December 4, 2020

Mr. Eric J. Heideman
Assistant Town Manager
Westford Town Hall
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Westford, MA, 01886

Tel: 978.692.5501 x1
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Proj: Limited Structural Assessment of 12 North Main Street, Westford, RFQ #20-15
Re: Limited Structural Assessment Report
CBI Job No. CB200291

Dear Mr. Heideman

In accordance with our Contract, CBI Consulting, LLC, a SOCOTEC Company (CBI), has prepared this limited structural building assessment of the abandoned historic mill building located at 12 North Main Street in Westford, Massachusetts.

Introduction

CBI received authorization to proceed on June 25, 2020 and performed the limited visual field survey at 12 North Main Street, Westford, Massachusetts on July 15, 2020. CBI understood that the interior of the building was not accessible due to safety concerns, and the structural assessment was limited to physical access at the exterior perimeter of the building only. CBI enlisted the assistance of Caledonian Corporation (Caledonian), who provided exterior access to the building via aerial lift, and MS Aerial, who provided exterior and interior documentation of the building via use of drone footage. CBI understood that the goal of the project was to review the existing structure in its current condition, identify any immediate public safety concerns at the site, and develop options for stabilization, partial demolition, and full demolition as part of the historic preservation program. An additional focus of this report is recommending repairs and stabilization in order for the Town of Westford's LSP, Environmental Strategies & Management, Inc. (ESM), to gain access into a portion of the interior of the building in order to safely to complete their groundwater study.

Background Information

After familiarizing ourselves with the Request for Qualifications (RFQ) titled "RFQ #20-15 Structural Design Services for 12 North Main Street Project", visiting the site on March 7, 2020 & July 15, 2020, and meeting with you via teleconference on April 7, 2020, we understand that the Town of Westford took ownership of the 12 North Main Street property as a result of non-payment of property taxes. The mill was originally constructed in 1858 and is approximately 32,000 square feet in size. The prior use of the building included light industrial and manufacturing operations.

The Westford Board of Selectmen formed the 12 North Main Street Task Force in 2014 to address public concerns over the condition of the abandoned mill building located at 12 North Main Street in the Graniteville Historic District. They prioritized the cleanup of this site as a critical goal for the Town. The task force was comprised of representatives from the Board of Selectmen, Planning Board, Board of Health, Finance Committee, Historical Commission, Economic Development Committee, Affordable Housing Committee, Community Preservation Committee, Town Manager's office, Graniteville residents, and residents at large. The granite mill building has been an iconic structure in the neighborhood for generations. It was built by Charles G. Sargent and Francis Calvert in 1858 and was used primarily by the Abbot Worsted Company until 1956. Fiber Materials Inc. and other companies occupied the building until a major fire in 1975. Westford Anodizing Corporation rebuilt and occupied the building from 1977 to 2005, and the building has been vacant since 2005.

Previous surveys were completed by the MassDEP, ESM, and Structures North Consulting Engineers, Inc. to document existing conditions and to provide recommendations regarding the integrity of the building. The 12 North Main Task Force requested Community Preservation Funding at the Special Town Meeting held on October 19, 2015. This funding was utilized for historic preservation and rehabilitation purposes following the collapse of a large portion of building's roof structure. The Task Force procured services to install shoring under the lower level floor joists, which had deteriorated significantly from being exposed to the outdoor elements. The chimney height was also decreased due to safety concerns with falling bricks and associated masonry. A crane service was hired to remove a large amount of debris from the interior of the building, including the roof structure that had collapsed. Upon completion of debris removal with the crane, the contractor then utilized smaller equipment and personnel to remove further items and trash from the lower level of the building.

Since 2016, the Town has released three (3) requests for proposals to sell the property to a private party for possible redevelopment, including preserving several historic aspects of the building. The Town was unable to find someone interested in taking on the project given its complicated site layout and the anticipated hazardous material cleanup costs. The building continues to degrade and has nearly lost the entire roofing system.

The interior of the building was not accessible at the time of this study due to safety concerns, therefore CBI was limited to a visual review of the interior via lift and areas accessible to the drone. The North Addition, which still has an existing roof, was not accessible, and therefore was not reviewed as part of this study. Additionally, due to the power lines running parallel to the building along North Main Street and Broadway Street, CBI was limited to operating the aerial lift along the south elevation, east elevation, and a small section of the north elevation up to the Bell Tower.

CBI enlisted the assistance of four (4) subconsultants for this study. Caledonian, a masonry contractor, provided exterior access to the building via aerial lift. MS Aerial performed a drone survey of the building and smokestack to provide video and imaging documentation for CBI's review. Fuss & O'Neil, Inc. (Fuss & O'Neil) provided hazardous building material consulting services to work with CBI and the Town's LSP to provide key insight for abatement procedures and requirements as well as cost estimating. These services did not include testing of any materials. Finally, PM&C provided CBI with construction cost estimating consulting services.

Purpose

The purpose of this study is to develop a conceptual plan for the Town to understand the scope of work and relative cost associated with stabilization, partial demolition, and full demolition of the building, as well as to provide the Town of Westford's LSP, Environmental Strategies & Management, Inc. (ESM), guidance for stabilization efforts in order to gain access into the interior of the building to complete their groundwater surveying study. Additionally, CBI documented the existing conditions of the building that were accessible with the drone, lift, and by viewing conditions through open windows and doors while remaining on the exterior of the building. This report explains our methodology and approach to perform this study, and provides recommendations for next steps to remedy potential public safety concerns observed throughout the building.

Methodology

CBI began this study by meeting with the Town and 12 North Main St. Task Force. CBI used the information gathered from the meeting, and our review of the existing documentation to establish that the team needed to effectively document the building given the site-specific limitations. CBI utilized in house Structural Engineers, Building Envelope Consultants, and Architects. Additionally, since this is a historic structure (not designated but construction in 1858) and is located in a Historic District, it was imperative that CBI have personnel on the team experienced with historic buildings and the personal skills to work with and ask the right questions.

CBI understood that the interior of the building was not accessible due to safety concerns at the time of the study, so the structural assessment was limited to the exterior of the building. CBI engaged the assistance Caledonian, a masonry contractor, to provide vertical exterior access to the building via aerial lift and MS Aerial, a drone surveying firm, to perform a drone survey of the building and smokestack to provide video and imaging documentation for CBI's review. CBI also employed Fuss & O'Neil, Inc. (Fuss & O'Neil) to provide hazardous building material consulting services to work with CBI and the Town's LSP to provide key insight for cost estimating. Lastly, CBI engaged PM&C to provide construction cost estimating expertise.

With the appropriate team established, CBI performed a limited visual and physical inspection of the structure on July 15, 2020, in which CBI and the team verified measurements as well as documented the condition of structural systems, materials, and finishes that were accessible. CBI probed mortar joints from the ground and the lift, and visually reviewed the condition of the building materials in order to more fully understand the exact nature of the structural problems. Caledonian assisted in operating the aerial lift during the investigation, and at our direction, navigate to portions of the building where the existing construction was exposed so that we could examine actual conditions and compositions, such as wall thicknesses and construction, building materials, and concealed building system elements. The aerial lift was also used to assist the drone operator in navigating the drone in and around the Smokestack, inside east portion of the central mill, and around the Bell Tower. This was critical to allow the drone operator to maintain a line of site without losing GPS signal. The information gathered during the review of previous studies and reports was combined with the field observations to develop conclusions and recommendations including, structural inadequacies, stabilization, partial demolition, remedial measures and items requiring further investigation.

Document Review

CBI reviewed all of the existing documentation provided by the Town of Westford, and all of the existing documentation that was accessible on the 12 North Main Street Task Force website. The major reports, drawings and letters reviewed were as follows:

Document	Author / Designer	Date
Action Administrative Record Letter	Town of Westford, Board of Health	*March 13, 1992*
Mass DEP Compliance Report	MassDEP	*April 12, 1994*
EPA Enforcement & Compliance Assurance Report	Environmental Protection Agency	*July 1998*
RFQ #20-15	Town of Westford	*March 11, 2020*
Limited Soil Assessment Report	Watermark	*January 2014*
Hazardous Building Materials Survey Report	Axiom Partners, Inc.	*September 24, 2014*
Plans for Smoke Stack Stabilization	Structures North Consulting Engineers, Inc.	*November 16, 2015*
Plans for Floor Stabilization	Bargmann Hendrie + Archetype, Inc.	*November 16, 2015*
Presentation to Public	Bargmann Hendrie + Archetype, Inc.	*September 24, 2015*
Presentation to Task Force	Bargmann Hendrie + Archetype, Inc.	*July 22, 2015*
Matrix of Preservation Options	-	*September 25, 2015*
Preliminary Structural Report	Structures North Consulting Engineers, Inc.	*July 20, 2015*
ASTM Phase I Environmental Site Assessment	Environmental Strategies & Management, Inc.	*April 7, 2015*

Building Examination

For consistency, CBI has used the same nomenclature as Structures North for the different components of the building. Therefore, when looking at the building in plan, north is directed towards the top of the page, and North Main Street runs in the east-west directions. The building is separated into the following components:

- Central Mill – The main two (2) story stone wall construction of the mill running in the east-west directions that are separated by a stone and brick construction demising wall running in the north-south directions. CBI observed the construction to be fieldstone of various shapes and sizes, wet laid with a lime and sand mortar. The roof of this building component has completely collapsed, with various areas of first floor decking collapsed as well. The roof and walls are/were timber framed construction, with sawn lumber beams that

pocket in the perimeter stone walls and are supported by timber columns with additional supplemental timber posts supporting the span.

From previous reports, it is CBI's understanding that the basement floor construction is a concrete slab on grade, with exception to areas of the floor with wood framed construction over the concrete pits recessed into the floor slab. Additionally, the roof was a replacement roof system from the original roof and was constructed of gang-nail plated wooden trusses that clear san from north to south.

- North Addition – The North Addition is located north of the Central Mill, running adjacent to North Main St. This section of the building is of similar construction to the Central Mill, comprised of various sized and shaped fieldstones wet laid with a lime and sand mortar.

  CBI was not able to review the interior of the building but based on the Structures North report, the basement floor is constructed of a concrete slab on grade. The first floor is constructed with wood deck supported by timber beam framing that runs in the north-south direction between the perimeter walls and in line of center columns at the interior, similar to the Center Mill. This framing consists of rough sawn timbers in the majority of the structure and rolled wrought iron or steel I beams in the west end.

  The main roof is constructed with sawn lumber beams and low slope rafters, supported on interior timber posts and bearing walls, and the stone walls at the perimeter. There is a small single-story wood framed addition at the very east end of the North Addition that is even with the "transition" level at the North Addition's east end. The perimeter walls are typically constructed with varying sizes and shapes of fieldstone stone masonry that is wet laid with a lime and sand mortar.

- Bell Tower – The Bell Tower is comprised of brick masonry and stone masonry perimeter wall construction ascending from about the eastern third point of the front bay of the North Addition. This has two (2) enclosed levels above the main roofline that are wood framed infills between the brick masonry perimeter walls, along with an open wood framed belfry at the top.

- Smokestack – The Smokestack (stack) is attached to the North Addition's west end, adjacent to the intersection of North Main St. and Broadway St. The Smokestack is a round stack with a square base. The square base is constructed of multi-wythe clay brick masonry while the shaft is constructed with buff hollow cored radial brick. Based on the 'Smoke Stack Stabilization' design drawings by Structures North dated November 16, 2015, at least four (4) courses of the Smokestack were removed, and eight (8) 8" x 8" x 8'-0" long pressure treated timber dunnages were placed vertically around the top of the stack, held in place with 3/8" diameter wire rope and turnbuckles. Although not indicated on the design drawings, CBI observed the top of the brick was covered with a parge coating of mortar.

- South Wing – The South Wing is an ell extension to the south of the Central Mill that runs parallel to Broadway Street, with the southwest corner adjacent to the river. This section of the building is of similar construction to the Central Mill, comprised of various sized and shaped fieldstones wet laid with a lime and sand mortar. Based on previous reports, the basement floor is a concrete slab on grade. The first floor and roof construction are comprised of sawn lumber spanning in the east-west directions supported by the perimeter stone walls. A majority of the existing roof system is still in place, with exception to various isolated areas where the wood plank deck has deteriorated creating voids.

Observations

While on site, CBI observed the following existing conditions:

- In general, the existing mortar joints were observed to be in poor condition throughout the building and have the consistency of sand to the touch. The mortar joints at the Bell Tower appear to have been repointed and from the ground appeared to be in good condition. However, based on up close physical inspection from the lift, are also deteriorated, having a sand-like consistency behind the thin layer of more recently applied mortar.

- CBI observed that the existing roof system, once covering the Central Mill, has since completely collapsed. It is CBI's understanding that some of the material and debris from the collapsed roofing was removed during

the 2015/2016 stabilization efforts. This is most notable in the area of the Central Mill to the east of the stone demising wall running north south. Based on previous reports and photos, a portion of the gabled roof to west, above Broadway St., was left in place during the stabilization efforts, and it is CBI's understanding that the gable end has since been purposefully pushed over into the interior of the building as it was determined to be a public safety hazard. These materials are still observed to be in place resting on the first-floor framing at the west end of the Central Mill.

The roof systems on the North Addition and South Wing were observed to be in poor condition but are still intact, with exception to isolated areas, where the timber plank deck has deteriorated creating voids in the roof system. The roof covering the bell tower was observed to be in fair to poor condition.

- The first-floor framing of the Central Mill was observed to be in poor condition and has been exposed to the elements since the previous stabilization efforts in 2015/2016. Based on the 'First Floor Stabilization' plan dated November 16, 2015, developed by Bargmann Hendrie + Archetype, Inc. (BHA), new 6"x6" and 8"x8" timber shoring posts were added to support the first-floor framing above in the Central Mill. Two (2) rows of timber posts were added beneath the midspan of each timber beam, on either side of the existing column line 'C' which runs in the east-west direction at the center of the Central Mill. CBI was unable to physically review the existing shoring, but from drone footage, the existing timber posts appeared to be in good condition.

  CBI observed the original timber beams, and plank decking to be in poor condition and deteriorated with signs of wood rot and moisture damage. This is typical of the existing wood framing throughout the building.

- At the south side of the building, where the south perimeter wall of the Central Mill meets the South Wing, the stone wall and brick masonry was observed to be deteriorated. This section of the wall, approximately 30 feet in length, appears to have collapsed down to the first-floor framing at some point since the previous stabilization efforts. The mortar at these areas was observed to be missing and has likely eroded over time due to exposure to rain, snow, and freeze thaw leaving some areas of the wall held in place by abandoned embedded steel that is showing signs of oxidation (rust).

- A granite stone band was observed along the perimeter of the Central Mill stone wall. The stones were observed to be in good condition, but stones were observed to be missing in various locations, undermined by deteriorated mortar, and/or leaning to the exterior of the building and pose potential fall hazards.

- The punched window openings were observed to be framed with a granite stone lintel above the window opening on the exterior of the building, and timber header beam on the interior. The timber headers were observed to be in poor condition and in many locations have deteriorated, which resulted in undermining and collapsing of the stone or masonry construction above.

- In general, the wood framed Bell Tower was observed to be in fair condition. The wood construction is in need of repair, and while on site CBI observed some planks of loose wood trim, and fascia hanging from the bell tower, which Caledonian safely removed due to concerns of a potential fall hazard.

- Using drone footage, CBI observed that the interior and exterior mortar joints of the smokestack are severely deteriorated and missing in some areas.

- CBI observed a separation crack in the south wall of the south wing of the building, indicating that the wall is leaning away from the building towards the river below.

Discussion

The 12 North Main St. Task Force requested that CBI initially focus our efforts on working with ESM and the Town to provide safe access to isolated areas of the Central Mill in order to complete the ground water survey study. ESM provided CBI with a plan of proposed boring locations, attached to the end of this report, with six (6) proposed test borings in the Central Mill. Five (5) of these test boring locations are located to the west of the north-south demising wall, with one (1) location to the east and adjacent of the demising wall. It is CBI's understanding that all the materials on site are to be considered hazardous material containing since the materials have been exposed to weather for an extended period of time (5+ years). Because of this, any materials that are assumed to be touched at the interior of the building must be considered hazardous and must be abated. Due to the unique nature of the project, F&O

advised CBI that a Non-Traditional Asbestos Abatement Work Plan will need to be developed and submitted to the MassDEP for review and approval prior to performing any work on the building. In this work plan, we recommend that training be coordinated for any workers who will be performing the testing or providing contractor assistance. All of the materials will likely need to be bulk loaded and removed from the site for bulk abatement. As this can become costly, CBI has provided two (2) options for cost estimating to provide access to the interior of the building (Conceptual floor plans attached). In both options, materials and debris that are resting on the first-floor framing to the west of the Central Mill demising wall will need to be removed and abated. Per ESM, the preferred testing equipment to perform the borings is a Geoprobe 54LT direct push machine, which is approximately 2,500 pounds and is approximately 34.5" wide x 87" long.

Option one (1) is the scenario which provides ESM with access to all of their requested test boring locations. In order to do this and limit the materials that need to be abated, CBI recommends that the existing loading dock door be used to the east of the demising wall in the Central Mill to access test boring location six (6), and widen the existing doorway to provide access to the west of the demising wall to access test boring locations one (1) to five (5). Once the doorway has been widened on the west side of the demising wall, and adjacent first floor framing beams supported, a temporary steel traffic plate, or diamond plated steel bridges be placed to provide access for ESMs boring machine into the building over the section of wood framed floor that is determined to be structurally unstable on previous reports. The boring machine can follow the proposed pathway as shown in the attached conceptual floor plans, to limit the footprint and abatement required in the interior of the building. All materials that are assumed to be touched or otherwise disturbed by workers and the machine in the pathway will need to be abated ahead of time. This includes abandoned equipment and other debris in the basement level that is obstructing the pathway. Temporary diamond plated ramps can be used to provide access for the machine to the concrete recessed pits below. The pits are assumed to be filled with rainwater and will need to be removed from the pit and abated prior to access with the boring machine.

To the east of the demising wall, a majority of the abandoned equipment has already been removed during the prior stabilization efforts which will minimize the amount of material that will need to be abated. CBI proposes using the existing loading dock door opening to provide access for the boring machine to the interior of building.

CBI worked with ESM to provide a second option that would limit the area of the building that needs to be abated in order to reduce cost. CBI proposes containing all the boring test location to the one (1) room of the Central Mill to the west of the demising wall. This will eliminate test boring location six (6). ESM advised CBI that the priority is to access the three (3) boring locations adjacent to the north perimeter wall, and that there is a possibility that the remaining two (2) boring locations adjacent to the south perimeter wall can be moved to the exterior of the building to the south. This will limit the abatement to draining the water from one (1) recessed pit location, and limit abatement to one (1) room.

After reviewing the cost estimate for the two (2) above mentioned options, it was determined that the cost to complete the work exceeded the funds budgeted for the project and therefore the groundwater survey will no longer be feasible to complete in the 2020 Fiscal Year. CBI was directed to complete our evaluation by providing the conceptual plans for stabilization, partial demolition, and full demolition of the site such that the Town of Westford can make an informed decision.

CBI prepared three (3) conceptual options, based on the information provided, and observed while on site. Conceptual plans for each option can be found for review at the end of this report. The three (3) options are as follows:

Option 1 – Make Safe Repairs - Partial Demolition: The scope of work for this option is as follows:

- Provide 100% abatement of materials. Clean, stack, and store salvageable granite stones, and field stones on site.
- Demolish South Wing and Central Mill as shown down to the concrete slab. Allow 1-month while cast in place concrete slab is still in place for Town's LSP to complete their groundwater survey.
- Remove existing cast in place concrete floor slab and pits.
- Regrade site to prepare for potential future development.
- Provide approximately 15-foot-high reinforced concrete wall and footing (height includes sub grade portion) to support adjacent roadway, Broadway Street.
- Sawcut existing stone wall one foot from the demising wall down to grade.
- Demolish, abate and salvage central mill stone demising wall down to just above first floor level framing.
- Provide and secure protective netting over the top of remaining walls; typical.

- Provide New Diagonal W12 Steel Kicker Braces with concrete cast in place footings to stabilize demising wall.
- Demolish, abate, and salvage central mill stone wall to the east of the central mill demising wall down to just above first floor level framing.
- Provide new Steel Beams, pocketed into existing masonry wall on each end, at 16'-0" o.c.
- Provide and secure protective netting over the top of remaining walls; typical.
- Provide plywood sheathing and timber framing as needed to close off existing wall and roof fenestrations.
- Provide 100% deep repointing of all existing stone and masonry walls supporting the bell tower and north addition.
- Provide Ice & Water Waterproofing roofing membrane over roof penetrations/failed roof locations to mitigate water infiltration to the interior of the building.
- Check bell tower for any loose building materials, including but not limited to decorative iron items, asphalt shingle roofing, wood framing or wood trim, or other roofing materials. Resecure building items and provide supplemental wood framing as required.
- Perform further investigation to interior of north addition and determine if additional repairs or supplemental framing is required.
- Provide protective netting over North Addition, secured to cast in place concrete footings on each side of building.
- 100% re-pointing of existing masonry chimney. Replace cracked or otherwise deteriorated brick.

Option 2 – Limited Historical Preservation - Partial Demolition: The scope of work for this option is as follows:

- Provide 100% abatement of materials. Clean, stack, and store salvageable granite stones, and field stones on site.
- Demolish South Wing and Central Mill as shown down to the concrete slab. Allow 1-month while cast in place concrete slab is still in place for Town's LSP to complete their groundwater survey.
- Remove existing cast in place concrete floor slab and pits.
- Regrade site to prepare for potential future development.
- Provide approximately 15-foot-high reinforced concrete wall and footing (height includes sub grade portion) to support adjacent roadway, Broadway Street.
- Provide New Diagonal Steel Kicker Braces with concrete cast in place footings to stabilize Bell Tower & North Addition South Wall.
- Provide plywood sheathing and timber framing as needed to close off existing wall and roof fenestrations.
- Provide 100% deep repointing of all existing stone and masonry walls supporting the bell tower and north addition.
- Provide Ice & Water Waterproofing roofing membrane over roof penetrations/failed roof locations to mitigate water infiltration to the interior of the building.
- Check bell tower for any loose building materials, including but not limited to decorative iron items, asphalt shingle roofing, wood framing or wood trim, or other roofing materials. Resecure building items and provide supplemental wood framing as required.
- Perform further investigation to interior of north addition and determine if additional repairs or supplemental framing is required.
- Provide protective netting over North Addition, secured to cast in place concrete footings on each side of building.
- 100% re-pointing of existing masonry chimney. Replace cracked or otherwise deteriorated brick.

Option 3 – Full Demolition: The scope of work for this option is as follows:

- Provide 100% abatement of materials. Clean, stack, and store salvageable granite stones, and field stones on site.
- Salvage existing historic mill bell from the Bell Tower before demolition.
- Demolish South Wing, Central Mill, North Addition, Bell Tower, and Chimney as shown on the conceptual drawing plans down to the concrete slab. Allow 1-month while cast in place concrete slab is still in place for Town's LSP to complete their groundwater survey.
- Remove existing cast in place concrete floor slab and pits.
- Regrade site to prepare for potential future development.

Due to the infinite range of demolition and partial demolition options, CBI worked with PM&C to break down the cost estimate line items such that it provides the data for the Town of Westford for future use. However, should any variations of these options be considered in the future, CBI recommends additional review by CBI and PM&C for scope and cost impacts.

Conclusions & Recommendations

In general, the 12 North Main St. building construction is observed to be in poor condition. CBI recommends the following make safe repairs be made, and further investigation be performed:

- Engage Structural Engineering and Hazardous Materials Consultants to develop bidding documents, including design drawings and a Non-Traditional Asbestos Work Plan (NTAWP), that can be submitted to the MassDEP for review and approval in order to provide ESM access to the interior of the building to finish their groundwater study.

- Engage a masonry contractor, and crane, to access the Bell Tower to remove or secure any materials that may pose as potential fall hazards. Additionally, the existing brick masonry smokestack requires deep mortar joint repointing from the exterior. Once the building has been determined safe for interior access, the interior of the Smokestack should also require 100% deep mortar joint repointing to ensure long term structural stability of the structure.

- With an approved NTAWP, CBI recommends that the remaining materials and debris resting on the first-floor framing at the west end of the Central Mill be carefully removed and abated as specified in order reduce the excess load acting on the existing first-floor framing. The contractor is to be careful not to damage any of the existing first floor structural framing during this process. Additionally, the contractor shall safely remove and abate the materials and debris that will potentially impede or be touched by any personnel during the completion of the groundwater study. This includes contractors, consultants, and machinery. See Appendix B for conceptual work plan.

- Once the central mill debris and have been safely removed from the site, CBI recommends a further evaluation of the first-floor framing to verify if there are any newly exposed areas that may require additional support for long term stability.

- At the south side of the building, where the south perimeter wall of the Central Mill meets the South Wing, the stone wall and brick masonry was observed to be deteriorated. CBI recommends that all of the loose stone, masonry, and embedded steel on this section of the wall, which is approximately 30 feet in length, be removed.

- A granite stone band was observed along the perimeter of the Central Mill stone wall. The stones were observed to be in good condition, but the stones were observed to be missing in various locations, undermined by deteriorated mortar, and/or leaning to the exterior of the building and pose as a potential fall hazard. CBI recommends at a minimum that a layer of mortar be placed along the top of the Central Mill perimeter wall in order to temporarily secure loose stone and masonry construction until further repairs can be made. This section of the wall appears to have collapsed at some point since the previous stabilization efforts down to the first-floor framing.

- CBI observed a separation crack in the south wall of the south wing of the building showing signs that the wall is leaning away from the building towards the river below. CBI recommends a further investigation be performed to determine the source of the cracking, and if necessary, provide repair options to mitigate further deterioration of the wall.

- CBI recommends that a further investigation be performed to the interior of the building has been determined safe for entry to provide more conclusive recommendations on the long-term potential of the historic mill building.

We believe that this report clarifies the current condition and immediate concerns that need to be met in order to provide interior access for ESM to complete their groundwater study. Once the results of this study have been determined, and the Town, including the 12 North Main Street Task Force, will have a better understanding of the extent of hazardous materials on the site and further investigations can be performed to provide long term recommendations, programming, and associated cost estimates to meet the current and future needs of the Town.

Best regards,
CBI Consulting, LLC

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Enclosures:
Appendix A – ESM Requested Boring Locations
Appendix B – Conceptual Interior LSP Access Plan
Appendix C – Conceptual Interior LSP Access Plan Cost Estimate
Appendix D – Partial Demolition & Full Demolition Conceptual Plans
Appendix E – Partial Demolition & Full Demolition Conceptual Plan Cost Estimates

EWM/rb
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Limited Structural Assessment
12 North Main St., Westford, MA
Photo Index
CBI Job No.: CB200291
December 4, 2020

Photo No.		Description
1.		Photo 1 of 2 – Overall photo taken from drone of 12 North Main St.
2.		Photo 2 of 2 – Overall photo taken from drone of 12 North Main St.

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3		Partial overall photo taken from the lift showing the south and west elevations of the bell tower.
4		Partial overall photo taken from the lift showing the north and east elevations of the bell tower.

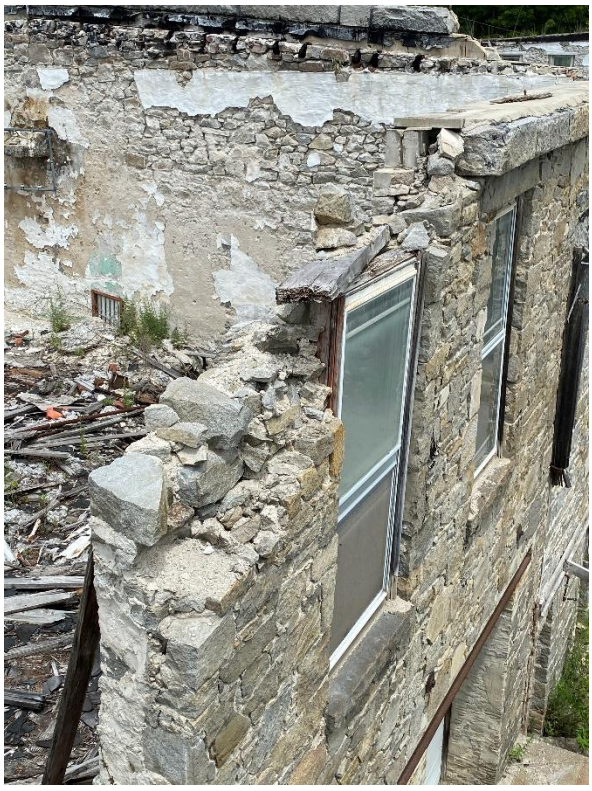
5		Close up photo taken from the lift showing the existing bell that still remains in the belfry.
6		Photo 1 of 3 – Partial overall photo of the east portion of the Central Mill first floor framing taken from a lift.
7		Photo 2 of 3 – Partial overall photo of the east portion of the Central Mill first floor framing taken from a lift. Note the demising wall (arrow) separating the east and west sections of the Central Mill.

8		Photo 3 of 3 – Partial overall photo of the west portion of the Central Mill first floor framing taken from a lift. Note the demising wall (arrow) separating the east and west sections of the Central Mill.
9		Close up photo taken from the lift showing the Central Mill roof system and gable end that was pushed over and resting on the first floor framing below.
10		Interior photo 1 of 3 taken with the drone from inside the east portion of the Central Mill showing the timber shoring posts that were installed to support the first-floor framing during the 2015/2016 stabilization efforts in good condition.

11		Interior photo 2 of 3 taken with the drone inside the west portion of the Central Mill showing the timber shoring posts that were installed during the 2015/2016 stabilization efforts in good condition. Note the abandoned materials and debris that will need to be removed and abated for to provide ESM access to complete their groundwater study.
12		Interior photo 3 of 3 taken with the drone taken inside the west portion of the Central Mill showing the timber shoring posts that were installed during the 2015/2016 stabilization efforts in good condition. Note the abandoned materials and debris that will need to be removed and abated for to provide ESM access to complete their groundwater study.
13		Partial overall photo of South Wing roof taken from the lift.

14		Up close photo taken from the lift of one of the voids observed in the existing South Wing roof.
15		Overall photo of the North Addition Roof taken from the lift.

16		Partial view of south elevation taken from the ground showing the section of wall that has collapsed. This wall is located at the intersection of the Central Mill south elevation and the South Wing east elevation.
17		Photo 1 of 4 – Partial up-close view taken from the lift showing the collapsed wall on south elevation adjacent to the South Wing. Note the loose materials and debris that pose as potential fall hazards.

18		Photo 2 of 4 – Partial up-close view taken from the lift showing the collapsed wall on south elevation adjacent to the South Wing. Note the loose materials and debris that pose as potential fall hazards.
19		Photo 3 of 4 – Partial up-close view taken from the lift showing the collapsed wall on south elevation adjacent to the South Wing. Note the loose materials and debris that pose as potential fall hazards.

20		Photo 4 of 4 – Partial up-close view taken from the lift showing the collapsed wall on south elevation adjacent to the South Wing. Note the loose materials and debris that pose as potential fall hazards.
21		Photo of the top of the Central Mill south wall where the existing granite stones were observed to be bowing to the exterior of the building.

22		Close up photo showing one of the granite stones at the top of the Central Mill south wall where the existing granite stones has been displaced approximately three (3) inches and appeared to be leaning away from the building. Note the sand like consistency of the remaining mortar.
23		Photo taken from the lift showing one of the locations where the wood headers above the Central Mill punched window openings has deteriorated, undermining the stone and masonry construction above.

24		Partial overall photo of the Smokestack taken from the lift.
25		Up-close photo of the Smokestack taken with the drone showing the deteriorated mortar joints.

26		Up-close photo of the top of the Smokestack taken with the drone showing the previous stabilization repairs that were made in 2015/2016.
27		Overall photo taken from the drone looking down on the Smokestack.
28		Interior photo 1 of 2 taken from the drone inside of the Smokestack.
29		Interior photo 2 of 2 taken from the drone inside of the Smokestack. Note the deteriorated mortar joints.

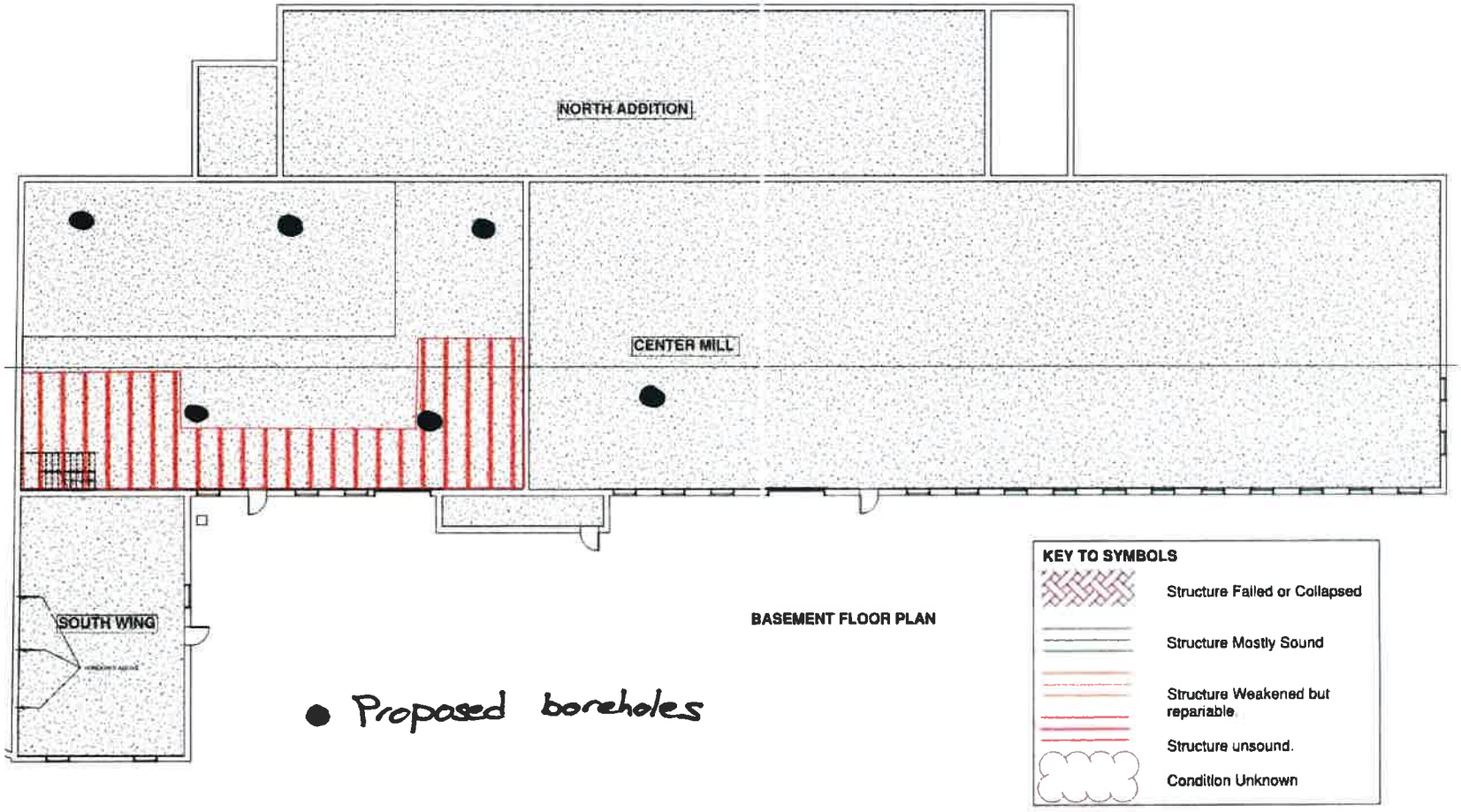
CBI Consulting, LLC
250 Dorchester Avenue | Boston, MA 02127 | Tel.: +1 617 268 8977 | Fax : +1 617 464 2971
www.cbiconsultingllc.com

Appendix A:

ESM Requested Boring Locations

FORMER ABBOT WORSTED COMPANY MILL #1
12 North Main Street, Graniteville, Westford

❖ STRUCTURAL CONDITIONS



STRUCTURAL CONDITIONS - BASEMENT

Appendix B:

Conceptual Interior LSP Access Plan

WESTFORD HISTORIC MILL BUILDING: Structural Assessment

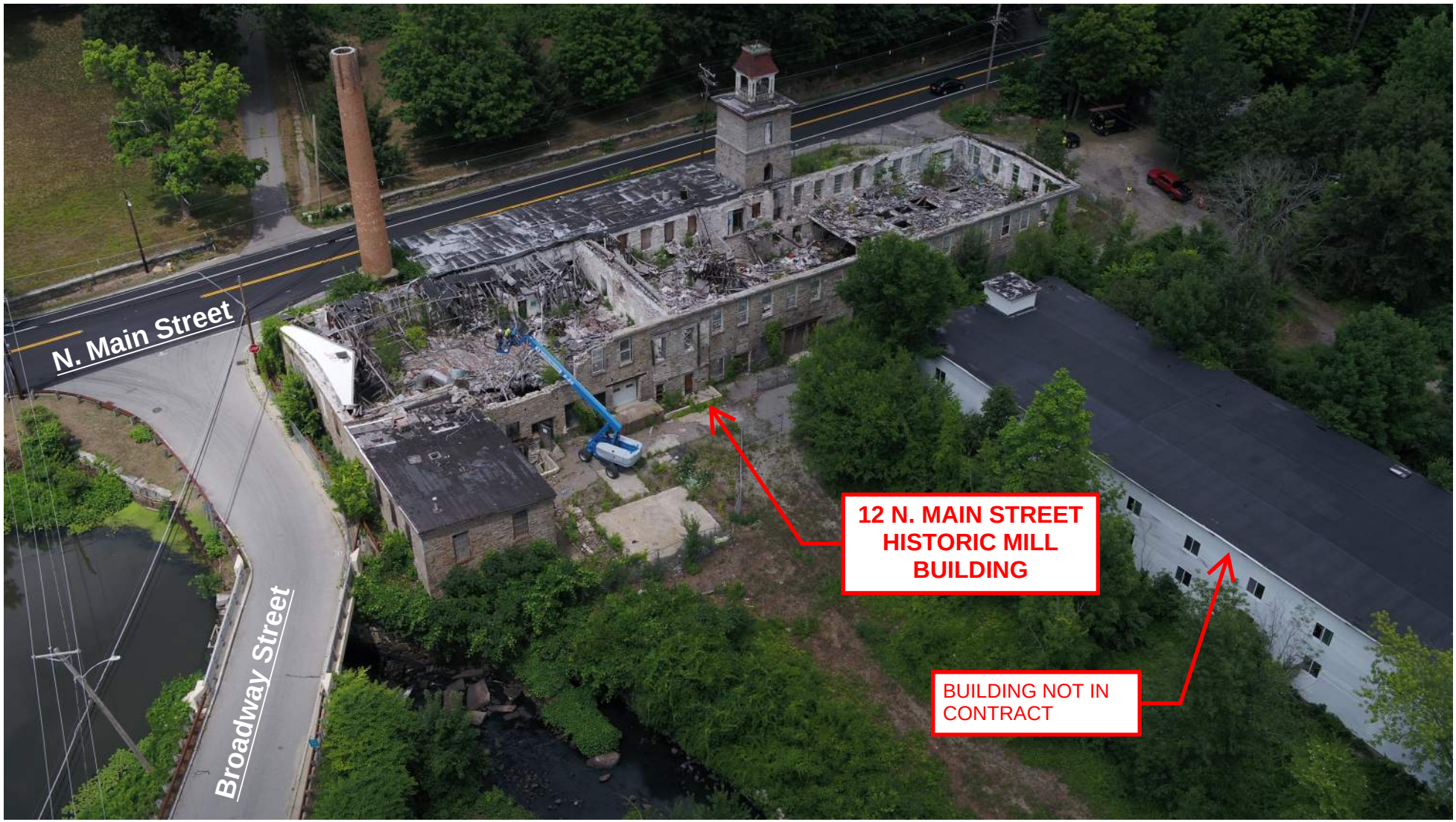
12 North Main St.
Westford, MA 01886

CBI Consulting LLC.
WRL / SAW / EWM
09.18.2020

Scope of Work for Cost Estimating

OVERALL PHOTO #1

OVERALL PHOTO #2



OPTION 1:
ACCESS ALL REQUESTED TEST BORING LOCATIONS

NOTES:

1. ALL WORK WILL BE PERMORMED UNDER A NON-TRADITIONAL ASBESTOS CONTAINING WORK PLAN THAT IS TO BE APPROVED BY THE MASSDEP.

2. IT IS ASSUMED THAT ALL WORKERS, INCLUDING ENGINEERS PERFORMING THE TESTING, WILL NEED TO GO THROUGH A HAZARDOUS MATERIAL AWARENESS TRAINING AS DETERMINED BY THE MA DEPARTMENT OF LABOR STANDARDS.

3. ALL MATERIALS ARE TO BE CONSIDERED ASBESTOS CONTAINING MATERIALS.

4. ALL MATERIALS ARE TO BE BULK LOADED, AND SAFELY ABATED/REMOVED FROM THE SITE.

ZONE TO BE ABATTED. REMOVE LOOSE DEBRIS ON FLOOR ABOVE; ASSUME BULK REMOVAL OF HAZARDOUS MATERIALS

TEMPORARY GRATED STEEL RAMP TO ACCESS LOWER PIT LOCATION WITH BORING MACHINE

ASSUME EXISTING PITS TO BE FILLED WITH RAINWATER CONTAINING HAZARDEOUS MATERIALS TO BE REMOVED

PROVIDE DUST BARRIERS TO CLOSE OPENING AS PART OF NON-TRADITIONAL ASBESTOS WORK PLAN

PROVIDE DUST BARRIERS IN FRONT OF TIMBER FRAMING TO CLOSE OFF ABATEMENT ZONE AS PART OF A NON-TRADITIONAL ASBESTOS WORK PLAN

TEMPORARY GRATED STEEL RAMP TO ACCESS LOWER PIT LOCATION WITH BORING MACHINE

PROVIDE DUST BARRIERS TO CLOSE OPENING AS PART OF NON-TRADITIONAL ASBESTOS WORK PLAN

PROPOSED PATH FOR BORING MACHINE

PROVIDE NEW TEMPORARY SHORING POSTS TO SUPPORT BEAMS ABOVE

FLOOR STRUCTURALLY UNSOUND; UNSAFE FOR MACHINERY (HIGHLIGHTED IN YELLOW)

WIDEN EXISTING BRICK MASONRY DOORWAY TO FIT 5' WIDE TEMPORARY STEEL HIGHWAY PLATE "BRIDGE", OR TEMPORARY GRATED STEEL DECK TO PROVIDE ACCESS OVER UNSOUND FLOOR

PROPOSED PATH FOR BORING MACHINE

TEMPORARY GRATED STEEL RAMP TO ACCESS EXISTING LOADING DOCK

TEST BORING 1
TEST BORING 2
TEST BORING 3
TEST BORING 4
TEST BORING 5
TEST BORING 6

EXISTING PIT APPROX 5' DEEP
EXISTING CONCRETE FLOOR
EXISTING WOOD FLOOR
EXISTING TIMBER POSTS TO REMAIN
NOTE: "A/D" DENOTES DET. "A" W/ DET. "D"
PROVIDE ACCESS BRIDGE OVER WOOD FLOOR SEE DET. ©
NEW SHORING POSTS TYPICAL
"X" DENOTES POST BETAIL ABOVE
RAMP UP
UP
DN
8'-7 3/8"
25'-9 3/4"
EQ

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
300 A Street
Boston, MA 02210
617 350-0450 Tel

PROJECT NAME

FIRST FLOOR
Stabilization 12 North Main Street
Westford MA 01886

CLIENT

Town of Westford MA

Westford Town Hall
55 Main Street
Westford MA 01886

PROJECT TEAM

Structural Engineer
Structures North
60 Washington Street
Salem MA, 01970-3517

REVISIONS

1
2
3
4
5
DATE

DRAWING TITLE

BASEMENT PLAN

DRAWING INFORMATION

11/16/15
DATE OF ISSUE

Construction Documents
DESCRIPTION

1/8" = 1'-0"
SCALE

SB
DRAWN BY

3246
PROJECT #

3246_12NMainWestford.rvt
FILE NAME

DRAWING NUMBER

S101

P:\3246 Westford Abbot Mill Preservation Study\dwg\Revit\3246 12 N Main Street Westford.rvt
10/28/2015 4:24:32 PM ENF

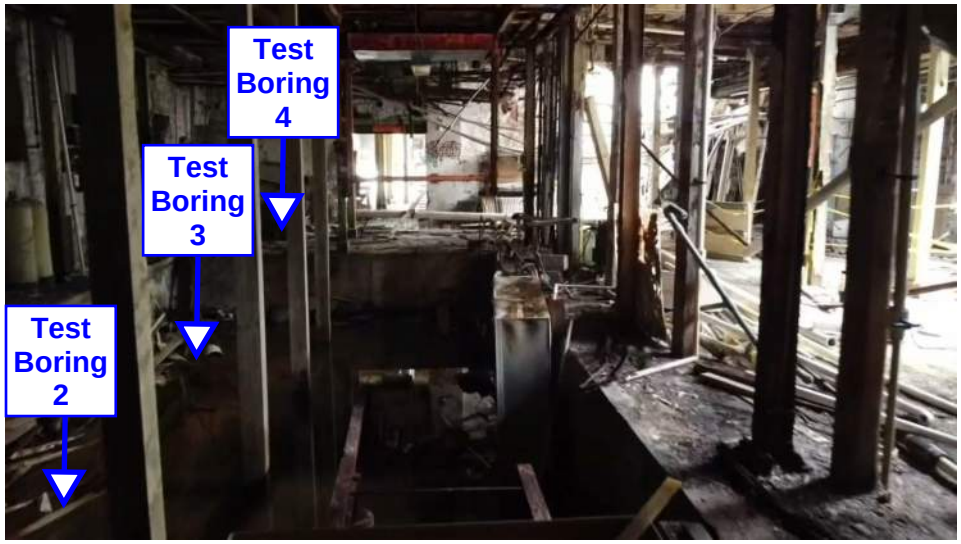
Z:\CAD\Projects\2015\12 N Main Street Westford\Structl\S101 - BASEMENT PLAN.dwg, Basement, 10/28/2015 12:50:19 PM

BULK LOAD REMOVE ALL LOOSE DEBRIS ON SECOND FLOOR; EXISTING BEAMS AND STRUCTURAL FRAMING TO REMAIN.

BULK LOAD REMOVE ALL LOOSE DEBRIS ON SECOND FLOOR; EXISTING BEAMS AND STRUCTURAL FRAMING TO REMAIN.

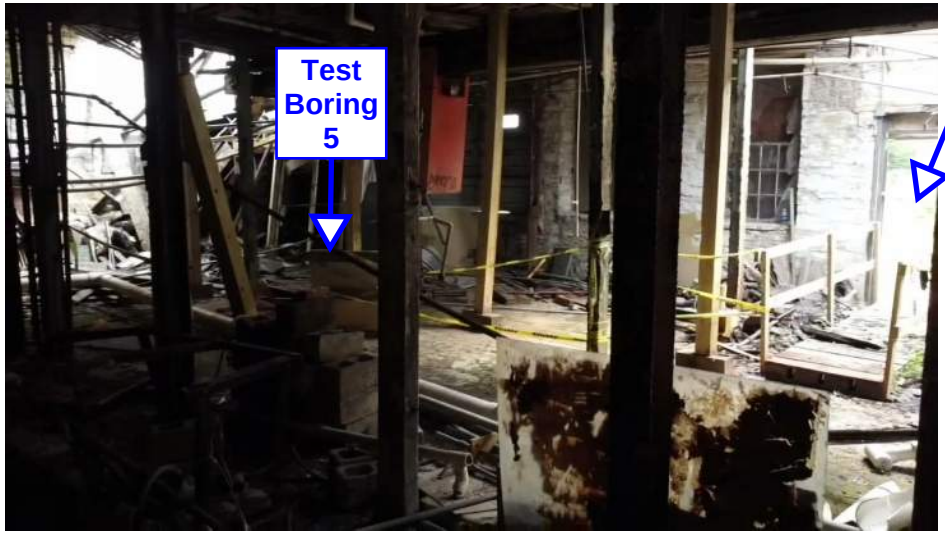

TEST BORING
#6 BELOW
BULK LOAD REMOVE
ALL LOOSE DEBRIS ON
SECOND FLOOR;
EXISTING BEAMS AND
STRUCTURAL
FRAMING TO REMAIN.


Test Boring 2 - Behind Debris


Test Boring 4
Test Boring 3
Test Boring 2


Test Boring 4


Test Boring 1


Test Boring 5
ENTRANCE/EXIT


ENTRANCE/EXIT
Test Boring 6

OPTION 2:
LIMIT TEST BORING LOCATIONS TO ONE ROOM

NOTES:

1. ALL WORK WILL BE PERMORMED UNDER AN NON-TRADITIONAL ASBESTOS CONTAINING WORK PLAN THAT IS TO BE APPROVED BY THE MASSDEP.

2. IT IS ASSUMED THAT ALL WORKERS, INCLUDING ENGINEERS PERFORMING THE TESTING, WILL NEED TO GO THROUGH A HAZARDOUS MATERIAL AWARENESS TRAINING AS DETERMINED BY THE MA DEPARTMENT OF LABOR STANDARDS.

3. ALL MATERIALS ARE TO BE CONSIDERED ASBESTOS CONTAINING MATERIALS.

4. ALL MATERIALS ARE TO BE BULK LOADED, AND SAFELY ABATED/REMOVED FROM THE SITE

ZONE TO BE ABATTED. REMOVE LOOSE DEBRIS ON FLOOR ABOVE; ASSUME BULK REMOVAL OF HAZARDOUS MATERIALS

PROVIDE DUST BARRIERS TO CLOSE OPENING AS PART OF NON-TRADITIONAL ASBESTOS WORK PLAN

TEMPORARY GRATED STEEL RAMP TO ACCESS LOWER PIT LOCATION WITH BORING MACHINE

ELIMINATE BORING LOCATION

ASSUME EXISTING PITS TO BE FILLED WITH RAINWATER CONTAINING HAZARDEOUS MATERIALS TO BE REMOVED

PROVIDE DUST BARRIERS TO CLOSE OPENING AS PART OF NON-TRADITIONAL ASBESTOS WORK PLAN

POTENTIALLY RELOCATE BORING TO JUST SOUTH OF WALL

POTENTIALLY RELOCATE BORING TO JUST SOUTH OF WALL / OR DISQUALIFY TEST LOCATION

FLOOR STRUCTURALLY UNSOUND; UNSAFE FOR MACHINERY (HIGHLIGHTED IN YELLOW)

PROPOSED PATH FOR BORING MACHINE

PROVIDE TEMPORARY SHORING POSTS TO SUPPORT BEAMS ABOVE

WIDEN EXISTING BRICK MASONRY DOORWAY TO FIT 5' WIDE TEMPORARY STEEL HIGHWAY PLATE "BRIDGE". OR TEMPORARY GRATED STEEL DECK TO PROVIDE ACCESS OVER UNSOUND FLOOR

TEST BORING 1

TEST BORING 2

TEST BORING 3

TEST BORING 4

TEST BORING 5

EXISTING PIT APPROX. 5' DEEP

EXISTING CONCRETE FLOOR

EXISTING WOOD FLOOR

EXISTING TIMBER POSTS TO REMAIN

NEW SHORING POSTS TYPICAL

"X" DENOTES POST BETAIL ABOVE

NOTE: "A/D" DENOTES DET. "A" W/ DET. "D" BELOW

PROVIDE ACCESS BRIDGE OVER WOOD FLOOR SEE DET. E

8'-7 3/8"

25'-9 3/4"

RAMP UP

UP

DN

UP

UP

27.3

P:\3246 Westford Abbot Mill Preservation Study\dwg\Revit\3246 12 N Main Street Westford.rvt
10/28/2015 4:24:32 PM ENF

Z:\CAD\Projects\2015\12 N Main Street Westford\Struct\S101 - BASEMENT PLAN.dwg, Basement, 10/28/2015 12:50:19 PM

ARCHITECT

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CLIENT

Town of Westford MA

Westford Town Hall
55 Main Street
Westford MA 01886

PROJECT TEAM

Structural Engineer
Structures North
60 Washington Street
Salem MA, 01970-3517

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BASEMENT PLAN

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1/8" = 1'-0"
SCALE

SB
DRAWN BY

3246
PROJECT #

3246_12NMainWestford.rvt
FILE NAME

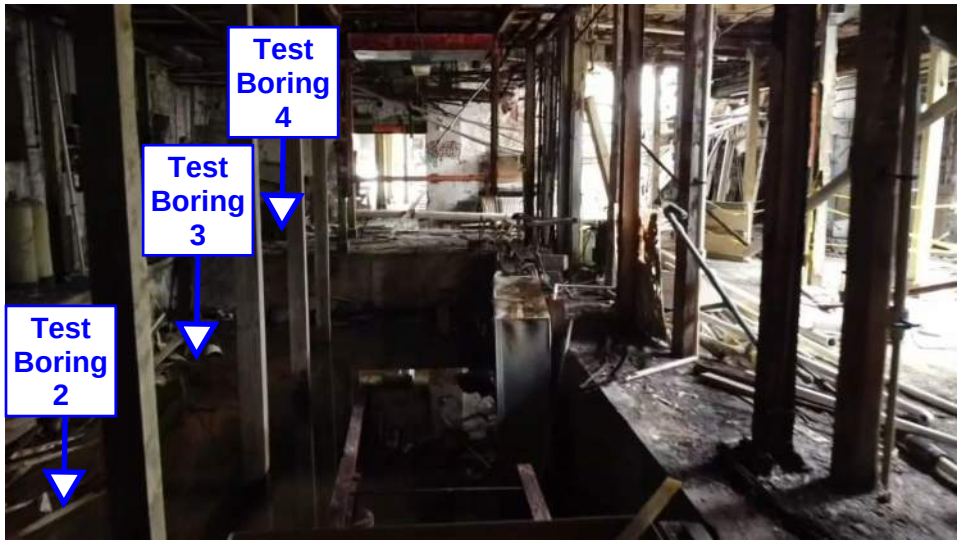
DRAWING NUMBER

S101

BULK LOAD REMOVE ALL LOOSE DEBRIS ON SECOND FLOOR; EXISTING BEAMS AND STRUCTURAL FRAMING TO REMAIN.

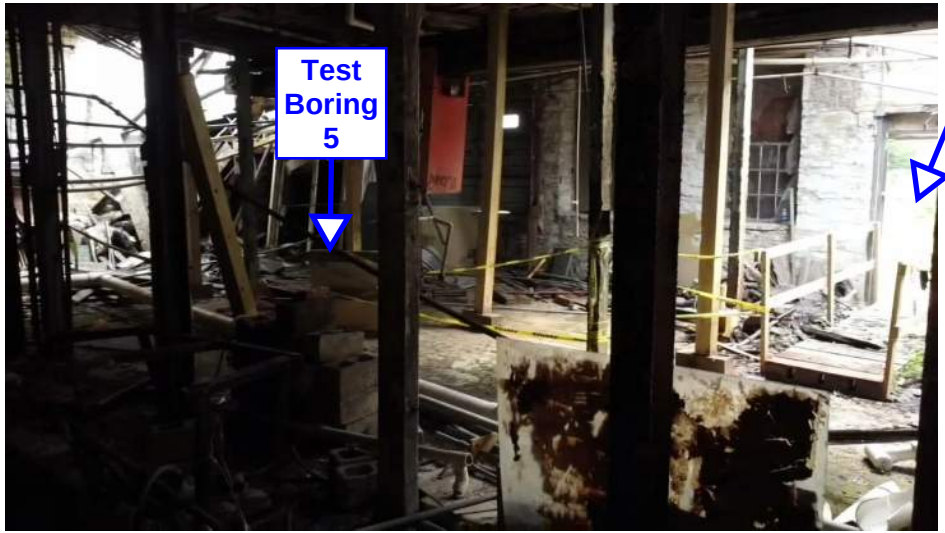
BULK LOAD REMOVE ALL LOOSE DEBRIS ON SECOND FLOOR; EXISTING BEAMS AND STRUCTURAL FRAMING TO REMAIN.


Test Boring 2 - Behind Debris


Test Boring 4
Test Boring 3
Test Boring 2


Test Boring 4


Test Boring 1


Test Boring 5
ENTRANCE/EXIT

Appendix C:

Conceptual Interior LSP Access Plan Cost Estimate

Progress Estimate

Westford Historic Mill

Structural Assessment

Westford, MA

PMC LLC
20 Downer Avenue, Suite 5
Hingham
MA 02043
(ph) 781-740-8007
(f) 781-740-1012

Prepared for:

CBI Consulting Inc.

October 5, 2020

PM&C

Westford Historic Mill

Structural Assessment

Westford, MA

05-Oct-20

Progress Estimate

MAIN CONSTRUCTION COST SUMMARY

	Construction Start	Estimated Construction Cost
OPTION 1	Dec-20	$328,902
OPTION 2	Dec-20	$261,472

This Structural Assessment conceptual estimate was produced from drawings prepared by CBI Consulting Inc. dated September 29, 2020. Design and engineering changes occurring subsequent to the issue of these documents have not been incorporated in this estimate.

This estimate includes all direct construction costs, abatement contractor's overhead and profit and design contingency. Cost escalation assumes start dates indicated.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT CONSIDERED IN THIS ESTIMATE

Items not included in this estimate are:

Removal of PCB's, contaminated soils, heavy metals.
Assumed all debris can be disposed in State as bulk hazardous waste
No work to exisyting structure other than shown in reports is included
All professional fees
Engineering design fees
Hazardous Materials Consultant fees, including cocsts to prepare Non-traditional Work Plan and full-time monitoring while work is being performed
Other owner costs such as advertising project for public bid
Land acquisition, feasibility, and financing costs
All Furnishings, Fixtures and Equipment
Items identified in the design as Not In Contract (NIC)
Items identified in the design as by others
Owner supplied and/or installed items (e.g. draperies, furniture and equipment)
Utility company back charges, including work required off-site
Work to City streets and sidewalks, (except as noted in this estimate)

PM&C

Westford Historic Mill
Structural Assessment
Westford, MA

05-Oct-20

Progress Estimate

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 1							
	02 EXISTING CONDITIONS						
021500	**Demolition**						
	Zone to be abated - remove bulk debris as hazardous material	**11,100**	sf				
	Health + safety Plan	**1**	ls	1,500.00	1,500		
	Widen existing brick doorway for access	**1**	ls	3,000.00	3,000		
	Demolish and abate existing wood floor	**450**	sf	10.00	4,500		
	Shoring post systems, sleeper beams for base and bottom of timber posts	**6**	loc	1,500.00	9,000		
	Dust barriers to close off abatement zone	**100**	lf	108.00	10,800		
	Temporary steel access over unsound floor, 5' wide x 20'	**1**	ea	2,500.00	2,500		
	Temporary steel access ramps to 5' deep pits, 5' wide	**4**	ea	750.00	3,000		
	Remove loose debris on floor	**1**	ls	5,000.00	5,000		
	Bulk removal of hazardous materials on ground floor	**1**	ls	55,500.00	55,500		
	Bulk removal of hazardous materials on first floor framing	**1**	ls	83,250.00	83,250		
	Remove hazardous rainwater from pits	**12,700**	cf	1.50	19,050		
	Winter conditions	**1**	ls	15,000.00	15,000		
	SUBTOTAL					212,100	
	MARKUPS						
	Hazardous Materials Contingency	10%		162,300	16,230		
	Design and Pricing Contingency	10%		212,100	21,210		
	General Conditions	20%		249,540	49,908		
	Bond and Insurance	2%		249,540	4,991		
	Permits - Demo Only				100		
	Overhead and proift	8%		304,539	24,363		
						116,802	
	TOTAL OPTION 1						**$ 328,902**

PM&C

Westford Historic Mill
Structural Assessment
Westford, MA

05-Oct-20

Progress Estimate

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2							
02	***EXISTING CONDITIONS***						
021500	**Demolition**						
	Zone to be abated - remove bulk debris as hazardous material	**8,300**	sf		-		
	Health + safety Plan	**1**	ls	1,500.00	1,500		
	Widen existing brick doorway for access	**1**	ls	3,000.00	3,000		
	Temporary shoring posts, 8 x 8 (inside containment area only)	**18**	ea	1,500.00	27,000		
	Dust barriers to close off abatement zone	**22**	lf	108.00	2,376		
	Temporary steel access over unsound floor, 5' wide x 20'	**1**	ea	2,500.00	2,500		
	Temporary steel access ramps to 5' deep pits, 5' wide	**2**	ea	750.00	1,500		
	Remove loose debris on floor	**1**	ls	5,000.00	5,000		
	Bulk removal of hazardous materials on ground floor	**1**	ls	41,500.00	41,500		
	Bulk removal of hazardous materials on first floor framing	**1**	ls	62,250.00	62,250		
	Remove hazardous rainwater from pits	**5,500**	cf	1.50	8,250		
	Winter conditions	**1**	ls	15,000.00	15,000		
	SUBTOTAL					169,876	
	MARKUPS						
	Hazardous Materials Contingency	10%		115,000	11,500		
	Design and Pricing Contingency	10%		169,876	16,988		
	General Conditions	20%		198,364	39,673		
	Bond and Insurance	2%		198,364	3,967		
	Permits				100		
	Overhead and proift	8%		242,104	19,368		
						91,596	
	TOTAL OPTION 2					**$ 261,472**	

Appendix D:

Partial Demolition & Full Demolition Conceptual Plans

GENERAL NOTES:

- PROVIDE 100% ABATEMENT OF MATERIALS. CLEAN, STACK AND STORE SALVEAGABLE GRANITE STONES, AND FIELD STONES ON SITE.

100% re-pointing of existing masonry chimney. Replace cracked or otherwise deteriorated brick.

Crane and man bucket or staging required to repoint existing chimney. Not accessible via lift due to adjacent power lines.

Perform further investigation to interior of north addition and determine if additional repairs or supplemental framing is required.

Provide protective netting over North Addition, secured to cast in place concrete footings on each side of building.

Provide approximately 15 foot high reinforced concrete wall and footing (height includes sub grade portion) to support adjacent roadway, Broadway Street.

Provide Ice & Water Waterproofing roofing membrane over roof penetrations/failed roof locations to mitigate water infiltration to the interior of the building.
Account for 40 S.F. of roofing for Cost Estimate.

check bell tower for any loose building materials, including but not limited to decorative iron items, asphalt shingle roofing, wood framing or wood trim, or other roofing materials.

Resecure building items and provide supplemental wood framing as required.

Provide 100% deep re pointing of all existing stone and masonry walls supporting the bell tower and north addition.

Provide plywood sheathing and timber framing as needed to close off existing wall and roof fenestrations.

Demolish South Wing and Central Mill as shown down to the concrete slab. Allow 1-month while cast in place concrete slab is still in place for Towns LSP to complete their groundwater survey. Remove existing cast in place concrete floor slab and pits.
Regrade site to prepare for potential future development.

Provide New Diagonal W12 Steel Kicker Braces with concrete cast in place footings to stabilize Demising wall.

Sawcut existing stone wall one foot from the demising wall down to grade.

Demolish, abate and salvage central mill stone demising wall down to just above first floor level framing.

Provide and secure protective netting over the top of remaining walls; typical.

Demolish, abate and salvage central mill stone wall down to just above first floor level framing.

Provide and secure protective netting over the top of remaining walls; typical.

provide new W10 Beams, pocketed into existing masonry wall on each end, at 16'-0" o.c.

Typ. Wall Thickness = 1'-8"
Typ. Window Dimensions = 3'-8"x7'-6"

Remove all loose materials and debris, with exception to the existing first-floor framing members

Demolish, abate and salvage central mill stone wall down to just above first floor level framing.

Provide and secure protective netting over the top of remaining walls; typical.

Demolish, abate and salvage central mill stone wall down to just above first floor level framing.

Provide and secure protective netting over the top of remaining walls; typical.

N. MAIN ST.

BROADWAY ST.

NOT IN CONTRACT

NOT IN CONTRACT

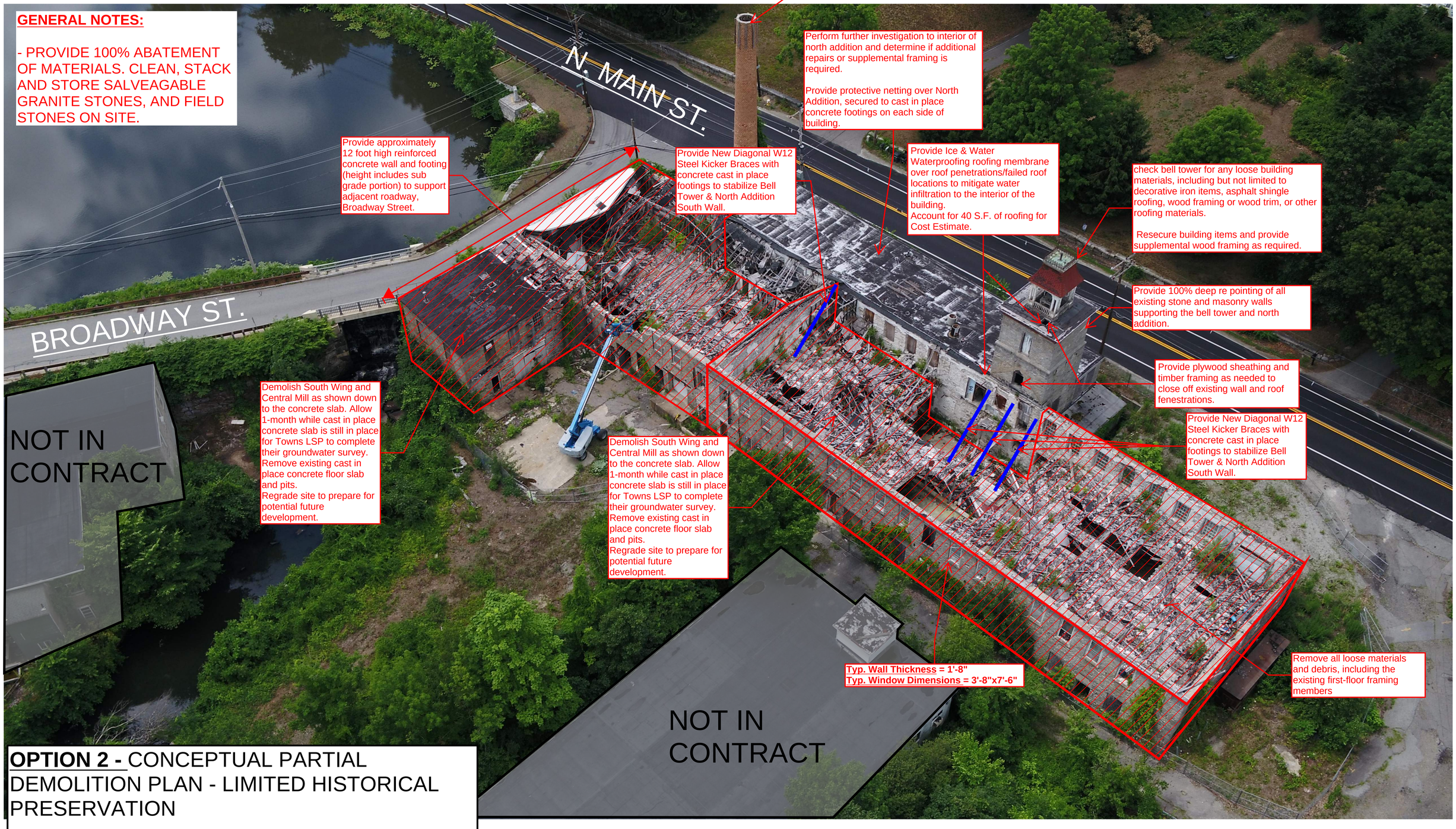
OPTION 1 - CONCEPTUAL MAKE SAFE - LIMITED DEMOLITION PLAN

12 North Main St. - Westford, MA
CBI Consulting, LLC. a SOCOTEC Company
10/20/2020

NOT FOR CONSTRUCTION

GENERAL NOTES:

- PROVIDE 100% ABATEMENT OF MATERIALS. CLEAN, STACK AND STORE SALVEAGABLE GRANITE STONES, AND FIELD STONES ON SITE.



100% re-pointing of existing masonry chimney. Replace cracked or otherwise deteriorated brick.

Crane and man bucket or staging required to repoint existing chimney. Not accessible via lift due to adjacent power lines.

Perform further investigation to interior of north addition and determine if additional repairs or supplemental framing is required.

Provide protective netting over North Addition, secured to cast in place concrete footings on each side of building.

Provide approximately 12 foot high reinforced concrete wall and footing (height includes sub grade portion) to support adjacent roadway, Broadway Street.

Provide New Diagonal W12 Steel Kicker Braces with concrete cast in place footings to stabilize Bell Tower & North Addition South Wall.

Provide Ice & Water Waterproofing roofing membrane over roof penetrations/failed roof locations to mitigate water infiltration to the interior of the building.
Account for 40 S.F. of roofing for Cost Estimate.

check bell tower for any loose building materials, including but not limited to decorative iron items, asphalt shingle roofing, wood framing or wood trim, or other roofing materials.

Resecure building items and provide supplemental wood framing as required.

Provide 100% deep re pointing of all existing stone and masonry walls supporting the bell tower and north addition.

Provide plywood sheathing and timber framing as needed to close off existing wall and roof fenestrations.

Provide New Diagonal W12 Steel Kicker Braces with concrete cast in place footings to stabilize Bell Tower & North Addition South Wall.

Demolish South Wing and Central Mill as shown down to the concrete slab. Allow 1-month while cast in place concrete slab is still in place for Towns LSP to complete their groundwater survey.
Remove existing cast in place concrete floor slab and pits.
Regrade site to prepare for potential future development.

Demolish South Wing and Central Mill as shown down to the concrete slab. Allow 1-month while cast in place concrete slab is still in place for Towns LSP to complete their groundwater survey.
Remove existing cast in place concrete floor slab and pits.
Regrade site to prepare for potential future development.

Typ. Wall Thickness = 1'-8"
Typ. Window Dimensions = 3'-8"x7'-6"

Remove all loose materials and debris, including the existing first-floor framing members

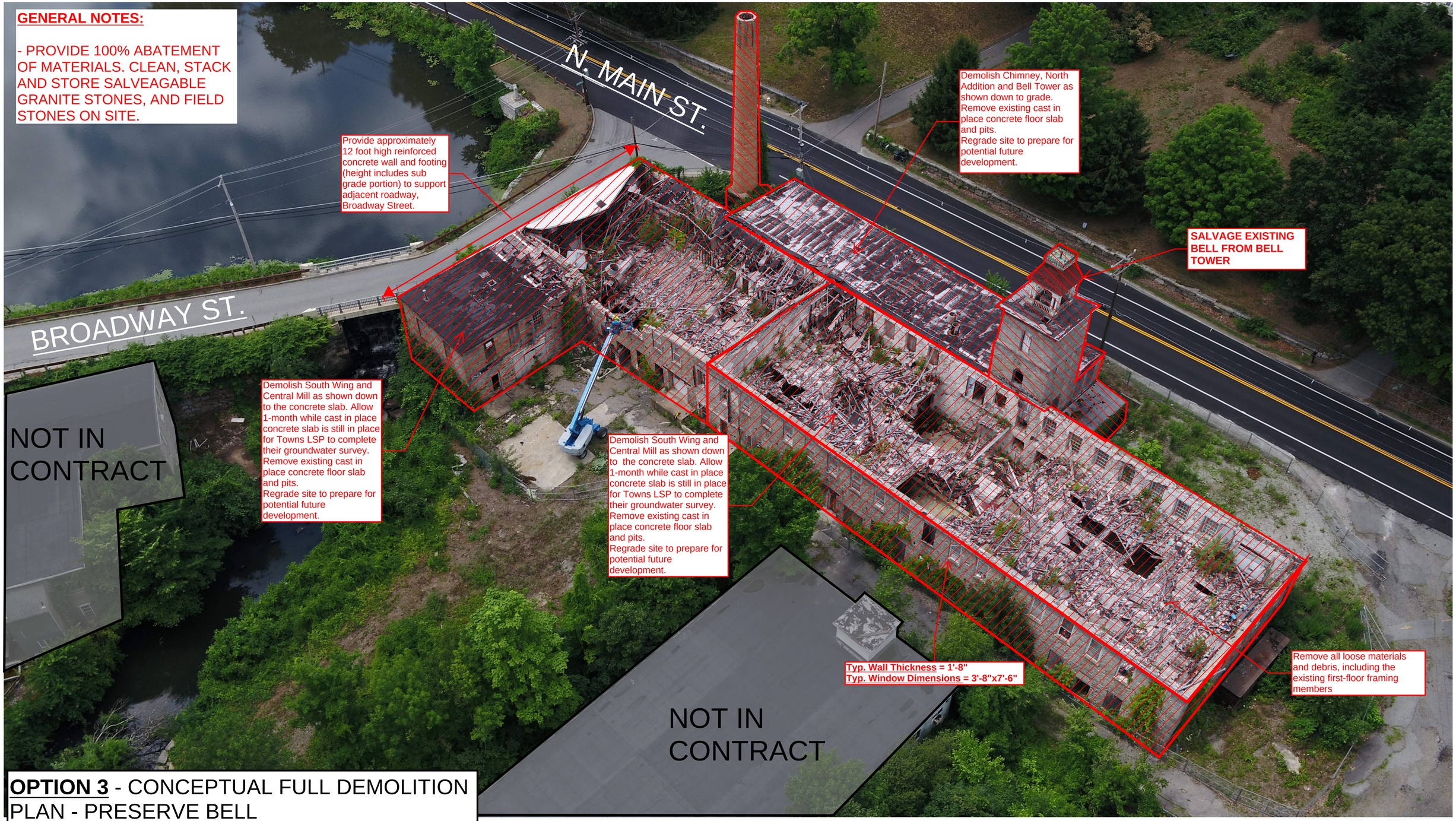
OPTION 2 - CONCEPTUAL PARTIAL DEMOLITION PLAN - LIMITED HISTORICAL PRESERVATION

12 North Main St. - Westford, MA
CBI Consulting, LLC. a SOCOTEC Company
10/20/2020

NOT FOR CONSTRUCTION

GENERAL NOTES:

- PROVIDE 100% ABATEMENT OF MATERIALS. CLEAN, STACK AND STORE SALVEAGABLE GRANITE STONES, AND FIELD STONES ON SITE.



OPTION 3 - CONCEPTUAL FULL DEMOLITION PLAN - PRESERVE BELL

12 North Main St. - Westford, MA
CBI Consulting, LLC. a SOCOTEC Company
10/20/2020

NOT FOR CONSTRUCTION

Appendix E:

Partial Demolition & Full Demolition Conceptual Plan Cost Estimates

Progress Estimate

Westford Historic Mill

Demolition Options

Westford, MA

PMC LLC
20 Downer Avenue, Suite 5
Hingham
MA 02043
(ph) 781-740-8007
(f) 781-740-1012

Prepared for:

CBI Consulting Inc.

October 29, 2020

PM&C

Westford Historic Mill

Demolition Options

Westford, MA

29-Oct-20

Progress Estimate

MAIN CONSTRUCTION COST SUMMARY

	Construction Start	Estimated Cost
OPTION 1: Make Safe - Limited Demolition	Dec-20	$1,744,215
OPTION 2: Partial Demolition - Limited Historical Preservation	Dec-20	$1,957,185
OPTION 3: Full Demolition, Preserve Bell	Dec-20	$1,652,533

This Structural Assessment conceptual estimate was produced from drawings prepared by CBI Consulting Inc. dated October 20, 2020. Design and engineering changes occurring subsequent to the issue of these documents have not been incorporated in this estimate.

This estimate includes all direct construction costs, abatement contractor's overhead and profit and design contingency. Cost escalation assumes start dates indicated.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT CONSIDERED IN THIS ESTIMATE

Items not included in this estimate are:

- Removal of PCB's, contaminated soils, heavy metals.
- Assumed all debris can be disposed in State as bulk hazardous waste
- No work to existing structure other than shown in reports is included
- All professional fees
- Other owner costs such as advertising project for public bid
- Land acquisition, feasibility, and financing costs
- Items identified in the design as Not In Contract (NIC)
- Items identified in the design as by others
- Owner supplied and/or installed items (e.g. draperies, furniture and equipment)
- Utility company back charges, including work required off-site
- Work to City streets and sidewalks, (except as noted in this estimate)

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 1 : Make Safe - Limited Demolition							
02	***EXISTING CONDITIONS***						
021500	**Demolition**						
	Zone to be abated - remove bulk debris as hazardous material	**26,860**	sf				
	Temporary construction fence, gates, contractor entrance	**1**	ls	30,000.00	30,000		
	Health + safety Plan	**1**	ls	1,500.00	1,500		
	Dust barriers to close off abatement zone	**130**	lf	108.00	14,040		
	Bulk removal of hazardous materials on ground floor - South addition and main mill	**1**	ls	134,300.00	134,300		
	Bulk removal of hazardous materials on first floor framing - South addition and main mill	**1**	ls	201,450.00	201,450		
	Remove hazardous rainwater from pits	**12,700**	cf	1.50	19,050		
	Sawcut stone wall	**315**	lf	25.00	7,875		
	Remove and salvage mill stone wall, 1'-8" thick	**4,095**	sf	5.00	20,475		
	Provide netting over wall where sawcut	**315**	lf	10.00	3,150		
	Stabilize existing demising wall, 50' x 14' high - W14 kicker braces	**1**	ls	12,000.00	12,000		
	W10 beams pocketed into existing masonry wall on each end, 50 LF	**9**	ea	2,500.00	22,500		
	Protective netting over North Addition	**1**	ls	5,000.00	5,000		
	Plywood sheathing at wall/roof fenestrations	**1**	ls	1,000.00	1,000		
	Check bell tower for any loose materials, secure	**1**	ls	1,500.00	1,500		
	Complete demolition of structure	**11,500**	sf	10.00	115,000		
	Clean stack and store salvageable granite stone and field stones on site (13,500 CF)	**1**	ls	67,500.00	67,500		
	Premium for phased demolition - SOG to remain in place for one month for surveys	**1**	ls	10,000.00	10,000		
	Winter conditions				Included		
	SUBTOTAL						666,340
033000	**Concrete**						
	Wall footing, 8' x 2'	*100*	*lf*				
	Formwork	**400**	sf	16.00	6,400		
	Re-bar	**8,000**	lbs	1.50	12,000		
	Concrete material; 4,500 psi	**62**	cy	140.00	8,680		
	Placing concrete	**62**	cy	120.00	7,440		
	Reinforced concrete wall, 24" thick						
	Formwork	**3,000**	sf	20.00	60,000		
	Re-bar	**15,000**	lbs	1.50	22,500		
	Concrete material	**117**	cy	140.00	16,380		
	Placing concrete	**117**	cy	120.00	14,040		
	Spread footings, complete						
	Spread footings for braces, allow	**3**	ea	1,000.00	3,000		
	Spread footings for North addition netting, allow	**8**	ea	1,000.00	8,000		
	SUBTOTAL						158,440
042000	**Masonry**						
	Bell tower - repoint 100% of stone and masonry	**2,640**	sf	40.00	105,600		
	Allow for lift	**1**	ls	10,000.00	10,000		
	Masonry chimney - repoint 100%	**1,532**	sf	40.00	61,280		
	Replace cracked/deteriorated brick as needed -10%	**153**	sf	100.00	15,300		
	Allow for staging	**1**	ls	30,000.00	30,000		
	SUBTOTAL						222,180
075000	**Roofing**						
	North AdditionProvide Ice & Water waterproofing roofing membrane over roof penetrations/failed roof locations to mitigate water infiltration to the interior of the building.	**40**	sf	40.00	1,600		
	SUBTOTAL						1,600

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 1: Make Safe - Limited Demolition							
312000	**EARTH MOVING**						
	Strip footings						
	Excavation	**311**	cy	12.00	3,732		
	Store on site for reuse	**311**	cy	8.00	2,488		
	Backfill with imported material	**249**	cy	40.00	9,960		
	Regrade when SOG removed	**5,750**	sf	0.50	2,875		
	SUBTOTAL					19,055	
	TRADE COSTS					**1,067,615**	
	MARKUPS						
	Hazardous Materials Contingency	10%		354,800	35,480		
	Design and Pricing Contingency	10%		1,067,615	106,762		
	General Conditions	20%		1,209,857	241,971		
	Bond and Insurance	2%		1,209,857	24,197		
	Permits - Demo Only				100		
	Overhead and profit	8%		1,476,125	118,090		
						526,600	
	TOTAL CONSTRUCTION COSTS OPTION 1					**$ 1,594,215**	
	Engineering & Hazardous Material Consulting Fee				150,000		
	TOTAL COSTS OPTION 1					**$ 1,744,215**	
	ALTERNATE						
	Remove stone from site ILO cleaning and store on site			DEDUCT		**$ (32,400)**	

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 2 : Partial Demolition - Limited Historical Preservation						
	02 EXISTING CONDITIONS						
021500	**Demolition**						
	Zone to be abated - remove bulk debris as hazardous material	**26,860**	sf				
	Temporary construction fence, gates, contractor entrance	**1**	ls	30,000.00	30,000		
	Health + safety Plan	**1**	ls	1,500.00	1,500		
	Dust barriers to close off abatement zone	**130**	lf	108.00	14,040		
	Bulk removal of hazardous materials on ground floor - South addition and main mill	**1**	ls	134,300.00	134,300		
	Bulk removal of hazardous materials on first floor framing - South addition and main mill	**1**	ls	201,450.00	201,450		
	Remove hazardous rainwater from pits	**12,700**	cf	1.50	19,050		
	Stabilize existing North Addition wall, 130' x 26' high - W12 kicker braces	**1**	ls	26,000.00	26,000		
	Protective netting over North Addition	**1**	ls	5,000.00	5,000		
	Plywood sheathing at wall/roof fenestrations	**1**	ls	1,000.00	1,000		
	Check bell tower for any loose materials, secure	**1**	ls	1,500.00	1,500		
	Complete demolition of structure	**26,860**	sf	10.00	268,600		
	Clean stack and store salvageable granite stone and field stones on site (18,000 CF)	**1**	ls	90,000.00	90,000		
	Premium for phased demolition - SOG to remain in place for one month for surveys	**1**	ls	10,000.00	10,000		
	Winter conditions				Included		
	SUBTOTAL					802,440	
033000	**Concrete**						
	Wall footing, 8' x 2'	*100*	*lf*				
	Formwork	**400**	sf	16.00	6,400		
	Re-bar	**8,000**	lbs	1.50	12,000		
	Concrete material; 4,500 psi	**62**	cy	140.00	8,680		
	Placing concrete	**62**	cy	120.00	7,440		
	Reinforced concrete wall, 24" thick						
	Formwork	**3,000**	sf	20.00	60,000		
	Re-bar	**15,000**	lbs	1.50	22,500		
	Concrete material	**117**	cy	140.00	16,380		
	Placing concrete	**117**	cy	120.00	14,040		
	Spread footings, complete						
	Spread footings for braces, allow	**10**	ea	1,000.00	10,000		
	Spread footings for North addition netting, allow	**8**	ea	1,000.00	8,000		
	SUBTOTAL					165,440	
042000	**Masonry**						
	Bell tower - repoint 100% of stone and masonry	**2,640**	sf	40.00	105,600		
	Allow for lift	**1**	ls	10,000.00	10,000		
	Masonry chimney - repoint 100%	**1,532**	sf	40.00	61,280		
	Replace cracked/deteriorated brick as needed -10%	**153**	sf	100.00	15,300		
	Allow for staging	**1**	ls	30,000.00	30,000		
	SUBTOTAL					222,180	
075000	**Roofing**						
	North AdditionProvide Ice & Water waterproofing roofing membrane over roof penetrations/failed roof locations to mitigate water infiltration to the interior of the building.	**40**	sf	40.00	1,600		
	SUBTOTAL					1,600	
312000	**EARTH MOVING**						
	Strip footings						
	Excavation	**311**	cy	12.00	3,732		
	Store on site for reuse	**311**	cy	8.00	2,488		

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
OPTION 2 : Partial Demolition - Limited Historical Preservation							
	Backfill with imported material	**249**	cy	40.00	9,960		
	Regrade when SOG removed	**13,430**	sf	0.50	6,715		
	SUBTOTAL					22,895	
	TRADE COSTS					**1,214,555**	
	MARKUPS						
	Hazardous Materials Contingency	10%		354,800	35,480		
	Design and Pricing Contingency	10%		1,214,555	121,456		
	General Conditions	20%		1,371,491	274,298		
	Bond and Insurance	2%		1,371,491	27,430		
	Permits - Demo Only				100		
	Overhead and profit	8%		1,673,319	133,866		
						592,630	
	TOTAL CONSTRUCTION COSTS OPTION 2					**$ 1,807,185**	
	Engineering & Hazardous Material Consulting Fee				150,000		
	TOTAL COSTS OPTION 2					**$ 1,957,185**	
	ALTERNATE						
	Remove stone from site ILO cleaning and store on site			DEDUCT		**$ (43,200)**	

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	OPTION 3: Full Demolition, Preserve Bell						
	02 EXISTING CONDITIONS						
021500	**Demolition**						
	Zone to be abated - remove bulk debris as hazardous material	**33,920**	sf				
	Temporary construction fence, gates, contractor entrance	**1**	ls	30,000.00	30,000		
	Health + safety Plan	**1**	ls	1,500.00	1,500		
	Bulk removal of hazardous materials on ground floor - South addition and main mill	**1**	ls	134,300.00	134,300		
	Bulk removal of hazardous materials on first floor framing - South addition and main mill	**1**	ls	201,450.00	201,450		
	Bulk removal of hazardous materials from North Addition	**7,060**	sf	10.00	70,600		
	Remove hazardous rainwater from pits	**12,700**	cf	1.50	19,050		
	Complete demolition of structure	**33,920**	sf	7.00	237,440		
	Salvage Bell from Bell Tower	**1**	ls	1,500.00	1,500		
	Clean stack and store salvageable granite stone and field stones on site (24,000 CF)	**1**	ls	120,000.00	120,000		
	Premium for phased demolition - SOG to remain in place for one month for surveys	**1**	ls	10,000.00	10,000		
	Winter conditions				Included		
	SUBTOTAL					825,840	
033000	**Concrete**						
	Wall footing, 8' x 2'	*100*	*lf*				
	Formwork	**400**	sf	16.00	6,400		
	Re-bar	**8,000**	lbs	1.50	12,000		
	Concrete material; 4,500 psi	**62**	cy	140.00	8,680		
	Placing concrete	**62**	cy	120.00	7,440		
	Reinforced concrete wall, 24" thick						
	Formwork	**3,000**	sf	20.00	60,000		
	Re-bar	**15,000**	lbs	1.50	22,500		
	Concrete material	**117**	cy	140.00	16,380		
	Placing concrete	**117**	cy	120.00	14,040		
	SUBTOTAL					147,440	
312000	**EARTH MOVING**						
	Strip footings						
	Excavation	**311**	cy	12.00	3,732		
	Store on site for reuse	**311**	cy	8.00	2,488		
	Backfill with imported material	**249**	cy	40.00	9,960		
	Regrade when SOG removed	**16,960**	sf	0.50	8,480		
	SUBTOTAL					24,660	
	TRADE COSTS					**997,940**	
	MARKUPS						
	Hazardous Materials Contingency	10%		425,400	42,540		
	Design and Pricing Contingency	10%		997,940	99,794		
	General Conditions	20%		1,140,274	228,055		
	Bond and Insurance	2%		1,140,274	22,805		
	Permits - Demo Only				100		
	Overhead and profit	8%		1,391,234	111,299		
						504,593	
	TOTAL CONSTRUCTION COSTS OPTION 3						**$ 1,502,533**
	Engineering & Hazardous Material Consulting Fee				150,000		
	TOTAL COSTS OPTION 3						**$ 1,652,533**

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	CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
		OPTION 3 : Full Demolition, Preserve Bell						
58		***ALTERNATE***						
59		Remove stone from site ILO cleaning and store on site			DEDUCT		**$**	**(57,600)**