofs / Photovoltaic Roofs.
 - All handrails and guards must meet the requirements of the 2014 NYCBC.
 - Structural design loadings (with reference to prior codes per 2014 NYCBC 1601.2).
 - All emergency and standby power systems must meet the requirements of the 2014 NYCBC.
 - Mold protection is required to comply with the 2014 NYCBC. Gypsum board or cement board is required to have a mold resistance rating of 10 in accordance with ASTM D3273. Examples of areas that require mold protection are as follows:
 - Interior faces of exterior walls of basements, cellars, and other below-grade rooms.
 - Walls and ceilings of spaces containing condensers, water tanks, water pumps, and pressure reduction valves.
 - Portions of walls within 2 ft of kitchen sinks to a height of 4 ft above the floor.
 - Walls of bathrooms that are not solely water closet compartments, other than walls specifically required to be cement board.
 - Walls and ceilings in service sink closets.

2.4.2 1968 BCCNY Required Upgrades (With Exceptions)

Aside from the exceptions listed in Section 2.4.1 above, if the cost of building repairs in any 12-month period exceeds 60% of the value of the building, 1968 BCCNY Article 4, Section 27-115 requires that the entire building be repaired/upgraded to comply with relevant provisions of the 1968 BCCNY. Based on our comparison of the estimated repair cost to the value of the building, the following requirements are necessary:

- Exit stairways and exterior exit doors must provide for the following per 1968 BCCNY 27-357 and 27-358:
 - Assembly spaces.
 - Minimum two remote exits per floor.
 - Maximum exit travel distance of 100 ft for primary exit, 125 ft for secondary exit.
 - Maximum dead-end corridor distance of 30 ft.
 - Sufficient door/stair width for the occupant load per floor (typically 15 to 100 sq ft / occupant). Alternatively, an occupant load may be based on the 2014 NYCBC Table 1004.1.
 - Storage (museum storage).
 - Minimum two remote exits per floor.
 - Maximum exit travel distance of 100 ft unsprinklered, or 150 ft if the building is fully sprinklered.
 - Maximum dead-end corridor distance of 50 ft.
 - Sufficient door/stair width for the occupant load per floor (typically 200 sq ft / occupant). Alternatively, an occupant load may be based on the 2014 NYCBC Table 1004.1.
- Minimum exit stair width of 44 in. for Assembly spaces, and 36 in. for storage spaces if the stair serves less than 60 occupants per 1968 BCCNY 27-375 and Table 6-1.
- Exit stairways must be enclosed in 2-hour fire resistance rated construction per 1968 BCCNY 27-375.
- Corridors must be enclosed in 1-hour fire resistance rated construction and be subdivided by smoke barriers every 150 ft. in length (1968 BCCNY 27-369).
 - Alternatively, corridors may be enclosed in 1-hr fire resistance rated construction without smoke barrier subdivision (2014 BCCNY 1018.1).
- Exit stairways and corridors must be provided with minimum 2 ft.-candle of lighting at floor level connected to an emergency power source per 1968 BCCNY 27-381 and 27-382.
- Exit signage (internally- or externally-lighted, or electroluminescent type) must be provided per 1968 BCCNY 27-385.

- Interior finish must be Class A within exits and corridors, and Class B elsewhere for Assembly and Storage spaces per 1968 BCCNY 27-348.

3. CONCLUSIONS

Based on the estimated cost to repair the building, the repair costs far exceed the assessed value of the building, which triggers compliance for the entire building with certain provisions of the 1968 BCCNY and the 2014 NYCBC. Given the additional costs associated with temporary stabilization and additional code upgrades not captured by the estimated repair costs, the cost to repair the building likely exceeds the cost to demolish the building and construct a new building that meets current building code requirements.

Please do not hesitate to contact us if you have any questions.

Sincerely yours,



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