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Ms. Lee Ann Amend
Sharon Public Library
90 South Main Street
Sharon, MA 02067

Reference: Sharon Public Library-Sharon, MA
Existing Conditions Study

Dear Lee Ann:

This letter summarizes our findings regarding the present condition of the structure of the Sharon Public Library building in Sharon, Massachusetts, and our recommendations regarding future uses of this structure. These observations and recommendations are based on information that you provided to us, as well as, our field observations of March 13, 2018. There are limited existing structural drawings for the original building and 1960 addition, and complete structural drawings for the latest addition, so our comments are based on a fairly good understanding of the structure and on our field observations and experience. Our field observations were only visual surface observations. We have not cut any holes in building finishes to verify structure, nor have we done any testing to determine the structure's underlying condition.

Existing Conditions

On March 15, 2018, I toured the existing Sharon Public Library with Ms. Lee Ann Amend, the library director. This original library building, built in 1914, is a two story structure. There was a two story addition added to the rear in 1960, and another two story addition to the rear and sides added in 1979. The building was originally built as the town's library and has functioned as such ever since. The lower level of the 1914 building houses the mechanical room, as well as offices and bathrooms. The lower level of the two additions house the children's areas and stacks. The upper floor of the original 1914 building has the reception desk, reading areas, and shelves with electronic media. The upper level of the 1960 and 1979 additions houses primarily book stack and reading areas. The building has flat roofs with some large skylights in the latest addition.

The lower level for the entire building has a combination of masonry and concrete foundation walls with spread footings on the perimeter and slabs-on-grade. There are steel pipe columns on spread footings in both the original building and the additions that support the structure of the upper floor. The exterior of the building above grade is multi-wythe brick masonry bearing walls in the 1914 structure and unreinforced CMU with brick masonry veneer in the 1979 addition. The floor of the 1914 building is conventional wood framed 2x10joists supported on a central wood and steel (flitch beam). The floor of the 1960 additions is a two-way cast-in-place concrete waffle slab system, while the 1979 floor is framed with steel beams, open web steel joists, and a concrete slab on form deck. The roof framing for the 1914 building is unknown, but most likely convention wood framing. The roof of the 1960 and 1979 additions are steel beams with open eel joists and steel roof deck.

The exterior unreinforced masonry walls act as shear walls to provide lateral stability for the building under wind and seismic loadings. Steel lintels support the brick veneer at the exterior openings.

We are able to determine the allowable gravity loading capacity of the framed floors and roofs (with the exception of the 1914 building roof, as there are no drawings for this area and finishes cover the framing). Based on what we could determine, the ground floor (slab-on-grade) has an allowable live load capacity of at least 150 PSF. The upper floor of the 1960 and 1979 additions have a live load capacity of 150 PSF, all of which are compatible with the code mandated live loading for library stack rooms (150 PSF). The live load capacity of the upper floor framing in the 1914 building is considerable below the requirement for library stacks areas. The floor joists have a capacity of approximately 100 PSF, while the center carrying beam has a live load capacity of approximately 60 PSF. This is well below the stack room loading requirement, but marginally acceptable for a reading room, as further evidenced by the significant floor deflection. The allowable loading capacity of the building's 1960 and 1979 addition roofs of 40 PSF is slightly above the Code mandated snow loads of today. The loading capacity of the 1914 building roof was not discernable, but appeared to be adequate based on its performance.

The structural framing for portions of the building is not visible, as finishes cover the framing, but there is no evidence of major structural distress. There is no evidence of major foundation settlement or foundation wall cracking. There is some minor cracking in the basement floor slab-on-grade. The upper floors and the roof show no evidence of structural problems, with the exception of some fairly significant localized deflection in the upper floor framing in the 1914 building, at and to the left of the main entry. This area should be used for reading and only light, low stacks as are presently there, and if conditions should worsen additional new supports in the lower level should be added under the central carrying beam. There is evidence of roof leakage at the skylights. The exterior of the building is in good condition, with only some minimal cracking of masonry. The building structure generally appears to be in good condition and well maintained.

Addition/Renovation Feasibility

We understand that the library needs more space and that a vertical addition has been proposed, as the site is too small for any further horizontal expansion. This structure is a very poor choice for a vertical addition for a number of reasons.

1. The existing roofs do not have the load carrying capacity to become floors. This means that the existing roof framing would need to be removed and new floor framing added.
2. The existing columns and footings do not have the capacity to carry the additional library floor and the associated loads. They would all need to be supplemented/replaced.
3. The existing building's lateral load resisting system is unreinforced masonry bearing/shear walls (URM's). A single story vertical addition would be an "Alteration Level 3 Substantial" as determined by the International Existing Building Code. This would require that the entire structure's lateral system be made to comply with IBC Wind and IBC Reduced Seismic loading. Due to the layout of this building, the amount of perimeter glass, and the very low allowable stresses that the code allows for this type of system, it is unlikely that it could be made to work without the addition of a new code compliant lateral load resisting system. Any such system (structural steel braced frames) would be extremely disruptive and expensive.

Such an upgrade to the structure would be prohibitively expensive, and must be avoided. Based on the above findings, it is our opinion that this building is a poor choice for an additional story, as the structural deficiencies in the gravity and lateral load resisting systems are so severe that to make the required structural upgrades would be prohibitively expensive. It is possible to add a new lateral load resisting system by installing new structural steel braced frames throughout the building, but this solution to the lateral loading issue is extremely disruptive, takes up additional space in the building, and is very expensive. Numerous studies have shown that the costs to upgrade lateral systems is generally higher than constructing a new code compliant building.

Generally, minor structural changes to the original structure, such as those required to modify stairs and elevators, and to add small mechanical penetrations, do not have a major impact on the existing building structure. New openings required for ducts, piping, etc. in the roof deck or in the framed floors can be accommodated as long as the openings fall between the existing framing members and do not interfere with the framing. Small openings, 12"or less, can be accommodated without any additional framing. The existing masonry walls should be left intact, as much as is possible, as increasing the lateral shear in any masonry wall by more than 10% would trigger a code mandated seismic upgrade, which must be avoided.

If you have any further questions, or if we can be of any further assistance, please do not hesitate to call.

Very truly yours,

Roome & G"C

Reginald Roome II, P.E.
Partner