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STRUCTURAL ASSESSMENT

OF THE

HIDDEN COVE DEVELOPMENT
BRANDRETH PILL FACTORY

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1.0 Executive Summary

Our office assessed the structural condition of the remaining buildings on the 19th century Brandreth Pill Factory campus in Ossining, New York on 15 August 2012 for the Hidden Cove development. The existing “Mill Building” is a three-story masonry building, constructed in several phases, that has fallen into disrepair. The purpose of our assessment was to determine whether it was structurally feasible to renovate the existing buildings for future residential use, or whether the condition of the structures warrants demolition.

The existing buildings are made of brick masonry bearing walls with wood floor framing. The wood floor joists typically span between the exterior walls to a center bearing wall. Miscellaneous supports for openings and other design elements are provided by masonry arches, wood or steel beams, and wood or masonry columns. The buildings are also situated in an area which has been designated as a Zone AE floodplain of the Hudson River.

The Mill Building has been exposed to the elements for some time and has suffered from water damage. Many of the windows have been broken out and sections of the roof have rotted away. The interior of the building has seen many seasons of rain and snow and seasonal freeze/thaw effects. The first floor has also been flooded from a ruptured water main.

The majority of the wood used in the Mill Building should be removed and replaced. Much of it, particularly at the roof and third floors, has rotted and is not structurally sound. The roof framing is in the early stages of collapse. The remaining wood has been exposed to enough moisture that it would be at risk of harboring mold. Much of the masonry has been damaged by water erosion and freezing. Masonry repair would require the reconstruction of many of the walls, pervasive crack repair, and replacement of damaged bricks.

As so much of the existing structure needs to be replaced in order to make the building safe for future occupancy, it is our recommendation that the building be razed. Damages have progressed to a state that it is no longer feasible to simply repair the structures, but that they need to be disassembled and rebuilt. Expected costs to complete a structural rehabilitation of the facility would easily exceed 2.5 to 3.0 times the cost of constructing a new facility of comparable size and construction on the same site.

2.0 Introduction

The Hidden Cove project, in Ossining NY, proposes a new residential development, a portion of which was to repurpose the existing structures of the 19th century Brandreth Pill Factory. The purpose of this structural assessment is to document the condition of the existing "Mill Building" structures and to establish the magnitude of their deterioration and the effort that would be required to rehabilitate, convert, and re-use the structures, or whether their current state requires demolition. The Mill Building is listed on the NY State and National Registry of Historic Places.

This report will summarize descriptions and opinions of the existing condition of the various structural systems comprising the Mill Building structure. Descriptions will include identification and location of deficiencies discovered from our evaluation. Photographic documentation is included to describe general

conditions and specific instances of note. In conclusion, the report will state our opinion on the current structural integrity of the Mill Building and our recommendations on whether to proceed with rehabilitation or demolition.

3.0 Description of Construction

The main intent of the structural assessment was to review the Mill Building, the principal structure remaining from the 19th century Brandreth Pill Factory. The Mill Building is a three-story masonry building that has had several additions. The current structure is in an L-shaped configuration and can be divided into three portions based on age (see Figure 1). The south wing is an extension of the short, west side of the building. This addition adjoins a party wall and has a tall smokestack at the southeast corner. The east wing is a newer extension to the long, north side of the building. It connects to the main building by a short connecting corridor, and is built over the brook that runs along the north side of the main building that was once used to turn the waterwheel that powered the facility. Also reviewed was the detached single-story Office building on the northwest corner of the site. Another remaining single-story out-building east of the Mill Building was not reviewed.

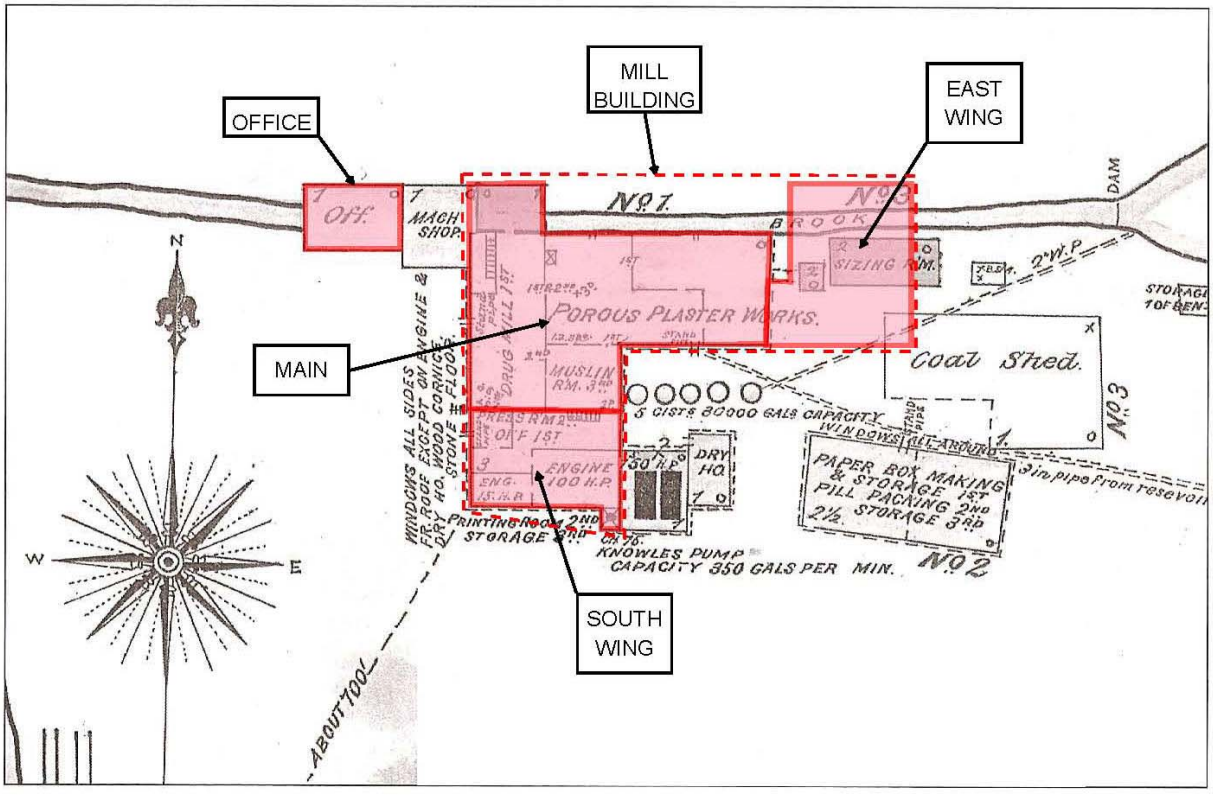

Figure 1 - Site Plan Indicating Existing Structures Remaining

The Mill Building appears to be founded on a stone masonry foundation, based on the exposed construction along the brook. The first floor is a slab on grade with no cellar or crawlspace. The upper

floors are constructed of wood floor planking spanning across wood joists. The joists are pocketed into load-bearing masonry walls down the center and around the perimeter of the building, or supported on interior girders. The masonry walls are of multi-wythe brick construction varying from approximately twelve inches to sixteen inches thick at the base, according to visible samples. Wall penetrations, such as doors and windows, are typically supported by brick arches. Interior joist support at openings and large interior spaces are provided through the use of timber or steel beams. These framing elements are in turn supported either by the masonry walls or by wood or masonry columns. The main building has a dormered mansard roof at the third floor with trussed roof structure to provide a column-less space at the third floor. The underside of the trusses are planked to provide what might be an attic floor.

Image 1 Mill Building – West Elevation

Image 2 Mill Building – East Wing North Elevation

The newer east wing is similar in construction to the rest of the building, being a masonry shell with wood framed floors. However, instead of joists spanning between the exterior walls and an interior support, a system of flitch beams (a composite beam consisting of a steel plate bolted between two wood joists) is used to create a large open room. The east wing's roof system also differs form the main building's shingled roof, constructed instead of corrugated metal roof deck supported by lightweight steel trusses.

4.0 Description of Damages

Image 3

The Mill Building, marked as "unfit for human inhabitation" by the Ossining Building Department, is in a state of disrepair. The principal source of damage appears to be water. The building, unoccupied for some time, has been exposed to the elements, seasonal effects, and the close proximity to the Hudson River estuary. All of the wood elements, exposed to water, are susceptible to rot or mold. Water infiltration through the masonry walls will erode them over time, but exposure to freeze-thaw effects opens and widens cracks and can destroy the structural integrity of the bricks.

Approaching the Mill Building from the northwest, the exterior of the building shows obvious distress. Sections of the mansard soffit are missing, the brick is cracked in many places with evidence of crumbling and missing brick and mortar around the base of the walls (see Image 4). Attempts have been made to correct some of the cracking in the past, evidenced by limited tuck pointing and a parging of the bottom two feet of the wall. Upon entering the building, the initial false impression of the first floor is that everything is in decent condition. However, moving into the main interior space adjacent to the courtyard and water wheel, damage due to water infiltration is much more apparent. The decking for the second floor appears to be generally water damaged, with localized areas that are rotting. Joists throughout appear to be structurally intact, though there are visible water stains. Joists at the localized areas of rot do appear to be compromised, including decay, cracking, and collapse in some locations.

Image 4 Typical Exterior Masonry Damage
(Main Building – West Entrance)

Joist bearing at interior masonry walls generally appears acceptable, but the masonry at the damaged areas was extensively cracked and decayed. The presence of moss on interior walls indicates persistent levels of high humidity (Image 5). In areas of obvious water infiltration, the bottom of the walls exhibit distress and decay including missing bricks and large amounts of masonry dust on the slab. The south wing has undergone some renovation which was incomplete. As a result, not all of the framing was visible and some repairs had been made.

Image 5 Typical Floor Framing and Masonry Water Damage (Main Building – Underside of Second Floor)

The masonry walls are all painted. Uniformly throughout the building, the paint has peeled off the bottom foot or two of the masonry. The peeling paint indicates moisture leaving the wall and is present even in areas where the bottom of the brick wall is elevated on a cmu pier or wall. The re-entrant corner of the building on the courtyard side appears to have suffered greatly. A large area of the floor is decayed, including damage to the joists, but also evident decay of the masonry arch supporting the joists framing from the north side (Image 6). The room adjacent to the water wheel had a standing puddle of water that covered most of the floor area of the room (Image 7). It appears that the central line of support for the second floor in this area was originally supported by a timber beam which is still in place. A newer steel beam has been installed directly under the timber beam supported by a sixteen inch square pier at the midspan. The steel beam and cmu pier appear to be in adequate condition except for possible water damage at the bottom of the pier.

Image 6 Water Damage at Joist Bearing on Masonry Arch
(Main Building - Underside of Second Floor)

Image 7 Standing Water in Wheel Room
(Main Building - Ground Floor)

The east wing appeared to be in generally better condition. In part, this is due to it being newer by approximately sixty years, but mainly there does not appear to be as much water damage. The bottom of the walls still exhibited peeling paint that is not present at the upper floors, and there are signs of water infiltration, but no large areas of rot in the second floor framing. At the second floor, some areas of the

flooring felt soft and weakened, but the supporting joists and beams felt solid. There is some water staining on the walls, but not nearly the degree of distress visible in the remainder of the building. From the second floor window of the east wing it is possible to view the east exterior wall of the main building. The masonry is very damaged, with evident cracking, decayed brick and mortar, and missing bricks, some of which are absent from the arch over the window (see Image 8).

Image 8 Typical Exterior Masonry Damage
(East Elevation of Main Building from East Wing)

The second floor of the main building is generally not in good shape (Image 10). Sections of steel check plate have been installed as a wearing surface for heavy traffic areas. The round wood posts seemed to be undamaged. While the top of the second floor confirms the observations of damage noted from below, the underside of the third floor is worse. Water damage is much more extensive, though focused at specific areas, the effected areas are larger than noted below. Damage to joists is also more apparent, with more rot and cracking. Cracks in the masonry are generally larger and more numerous (Image 9). Bearing ends of joists in damaged areas look less intact and more cracking and decay of the masonry is also apparent (Image 11). Timber beams seem to be in generally acceptable condition. Lichen is visible growing in patches on the floor. Holes had rotted through portions of the third floor decking. The west side of the building is in particularly bad shape. This area is where the exterior soffit is missing below the dormers. The floor is damaged with extensive amounts of flora growing on it (Image 12). A large width of the third floor framing shows water damage and rot adjacent to the exterior wall. The masonry is heavily cracked and decayed.

Image 9 Masonry Damage
(Main Building – Second Floor)

Image 10 Typical Water Damage
(Main Building - Second Floor)

Image 11 Water Damage at Joist Bearing
(Main Building - Second Floor)

Image12 Water Damage and Flora
(Main Building - Second Floor, West)

Image 13 Floor Damage
(Third Floor transition to South Wing)

The third floor is severely damaged (Image 17). The wood flooring of the west room has expanded so much from moisture that it has bulged the planks in the center of the room (Image 18). Many areas of the floor have rotted through. A joist at the transition into the south wing had fallen recently (Image 14) and the floor is decayed around the door (Image 13). Sections of the floor in the south wing had also decayed. At the re-entrant corner of the courtyard, the roof framing had rotted through at a connection. The framing members were supported by temporary shores bearing on the third floor deck (Image

15). While the joists of the attic were decked over, enough sections had rotted out that the roof framing was visible and the large sections of roof that had also decayed (Image 16). The connections for the center roof truss did not appear to be structurally sound. It appears that the roof is close to collapse, which will lead to a progressive collapse of the main building. The roof of the east wing, however, appeared to be intact (see Image 19).

Image 14 Recently Fallen Roof Joist
(Third Floor at Transition to South Wing)

Image 15 Partially Collapsed Roof Framing
(Main Building – Third Floor)

Image 16 Typical Roof Damage
(Main Building – Underside of Roof Framing)

Image 17 Typical Water Damage Below Mansard Framing
(Main Building – Third Floor)

Image 18 Flooring Expansion Damage
(Main Building – Third Floor)

Image 19 Metal Roof Trusses and Decking
(East Wing – Underside of Roof)

5.0 Description of Required Renovation

The building has been open to the elements for some time (Image 20). Rain and snow have had free access to the interior of the building and have slowly been rotting and eroding the structure. Moisture trapped in the masonry walls during the winter freezes and expands damaging the masonry and causing it to decay. Apparently, a lot of decay has happened in the last ten years, and the rate of decay can be expected to continue to increase. Several single-story out-buildings that looked intact apparently collapsed when nudged by a backhoe. The Mill Building may be in a similar state of decay.

In order to rehabilitate the existing structures, such that they could be structurally viable for residential habitation, all of the wood construction for the main and south wing of the building should be replaced and much of the masonry. The roof of the main building is no longer intact. What remains of the roof and roof framing should be removed and replaced, including the mansard framing and the removal of the existing cornice. The metal roof trusses of the east wing may be salvageable, but the metal roof deck should be replaced. All of the floor deck throughout the building for the second and third floors is either rotten or has sustained water damage and should be replaced. While very few of the floor joists appear to be structurally sound, most of which frame the second floor, a significant percentage show signs of decay, and almost all are likely to grow mold due to the moisture exposure. It is recommended, therefore, to replace 100% of the floor joists instead of trying to pick out the few that could remain yet still have the potential for future mold issues. The flitch beams framing the floors of the east wing appear to be in fair condition and may be salvaged. However, their structural capacity may be inadequate for re-use without further reinforcing.

Image 20 Main Building – North Elevation

The extent of the masonry damage has exceeded that which could be remedied by tuck pointing and localized crack repair. Significant portions of the bearing walls and piers require either rebuilding or reinforcement. Reinforcement of walls not too badly decayed could entail regularly spaced masonry anchors drilled into the walls to tie the wythes together, the addition of horizontal and vertical steel reinforcing bars or wire mesh, and a thickness of concrete applied to the interior wall surface to bond with the masonry and to replace strength lost to deterioration. Much of the exterior masonry would need to be replaced or reworked to correct cracking and missing and decayed bricks. In cases where the mortar has deteriorated, the bricks will need to be relayed. It is very likely that, during the course of such work, it will be found that the integrity of the brick has been compromised through the thickness of the walls, especially at the base by standing and freezing water. In these cases, which can be expected to be much of the main building, the masonry will need to be shored and reconstructed. The costs of such extensive work are only to make the structures adequate for use, and do not include work required for restoration or floodplain influence, which would be significantly greater.

Structurally, the Office building appears salvageable. This structure has been maintained and appears to require only maintenance level repairs to the masonry and wood framing. It may also be necessary, for lateral stability, to replace the ties that were removed with the original ceiling framing. However, the structure currently sits in the floodplain.

The existing structures occupy a Zone AE floodplain. In order to renovate the structures for use, they would need to be raised to an elevation approximately three feet above the flood elevation. In order for this feat to be performed, the structures would need to be stabilized structurally, which is arguably unachievable in their current condition, reinforced to accommodate being raised or moved, and then lifted onto a new foundation designed per current code requirements. While zone AE floodplains do not require pile foundations, piles may be required due to soil conditions.

6.0 Conclusion

Due to the encompassing nature of the required rehabilitation, it does not appear feasible to salvage the existing structure. Instead, it is our professional opinion that the structures be razed. Had renovation work commenced ten years ago, perhaps the building could have been salvaged. In its current state, however, renovating all but the east wing of the Mill Building requires essentially rebuilding the entire structure. While portions of the east wing and the office building could be salvaged, in order to use them in the proposed project they would need to be raised above the floodplain. The additional costs required to repair, reinforce, and move such a small portion of the facility do not appear viable.

We are not construction cost estimators and cannot accurately itemize costs involved in a complete structural rehabilitation/repair effort of the existing facility. However, we can confidently state that costs involved in such efforts (excluding costs for historic restoration and floodplain remediation) would easily accumulate to a minimum of 2.5 to 3.0 times that of constructing a new facility of comparable size and construction on the same site, inclusive of structural demolition costs of the existing unsafe structure.