Building Envelope Specialists
SPECIALIZED BUILDING CONSULTANTS

November 14, 2014

Mr. Keith McBey
Bonnette, Page & Stone
91 Bisson Ave.
Laconia, NH 03247

Re: Masonry Wall Construction Assessment at Belmont Mill

Dear Keith,

On November 12, 2014, Building Envelope Specialists (BES) performed an inspection of the masonry walls and selected framing members of the building known as Belmont Mill located in Belmont, New Hampshire. The purpose of the inspection was to create a basic understanding of the masonry's condition and to give an opinion regarding the integrity of the wall assembly.

Inspection Methodology

The inspection was visual in nature, however mortar picks, sounding hammers and moisture meters were used to enhance data gathering. Bonnet, Page and Stone provided 15 access locations that exposed the interior face of the masonry walls. Some locations involved removing sheetrock and insulation while other locations involved removing ceiling tiles.

Building History

The mill was originally constructed in 1833 to house a cotton spinning and weaving company. Over the years, additions and alternations were made to the exterior shell to accommodate adapt to use variations. A major fire in 1992 destroyed an addition attached to the south elevation of the building. The heat from this fire affected the masonry primarily at the first and second floors of the south elevation. The building remained vacant until 1995 when the Town of Belmont acquired the property. In 1998, the decision was made to save the building. To this end, various repairs to the exterior façade were made in subsequent years and the interior was redesigned to house mixed use.

Exterior Masonry Wall Construction Overview

The multi-wythe masonry walls are typical construction for this period of time. Each wythe is "locked" into the adjacent brick wythe by "row-locks" located at every 8 brick courses. This provides a strong interlocking masonry assembly. Consisting of a soft water-struck brick, sized at 1 ¾" x 3 ½" x 7 ½" set in a ¼" lime-mortar bed, the walls vary in thickness depending on the floor elevation of the building. The first floor exterior walls are approximately 20" thick; the second floor walls are approximately 16" thick while the third story walls narrow down to 14" thick. The gable ends of the north and south elevations are a new single wythe masonry wall backed up by a wooden framed wall assembly. Wooden support beams are pocketed into the masonry assembly where the beams intersect the exterior walls.

Observations

The core of the masonry walls (all wythes excluding the exterior wythe) assembly are solid, the mortar carbonation is complete providing adequate compressive strengths for the design of the wall, and "rowlocks" are well seated into the adjacent wythes thus providing a mass-load-bearing assembly. Moisture readings at all access points on the north, west, east and south elevations (above the first floor) recorded low levels of moisture in the masonry assembly. These levels are considered normal due to the porous nature of the lime-mortar and the original bricks. Mortar "pick tests" reveal no surface deterioration of the original mortar at all access points on the north, west, east and south elevations (above the first floor).

The exterior wythe of the masonry on all elevations is a mix of varying type bricks ranging from the original units to modern College-Blend water-struck units. The various brick units offer different compressive strengths, moisture absorption rates, and thermal expansion values. The blend of original and new masonry units have

added to the advanced aging of the façade. The pointing mortars are equally diverse. The building does retain a few good examples of the original pointing mortar but the balance of the mortar ranges in color, profile, compressive strengths, moisture absorption rates and workmanship. Much like the variety of masonry units, this variety of mortar types lends to the advanced aging of the exterior façade as well as creates a visually displeasing image.

The area of masonry assembly on the south elevation of the building below the second floor is the area subjected to the intense heat and conversely the rapid cooling as water was applied to extinguish the fire in 1992. When masonry assembly is subjected to the strong swings between heating and cooling, the masonry units become fractured and the mortar breaks down. Repairs after the fire appear to be limited to the first and second wythe of the assembly, but observations of the interior wall surface reveal the damage went much deeper. At the time of the repairs, this damage would not have revealed itself or it was not obvious. The interior masonry wall assembly is not solid. The mortar is a soft, sandy mass providing reduced compressive strengths for the design of the mass-load-bearing assembly. Moisture readings at three access points recorded high levels of moisture in the masonry assembly. These levels are considered abnormal as compared to undamaged wall sections. Mortar "pick tests" revealed excessive surface deterioration of the original mortar.

Area of Fire Damaged Masonry

Interior face of Fire Damaged Wall

Typical Moisture Readings on South Wall below Second Floor.

Conclusions

Overall the masonry wall assembly (with one exception) of the Belmont Mill is in good condition for the age of the building and is a viable building element in the renovation of the mill. The one exception is the masonry wall assembly subjected to the fire in 1992. This section of the assembly will need additional repair measures above the standard restoration repairs, but costs associated with the measures should not create a disproportional burden on the construction budgets. The variations with brick units and pointing mortars on the exterior façade is reversible and once completed, will create a uniform appearance as opposed to the current patchwork look.

If you have any questions, please call my office at 207-400-0086.

Regards,

Scott R. Whitaker

Scott R. Whitaker-President
Building Envelope Specialists, Inc.