



October 2, 2015

Mike Pivero  
Fire Station Building Committee  
Town of Newton  
2 Town Hall Road  
Newton, NH 03858

Phone: (603) 231-0209  
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RE: Structural Condition Assessment  
8 Merrimac Rd, Newton, NH

SFC Project No. 639001

Dear Mr. Pivero:

In accordance with our agreement, SFC Engineering Partnership, Inc. (SFC) visited the project site on September 25, 2015 to observe and document the condition of the visible structure of the metal framed portions of the storage building. The intent of this work was to endeavor to identify potential difficulties associated with the proposed conversion of the property from a storage facility to a fire station.

The property consists of a storage building and a municipal building. Assessment of the Municipal building and surrounding land is outside the scope of this report.

The storage building consists of four sections and collectively has an approximate footprint of 160 feet wide by 40 feet deep. The original section was a wood framed structure reported to have been constructed in 1963. In circa 1974 there were two additions constructed; a wood framed office space was added to the southwest and four (4) bays of prefabricated metal building were added to the northeast. In circa 1984 another two (2) bays of prefabricated metal building were added to the northeast of the '74 addition.

**Observations:**

The original building had a footprint of approximately 22 feet x 30 feet. The majority its structure has been removed during the subsequent renovations/additions. The remaining portions consist of a length of bearing wall at the interface with the '74 wood framed addition and the slab on grade.

The prefabricated metal building portions consist of steel truss columns and beams at 20 and 25 on center respectively for the '74 and '84 additions. The truss columns are supported on pilasters cast into a concrete stem wall. The stem wall appears to be an extension of the perimeter foundation wall. The steel shapes comprising the trusses in the two sections differ but both consist of steel angles, channels, and bar stock. Spanning

between the trusses are steel “z” purlins. The roof assembly consists of an EPDM membrane and insulated panels spanning between the purlins.

The exterior wall of the prefabricated metal building consists of insulated metal panels. Apart from the southwest wall, where the panels are supported on a wood bearing wall the panels are supported on a concrete stem wall extending approximately two (2) feet above grade. The metal panels are braced by two rows of steel “c” wind grits spanning between the trusses.

The steel framing is in good condition. However it appears that portions of the truss bracing either were not installed or have been removed.

The exposed portions of the foundation wall are in good condition, with the exception of one pilaster located on the northwest elevation that has significant spalling. Several non-structural defects such as shrinkage cracks and honeycombing were also observed.

The slab on grade was placed in sections as the building was expanded. The depth of the slabs is unknown, but reported to be between 8 and 4 inches. In general the condition of the slab is reflective of the age of the section, the older being more deteriorated. However, no area observed appeared to require more than surface repairs.

The condition of the wood framed addition was not assessed as this section was represented to be programmed for demolition if the project advances. However we did note that a portion of the bearing wall between the two sections is supported on steel framing while the remainder is supported at grade. This wall supports both the roof of the wood framed addition and the southwest most bay of the metal building. Therefore if the wall is removed, a portion of the metal building will need to be either temporarily shored or removed and reconstructed.

#### **Code Analysis:**

The proposed change in occupancy from a garage to a fire station current will result in the building being assigned to a higher occupancy category. It will change from a Category II, Common Building to a Category IV, Essential Facility. Per Sections 907.2 and 907.3 this change will require that the existing structure be brought into full code compliance with the current snow, wind, and seismic loading requirements.

The design loads on the existing building are unknown, but based upon its age it is suspected that seismic effects were not considered. The design wind and snow loads were likely slightly reduced from that required for a Category II building in the current code. Due to the raised importance factors associated with the change in category the code loads for snow, wind and seismic will increase by 20%, 15%, and 50% respectively when considered as a Category IV building.

Based upon the magnitude of the increase in the loading, it is expected that many of the structural elements will be overstressed. As a result, it should be assumed that much of the structure will need to be reinforced or augmented.


**Conclusion:**

The general condition of the garage is good and it can continue to function in its current use with minimal repair. However, if its usage is changed to a fire station, it would require structural improvements. A more detailed accounting of the existing structure and analysis is required to determine the extent of these improvements. However, it is expected that it would be extensive.

As an alternative to reusing the existing facility, it is recommended that razing the structure and replacing it with a new pre-fabricated building or evaluation of an alternate site be considered.

Sincerely,

***SFC ENGINEERING PARTNERSHIP, INC.***




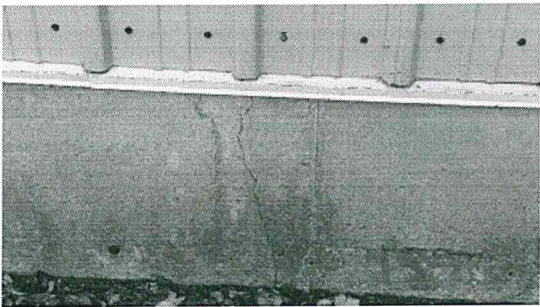
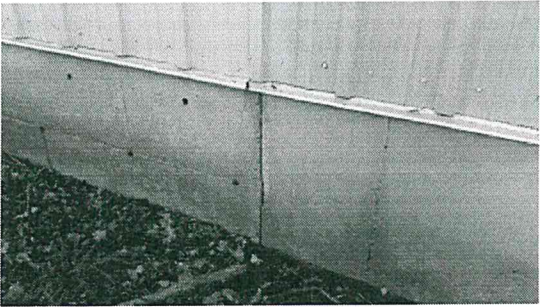
Eric R Kizak, P.E.  
Senior Structural Engineer



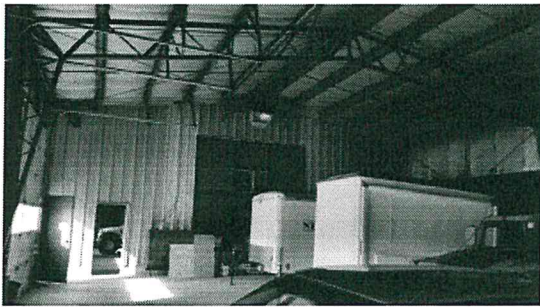
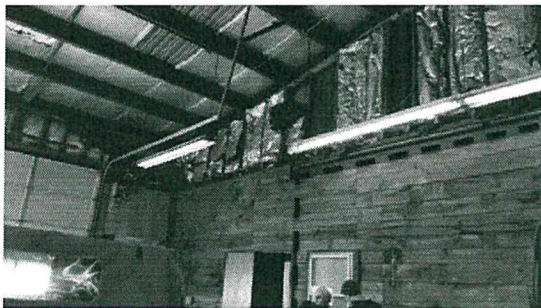
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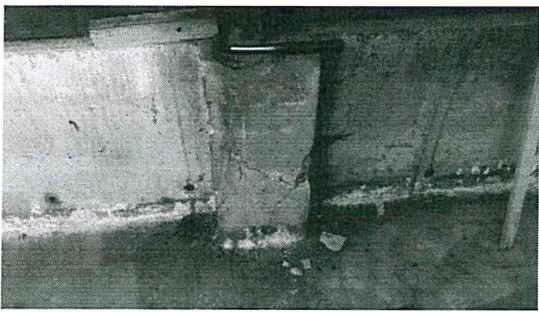
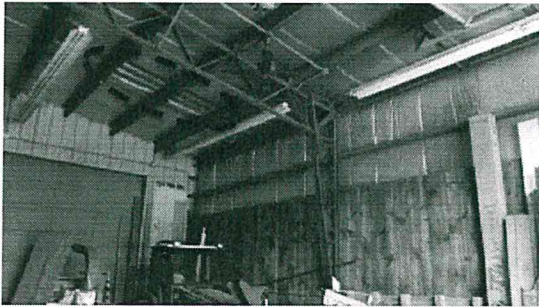
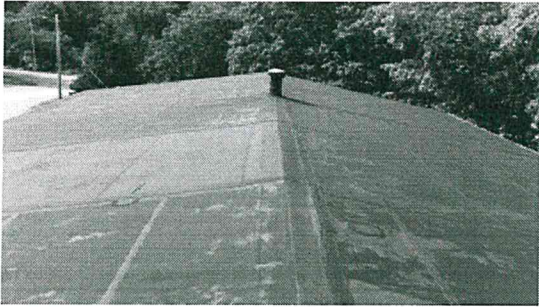


**8 Merrimac Rd, Newton, NH – Structural Condition Assessment**  
**Photo Index**  
**SFC Job No.: 639001**  
**September 25, 2015**

Photo No.		Description
1		General view of existing building.
2		Typical crack in the exposed concrete stem wall.
3		View of interface between the '74 and '84 additions.

4		Honeycombing in the concrete stem wall.
5		May of the overhead door jams have similar damage from prior vehicle impacts. The damage does not appear to have affected the structure of the building.
6		View of the interior of the '74 addition.
7		View of the interface between the prefabricated metal building and the wood framed addition. The Dashed lines indicated steel framing in the plane of the wall. The roof framing would need to be shored or removed when the wood framed addition is demolished.



8		Spalled pilaster supporting one of the truss columns.
9		<p>Typical view of the interior of the '84 addition. Note the framing of the trusses differs from those in the '74 addition.</p> <p>Note a section of the insulated panel has been replaced with a metal roof deck (circled).</p>
10		<p>General view of the roof of the prefabricated metal portion of the building.</p> <p>The EPDM appears to be in good condition. However some of the seams appear to be losing adhesion.</p>