PRELIMINARY BUILDING EVALUATION REPORT

BRIDGEWATER FIRE DEPARTMENT

22 School Street
Bridgewater, Massachusetts

September 9, 2010

Prepared By:
Yarosh Associates, Inc.
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(508) 477-4731

INDEX

SECTION 1

BUILDING SURVEY DIRECTORY

BRIDGEWATER FIRE DEPARTMENT
22 SCHOOL STREET
BRIDGEWATER, MA

Survey Date: August 19, 2010

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SUMMARY OF FIELD OBSERVATIONS

1.0 INTRODUCTION

The Bridgewater Fire Station has been in service for approximately 150 years. The Station has been remodeled and added to over the years, occupying the small area of land that began with the original building. The location for a fire station is ideal for it services and needs major work to maximize the facility's operations and provide full services to the community. The purpose of this PBER is to review existing conditions and to use this information to discuss how best to remodel the facility to accommodate the Department's requirements, while using current code requirements set forth for new or remodeled construction.

The feasibility to keep the station open while work is being done, whether in phases or all at one time, should be discussed prior to any design work starting.

The survey team assembled at the Bridgewater Fire Station, located at 22 School Street, Bridgewater, Massachusetts, on August 19, 2010. The team of 9 professionals proceeded to survey and evaluate the existing conditions. This PBER contains their findings.

1.1 PROJECT INFORMATION

A. Location

1. The building is located at 22 School Street, Bridgewater, Massachusetts.

B. Size

Ground Floor Area (Footprint)	6,181 SF
Second Floor	2,423 SF
Total Square Footage:	8,604 SF

C. Building Code Data

Original Building Design:	1,858± SF
Retrofit Design(s):	Many
Type of Occupancy:	Mixed Use (Business, Residential, Stor.)
Type of Construction:	Masonry, steel, wood frame

1. No code was used at the time this building was constructed in 1850.

D. Building and Health Department

1. Town of Bridgewater Inspectional Services Department
   Academy Building, 2nd Level
   66 Central Square
   Bridgewater, MA
   508-697-0904
   David Moore (Acting Building Inspector)
   Michael White (Asst. Building Inspector)

2. Health Department:
   Bridgewater Board of Health
   Academy Building, 1st Level
   66 Central Square
   Bridgewater, MA 02324
   508-697-0903
   Doug Sime, Health Agent

1.2 ARCHITECTURAL BUILDING SITE SUMMARY

A. GENERAL BUILDING HISTORY

The building is a two-story wood and masonry structure. Masonry construction on the first floor housing truck bays and offices. The second floor is wood frame construction with vinyl siding which houses the living and sleeping quarters for the firemen. The building has been constructed in multiple phases. The original building, being constructed in 1858, with later additions being added. Additions were made to the building in 1951, 1960, and 1972. Small changes were done in different areas from 1972 to present.

Exterior of Building. The exterior of the building is load bearing masonry construction. The front wall is 4" brick veneer with 8" masonry backup. The side and rear walls are 12" CMU. The CMU walls are painted. Much of the existing painting is cracked and peeling. The building shows signs of major water damage at several locations. (See report by Russo Barr Associates, Inc., RBA No. 2010200 dated March 31, 2010.) At the rear exterior of the building, in the area of the roof tower, CMU at the top is broken and in need of removal or major repair. The existing roof on this tower is failing. The water infiltration into the block has caused the exterior paint to peel, the block to crack under freeze/thaw cycles, and the mortar holding CMU together to crack and deteriorate. These areas must be addressed in any future work on this building.

At the tower at the back of the building, from the rear, the front right corner and the rear right corner, the block is broken and the flashing is

pulling up and the roof is deflecting in. This is going to need to be replaced or removed in its entirety.

At the top of the first floor, below the roof- line, is a painted plywood and wood fascia band. Paint is peeling on the fascia. This is more of a maintenance issue. The front of the building, first floor, is brick veneer. The right side of the building is painted CMU. The front of the building is 4" brick veneer with 8" CMU backup. The side of the building and the rear of the building is 12" painted CMU. The front brick is in average shape with a mixture of brick-type used depending on when that portion was built. The foundation is granite stone to poured concrete and varies in each old/new section.

The second floor of the building is wood frame construction of 2 x 4 wood studs with a board exterior covered with vinyl siding and inserted vinyl windows. It has a pitched gable truss roof with asphalt shingles. There is also a wood fascia band at the second floor, which matches the first level with the same maintenance problems.

Roof. The second-story roofing on the building is asphalt shingles on the truss framing floor roof section. This area is in good condition. The tower is built up asphalt and gravel on plywood over wood joist. This roof has failed with the flashing lifting up, separating, and water infiltration on all four sides of the tower. The first floor roof section is EPDM single ply roofing. A previous report stated that it appears to be about 15 years old. Several areas of this roof show signs of patching at corners and flashing in an attempt to repair leaks. There are several areas of ponding on this roof. We have been told that many of the pieces of equipment on this roof do not operate properly and are not used. Flashing issues at this equipment are also a problem. The insulation below roof must be wet from leaks. This will compromise the R values and needs replacement. A roofing report was prepared by Russo Barr Associates dated March 31, 2010.

Exterior. Other items on the exterior of the building are a metal stair at the back of the building for a second egress out of the second floor living quarters. The stairway is rusted and railings do not meet current code. The gas line on the right side of the building is very rusted and needs to be scraped and repainted. The exterior of the building has some areas of peeling and rotted wood trim. Gutters have become detached from the building, and gutters that are full of moss and vegetation, which are not draining correctly, need replacement. The area between the fire station and the Town Hall is very wet due to the gutters on both buildings not working properly, which will lead to moisture and water damage to both buildings on that elevation. Vegetation is growing at base of building and should be cleared.

There appears to be several sets of electrical lines and wires coming to the building from poles on the street elevation. There is also a conduit going between the Town Hall building and the Fire Station building. (See electrical report.)

Interior. The interior of the first floor is a composite of the old 1,858 square foot building structure and all new additions and renovations to date.

The building is comprised of three (3) truck bays, one (1) boat bay, one (1) ambulance bay, and various offices, radio-control and dispatch locations.

The design was created with a response to existing conditions and current need, and not to a proper fire station design layout. This creates an operational problem because of cross-circulation for firefighters and their supplies or equipment.

Limitations on ceiling heights restrict the use of open bays by certain vehicles. Mechanical equipment is taking valuable space on ground level. This can be relocated to increase usable space. The existing operation is set up to work with all the limitations offered by the building's structure; reduced ceiling heights, limited storage, poor circulation, crossover patterns, etc.

Many walls of the old original building are in place. Exterior walls from the past are now interior walls. The boat bay has a low ceiling with steel beam supports, which were added to carry the underside wood ceiling/roof joist. The back of this area has a sanitizing room with a lav, with low ceilings. The medical supplies are kept in a cabinet outside these rooms in the service bay. Floor drains are original and need further investigation for what they are connected to.

The center hallway area has a suspended acoustical tile ceiling with bare concrete floors. The walls are painted exposed brick and chipboard. Off of this area there are two (2) closets. The closet to the left of the stair contains telephone and computer equipment and the closet to the right under the stair, contains electrical equipment.

The Chief's sleeping room has industrial carpet on the floor and acoustical suspended ceiling, painted gypsum walls. It contains a desk area, bed, chair, built-in bookcase.

The main office area has a hard plaster ceiling, recessed lights. It appears that this area and the deputy office and the chief office was created out of previous truck bays. Also with industrial low-pile carpet on the floor. Similar construction to the deputy's office and chief's office.

The central communication/dispatch room has an elevated floor to allow for all wiring above the concrete to all equipment. This room has 3 to 4 persons working in it and is too small for its operations. The only benefit is its central location to the overall fire station.

Public Lobby Area. The public lobby area has concrete floors, wood tongue-and-groove siding, painted gypsum on the walls, and acoustical ceiling. There is a printer area and fire panels in the hallway area. This is located off the front of the center portion of the station and is used by all persons, public and employees, who come to the Station.

Large Bays. Right of the building in the main truck bay is concrete floors. It is steel beams and steel columns supporting the 8" wood floor and roof joists. There are three (3) bays in this area with roll-up overhead doors. One (1) bay has a door at both ends. The left rear portion of this seems to contain one of the additions where it has the hose tower and a generator room. A metal caged storage area, which houses several tools and work benches, is also in this area.

This is one area that should be redesigned to open up more floor space. The tower room and generator room can be moved or eliminated. This would allow more valuable support storage or increase truck bay.

The far-right truck bay has a 4'-8" deep pit covered by wood planks which must be a work area for working on the trucks. The truck bay area also contains several open lockers for the firefighters. The room to the front side of the hose tower contains the fire hoses. The back door of the tower room is a glass storefront door. Not typical for this use.

These bays are not high enough for equipment that is currently used by the Department. Future design study should review the raising of the roof of this section to accommodate existing vehicles, which require more height.

Hose Tower. The hose tower has two (2) wood framed platforms and a metal ladder going up the inside of the tower. As stated before, the wood frame roof of the tower is failing and this area should be addressed immediately. Removal of the tower is recommended.

Second Floor. The stairway to the second floor has an acoustical ceiling and painted gypsum walls, wood stairs. The stair tread and risers are damaged. This stair does not meet current codes. On the second floor is the sleeping area; one large open area with several beds and wooden chairs. There is one (1) bed tucked around the corner that is the female fire fighter's sleeping area. Adjacent to this area is also a single bathroom with a shower stall. This room has an acoustical tile ceiling, vinyl sheet

floor, and FRP walls. The main bathroom shower room at the other end of the room has a vinyl floor with two (2) toilet stalls, two (2) sinks, and two (2) showers. The sleeping area also has commercial grade carpet.

Pantry Area. Around the corner from the bathroom area is a pantry area which houses a sink and some cabinets.

Living/Kitchen-Dining Area. To the right side of the upper floor is a large open living and kitchen-dining area with several chairs, couch, television, full kitchen area with refrigerator, stove, microwave, and cabinets. This area also has a vinyl floor in the kitchen-dining area and commercial grade carpet in the living area.

Locker Room. Adjacent to the living/kitchen-dining area is a locker room with several metal lockers. There is an acoustical ceiling, painted gypsum walls. This area also has an egress door to the rooftop area which has access to grade by a metal stair in the back of the building.

Driveway. The concrete paving at the front of the building, where the trucks park, is cracked in several locations. There are weeds growing up through the cracks. Some areas are broken and heaved, causing uneven surfaces. This will need repair work.

B. SITE

1. Parking: At rear of building or in street.

2. Landscaping: None.

3. Service and Loading Docks: Through open bay doors.

4 Trash Compactor: None.

5. Site Topography: Flat site.

C. BUILDING EXTERIOR CONDITION

1. Walls: Average to poor. Water infiltration/mortar deteriorating on some CMU.

2. Front Doors: Good.

3. Signage: None.

4. Front Sidewalks: Average/Needs repair.

5. Transformer: On pole.

6. Exterior Egress Stairs and Ramps: Poor/Needs replacement.

D. ROOF CONDITION

1. Main Roof: Poor.

2. Shingled Roof: Average.

3. Flashing/Coping: Poor/Needs replacement.

4. Wood Trim: Poor.

5. Roof Flashing: Poor.

6. HVAC Units: See Mechanical Report.

7. Roof Access: Replace stairs.

8. Roof Expansion Joint: None.

E. BUILDING INTERIOR

1. Main Entry: Poor design.

2. Office Areas: Poor location.

3. Left Bay: Average.

4. Right Bays: Good. Need more height.

5. Toilet Facilities: Poor. No public facilities.

6. Sprinkler System: None.

F. EGRESS EXIT DOORS

There are a total of three (3) egress doors for this facility. Two (2) first floor; one (1) at second floor.

G. BUILDING CODE

- Use Group B (Business) (7th Edition & 8th Edition). Code transition period.

Mixed Use

- Garage
- Sleeping Areas
- Meeting Rooms

- Hazard Index 2
- All new building systems shall comply to current code requirements.
- Must meet height and area requirements with any addition.
- Legally designated as historical: (No).
- All hazardous conditions must be corrected.
- Existing building becomes minimum performance standard (can't make less conformant).
- Conform to IEBC 2009 Code.

Handicap Code

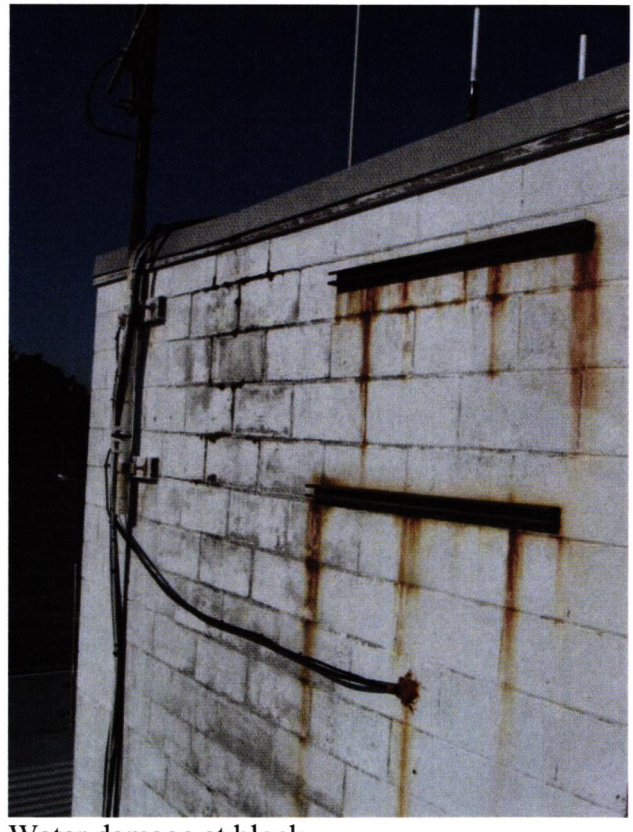
- Work over $100,000
  - Accessible public entrance
    - Toilet Room
    - Drinking Fountain
- Work over 30% full and fair cash value
  - Entire building brought up to code

See Structural, Mechanical, and Electrical Reports for additional code information.

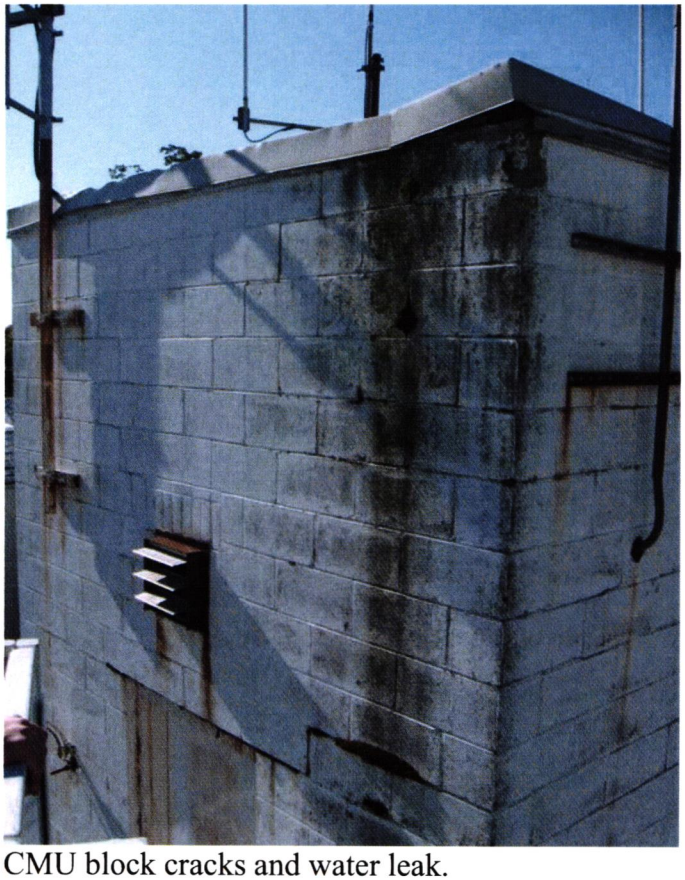
H. CODE ANALYSIS

A new Building Code is in a transition period and it will affect any work on this structure. See Structural Report for more information.

CMU damage at tower.



Water damage at block.



CMU block cracks and water leak.

Membrane roof over 3-bay garage.

Cracked slab and granite foundation base.

Mortar separation at brickwork and rotted trim.

Block damage at overhead door.

Brick damage at overhead door.

Front concrete pad needs removal & reconstruction.

Water damage. Space between buildings.

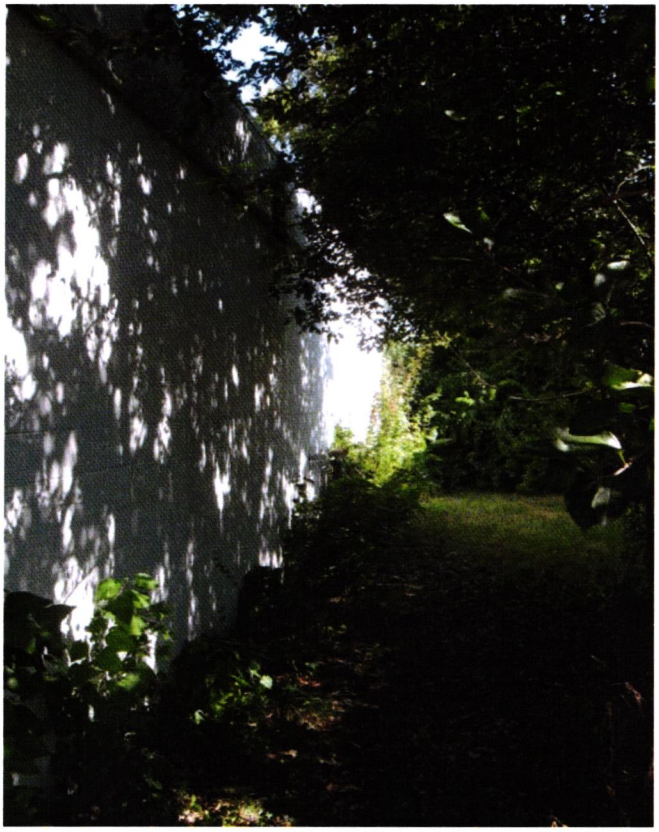
Cracks in concrete street pad.

Shingle roof above 2nd floor living quarters.

EPDM roof at 2nd floor emergency exit.

Typical curb flashing detail.

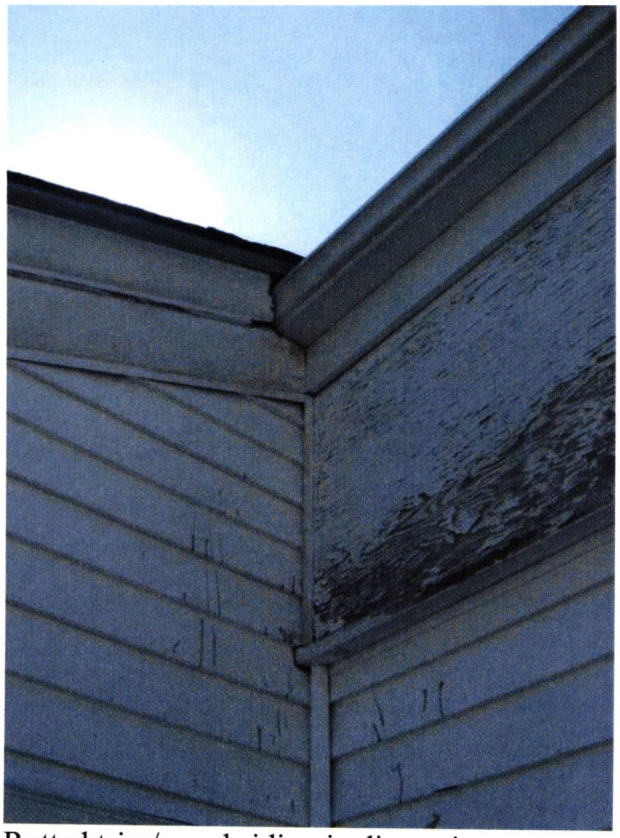
EPDM at base of tower.



Landscape area around building to be cut back.

Water damage CMU.

Wood band needs repair and repaint.



Rotted trim/wood siding in disrepair.

Main entry.


Front elevation space.


Front low ceiling bays.


Brickwork at 3rd bay door.

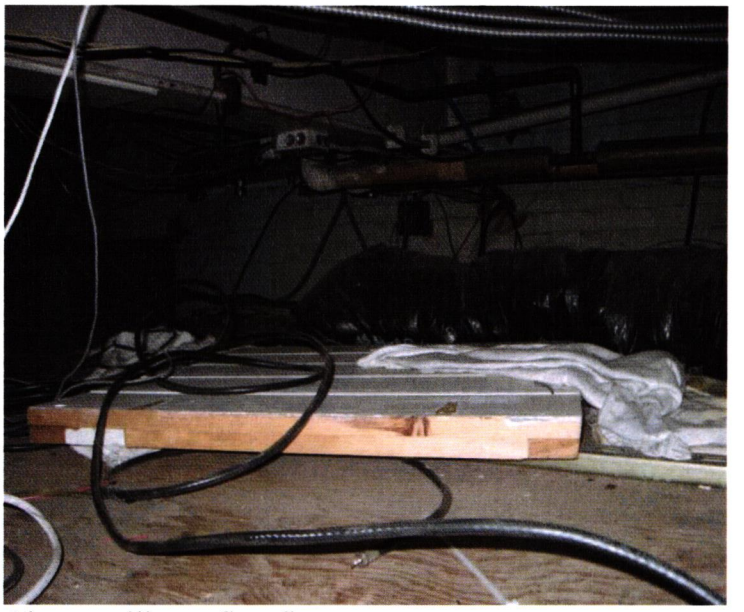
Stair not code compliant. Tower area.

Water infiltrated CMU. Rotted trim.

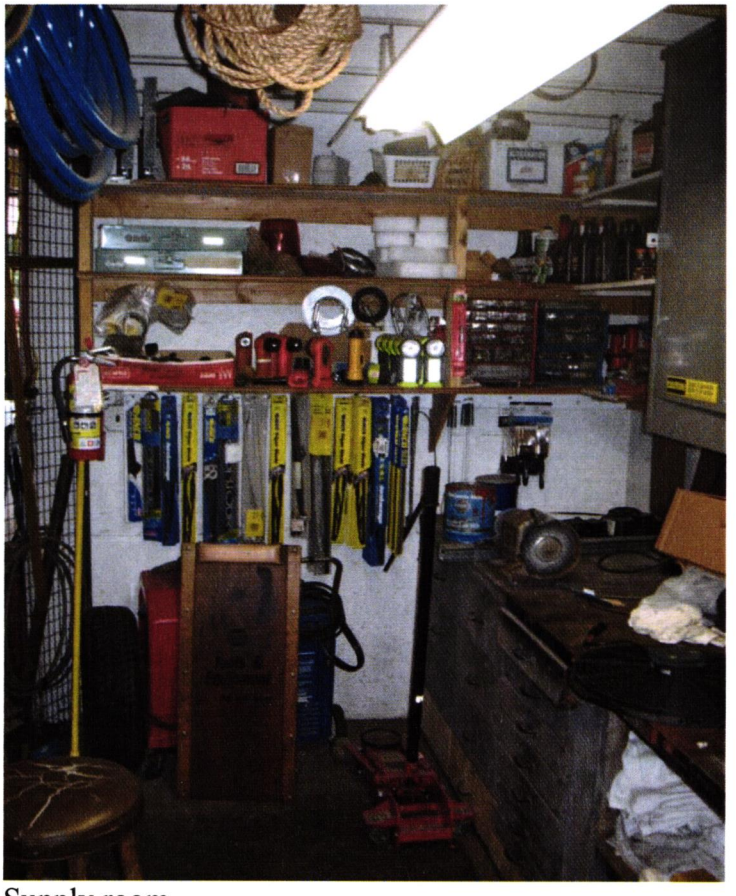
Paint peeling due to water entering block work.

Roof flashing allowing water in block causing mortar to fail and paint to peel.

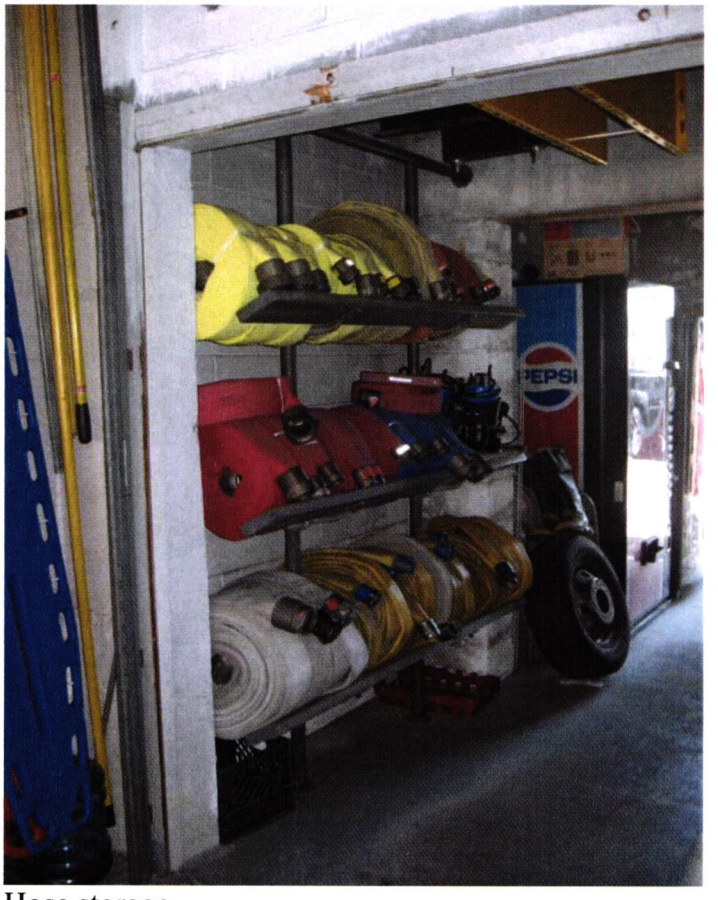
Clothing storage rack



Above ceiling – first floor.



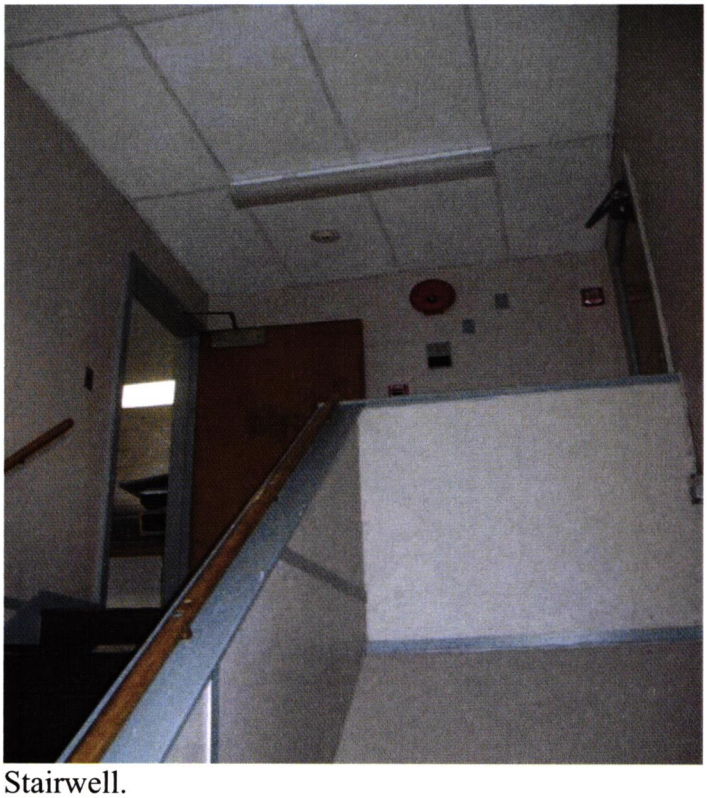
Supply room.



Hose storage.

Wood stairs – not code compliant.

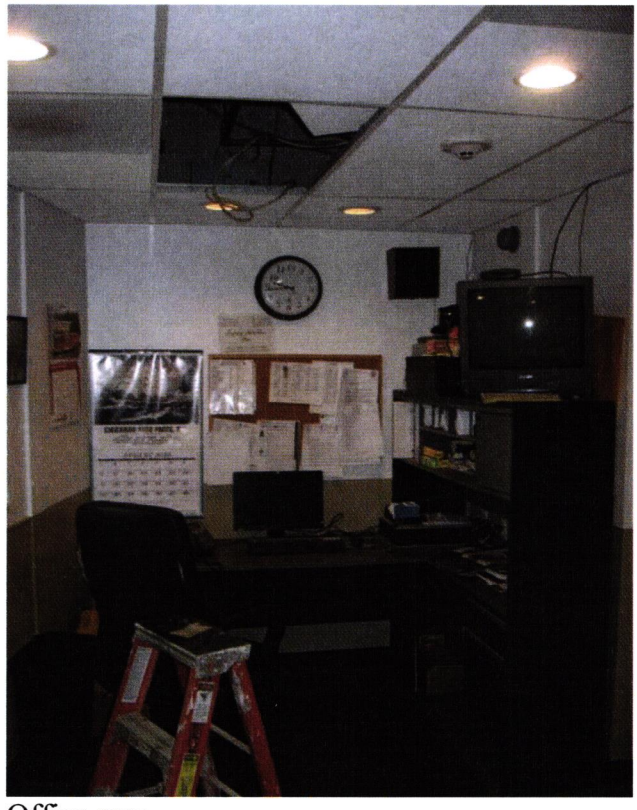
2 x 8 – 2nd Floor roof joist – no insulation.



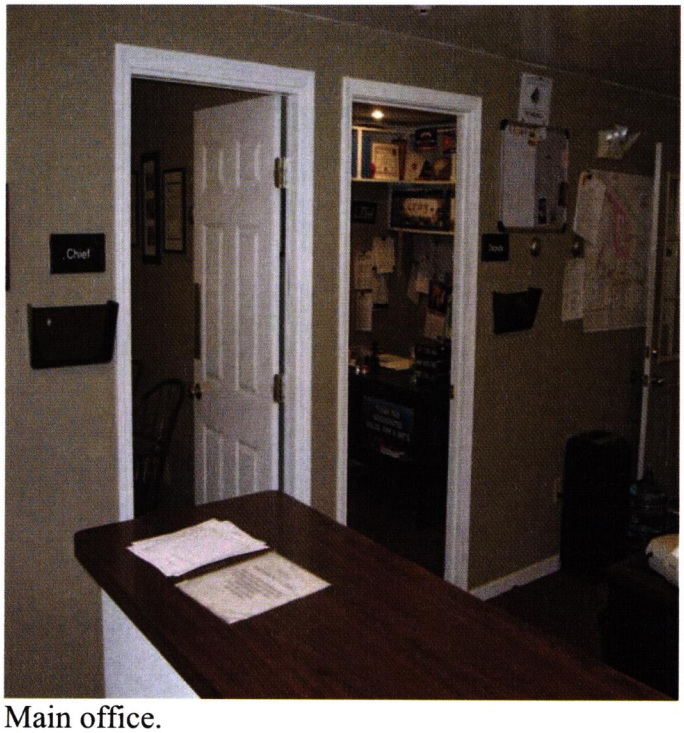
Stairwell.

Above office ceilings.

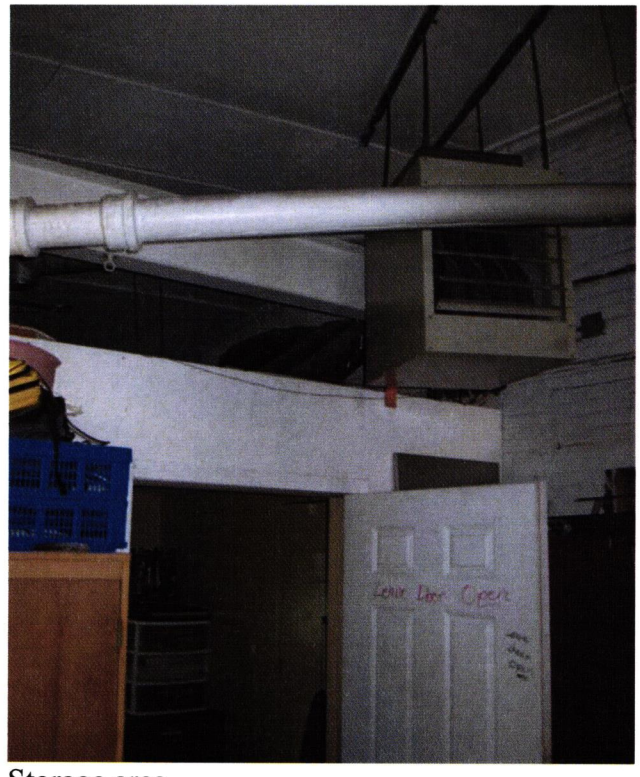
Truss roof.



Office area.

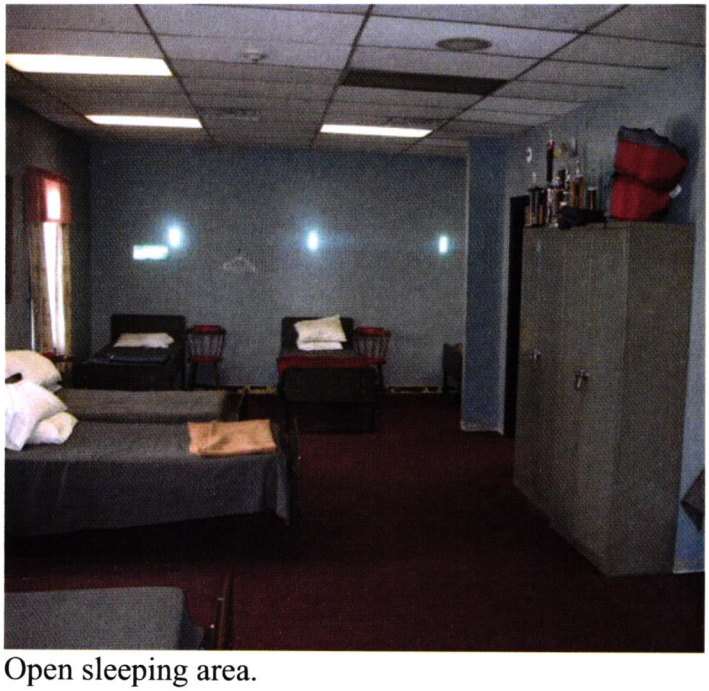


Main office.



Storage area.

Living room.



Open sleeping area.

SECTION 2

Chapin Associates, Inc.
Structural Report

Chapin Associates, Inc.

Structural Engineers
5 Grove Street Norwell, Massachusetts 02061

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September 8, 2010

Yarosh Associates, Inc. – Architects
10 Cape Drive
Mashpee, MA 02649
Attn: Mr. Walter M. Yarosh, RA

Re: Bridgewater Central Fire Station 22 School Street Bridgewater, MA
Expansion/Rehabilitation Feasibility Study (Structural)

As requested, we are submitting this report, presenting the results and conclusions of our study of the above-referenced building. This study was commissioned for the purpose of assessing the feasibility of constructing an addition to, as well as of performing a rehabilitation/upgrade of, the existing building. Specifically, as we understand it, the Town of Bridgewater Fire Department would like to investigate the feasibility of accomplishing the following:

1. Rehabilitate existing spaces throughout the building, making them more suitable for continued use. This would include cosmetic and other non-structure-related upgrades, but would also include to raise the height of existing fire truck bays, including truck door openings, to suit wider or higher equipment.
2. Add new Second Floor space above currently existing one-story portions of the building, in order to expand the area of what is already Second Floor space.

On Thursday, August 19, at 8:30 AM, the undersigned visited the subject building to conduct a walk-through, visual survey of the existing structure. Also at the building were representatives of your office, along with other members of the overall design team, and Fire Department personnel. This report is based in large measure on what we found during that on-site survey. Because of this, it is worth noting, at this point, some of the limitations inherent in a visual survey such as this:

1. In many cases, the structural elements (beams, columns, girders, etc.) were concealed by finish materials, such as gypsum board wall and ceiling construction, acoustic tile ceilings, etc. At acoustic tile ceilings, tiles were removed, at representative locations, to gain visual access to spaces above the ceiling from which structure could be viewed. Otherwise, no attempt was made to conduct invasive demolition for purposes of viewing the structure.
2. No numerical structural analysis of any kind was conducted. No structural drawings for these buildings were made available to us, and we made no attempt to field-measure member sizes, test structural materials, etc. for purposes of establishing member properties, either geometric or mechanical, that would be necessary in any kind of numerical and quantitative engineering evaluation.
3. No attempt was made to compare building construction, as viewed, with the requirements of any building or design code, either presently applicable or applicable at the time of building

construction. Observations in this regard about specific conditions may be made here and there in this report, but this should in no way imply that code-compliance was fully evaluated in any way.

4. Because the exact nature and extent of contemplated work on this building is not fully known at this time, the provisions that govern new work on existing buildings, as found in the applicable edition of the Commonwealth of Massachusetts-State Building Code, are difficult to establish, as these will vary depending on the nature and extent of proposed work.

With the above in mind, allow us to present our discussion of the various topics included in this report, as follows:

A. **Existing Building:** The existing building in its present form is the result of what appear to be a number of additions to the original Fire Station, which was constructed perhaps a century ago. This original building appears to have been a two-bay station with a Second Floor and, based on an old framed photograph of the building that is hanging in the station, probably a gable roof. Exterior walls were brick on a granite foundation, and Second Floor and roof were likely wood construction. Because the original building was fairly narrow, Second Floor joists likely spanned from side-to-side the entire width of the building, thereby leaving a column-free interior space at the First Floor apparatus room. The original door openings into the apparatus room, labeled as **"STEAMER 1"** and **"AUTO COM'BL"** in the photograph (see Photo 1. below) are still visible as what look, from the exterior, like two side-by-side overhead doors, each with a horizontal array of glazing at normal window height (see Photo 2. below). These, however, are actually what form the front exterior wall of the station's office and command center.

   To the left of the two-story section of the building in the photo is a one-story section that appears to have had two large doors, similar to those on the front of the two-story section. These are labeled **"HOOK & LADDER 1"**, and likely opened into another apparatus room. This section was likely torn down and re-built to its present configuration, as it appears to be noticeably different than what now exists in this part of the overall building.

   Just to the left of this one-story segment in the photograph is a narrow-two-story segment that appears, based on its adornment with banners, to have also been part of the fire station at that time. It has since been demolished, as there is now an alley between the far left end of the present station and the adjacent building. Note that the door into the adjacent building, at the far left of the photo, is still there, looking much as it did back when the photo was taken . See Photo 3. for these latter items.

Photo 1.: Early photograph taken at the front of the fire station.

Photo 2.: View of the front section of the original two-story fire station, with the original vertical brick piers beside door openings still visible. What appear to be overhead doors are actually fixed-in-place panels, with interior finished office/command center space within. The Second Floor superstructure, above the low roof level (which is visible at left in the photo), is not original.

Photo 3.: Far left end of the front of the present station. Just about everything visible, except for the two brick piers at far right (above the vehicle's windshield) is not part of the original building.

At some point, probably in the mid-1900s, various wood-framed additions were constructed. One of these additions/alterations involved removal of the roof of the original two-story building and construction of a new roof over an extended Second Floor area. As far as the other additions are concerned, some are one-story appendages to the existing building or to earlier additions, and some are Second Floor additions that were apparently built over what had originally been the roof of one-story space. Evidently there is no documentation, or even firm dates, available relative to these additions.

The one-story spaces appear to have concrete masonry unit (CMU) exterior walls, whereas the Second Floor spaces appear to have wood-framed stud exterior walls. All floors and roofs are framed with wood joists, studs, rafters, etc (see Photos 6., 7., 8., and 10.). There are some steel beams at the ceiling of the Apparatus Room (see Photo 9.), supporting wood floor and roof framing above, in order to permit the longer spans associated with steel, thus allowing a relatively column-free interior space. **Figure 1.** shows the present plan at both First and Second floors. Foundation for all buildings appear to be normal spread footings, and First Floors are grade- supported concrete slabs, overlain at some locations, by finish materials (carpet, tile).

B. **Present Condition:** Except for the items specifically noted below, the building appears to be, for the most part, in reasonably good condition. We saw no cracking of any significance in masonry walls or in concrete foundation walls. Wood floors and roofs appeared to be reasonably plumb and level, except where roofs have been intentionally pitched for drainage (see Photo 11.). There was no evidence of significant wood rot or insect damage, nor was there extensive corrosion of steel members. A few minor exceptions to this are noted, as follows:
    1. One interior steel wide-flange (WF) column has suffered localized but significant corrosion, to the point where the web has rusted completely through (see Photo 4.).
    2. Wood joist framing over Hose Drying tower has deteriorated, with partial collapse (see Photos 5. and 6.).

3. Masonry wall of Hose-Drying tower, near top, shows cracking and other damage to masonry walls.

C. **Building Codes:** It is quite likely that the Town of Bridgewater had no building code when the original station was built. Since the 1st edition of the Commonwealth of Massachusetts – State Building Code did not become effective until 1975, it's almost as likely that many of the additions that, along with the original building, make up the present fire station were not constructed under the State Building Code, but under whatever building code the Town of Bridgewater may have developed on their own in the intervening years between construction of the original building and construction of the additions. Any future construction done on this building will likely be subject to the provisions of the 8th (or later, depending on timing) edition of the State Building Code. The 8th edition became effective on August 6 of this year, and the six-month overlap "grace" period will expire on February 6, 2011. It's unlikely that plans could be completed for new construction in time to be permitted under the 7th edition of the code.

D. **Development Issues:** There are several structure-related issues that will need to be dealt with as consideration is being given to renovating and adding to this existing building. These are discussed as follows:

1. **Existing Structural Geometry:** As we understand it, the existing structure will need to be modified in order to gain higher truck bays, higher doors, code-compliant stairs, etc. This, of course, would impact existing roof and Second Floor construction. Significant dollars out of what appears to be a limited budget would have to be spent to accomplish similar, and perhaps more extensive, re-structuring for similar purposes. As we understand it, one of the items up for consideration is the addition of more Second Floor space, to be built above what is presently existing one-story space. Using existing roof as floor space raises the issue of building a flat floor on top of what is now a sloped roof, and having the elevation of that new floor match that of the existing Second Floor.
2. **Existing Structural Capacity:** As noted above, one of the proposed plans would involve the construction of new Second Floor space over existing roof. Because code-defined floor loads are almost always larger than roof snow loads, the issue of the present roof's capacity becomes an issue. This is true even for roofs that will not become a new Second Floor, as the proximity of the new Second Floor structure nearby makes it likely that the roof will experience snow drift loads that it has not hitherto had to support.
3. **Code Requirements for Existing Buildings:** The Commonwealth of Massachusetts has adopted the International Building Code-2009 edition (IBC-2009)as the so-called "model code" on which it's own code is based. The State will no longer publish its own code. Rather, it will publish a list of amendments to IBC 2009 which are to be used in Massachusetts.

   This is also true of the special code provisions one must use when working on existing buildings. Unlike the 7th edition of the State Code, that had its own provisions in Chapter 34, the 8th edition adopts the International Existing Building Code-2009 edition (IEBC-2009), and will publish a Massachusetts-specific list of amendments to this document. These amendments have not yet been published, so it's not clear exactly how the State will modify the IEBC-2009 requirements. However, what is clear, based on our review of IEBC-2009 and of a recent "draft" copy of the proposed amendments that was available to us, is that these provisions will severely impact what can be reasonably accomplished with this existing building.

   a) IEBC-2009 limits the size of new "structurally-attached" additions to about 10 percent of the size of the existing building without requiring substantial upgrading of the existing structure. Anything larger than about 10 percent

would trigger all kinds of requirements for upgrading the existing gravity and lateral (wind, earthquake) load-resisting system to meet the requirements of the code for new buildings. This would result in spending significant dollars to do things like:

- reinforce the existing floor and roof structure to meet the gravity dead and live load requirements of the 8th edition,
- provide code-conforming seismic attachment of floors and roofs to masonry walls,
- provide a new lateral load-resisting assembly (e.g. steel moment-resisting frame, reinforced masonry shear wall) where the present structure lacks the capability to resist lateral loads,
- possibly install vertical reinforcing rods grouted into existing block cells over the full height of the wall. This is because the Massachusetts amendments to IEBC-2009 are expected to have stricter provisions than does IEBC-2009 itself regarding the allowability of unreinforced masonry walls. It is highly unlikely that any of the masonry walls at this building are reinforced.

b) IEBC-2009 imposes similar constraints on the amount of non-structural renovation work that can be performed before unintended (by the designer) structural upgrades are required. In other words, even if no structural work is initially intended, significant non-structural renovation work will actually trigger structural compliance requirements similar to what are described in a) above.

The reasons why the code imposes the two above-described provisions are two-fold.

- The philosophy behind these general requirements is that if an owner is spending a significant amount of money to extend the life of an existing building for his own benefit, he should be obligated to make sure that the building is brought up to some reasonably current standard of performance with respect to loading, both gravity and lateral.
- The second, more building-specific, reason is that Fire Stations are considered to be an "essential facility" that is expected to be able to perform well in an event, such as an earthquake or hurricane. As such, they are assigned the highest of the four "Occupancy Categories" for design purposes. During the course, and in the aftermath, of such an event, when other buildings may be damaged, subject to the threat of fire, or otherwise compromised, many people would be relying on the assistance that only a whole and undamaged Fire Department could offer. "Occupancy Category IV" buildings have the most stringent design requirements of the four categories.

E. **Conclusions:** In conclusion, the following points need to be considered in any discussion regarding the feasibility of renovating, and/or adding to, the subject existing building:

1. Either the size of any addition must be limited to a relatively small fraction (about 10 percent) of the size of the existing building, or significant dollars will likely have to be spent to upgrade existing structural systems, details, attachments, etc. (see D. above).
2. Even without an addition, substantial renovations, whether structural or non-structural, have the potential to trigger requirements for structural upgrades similar to those that would be required under 1. above, with accompanying costs (see D. above).

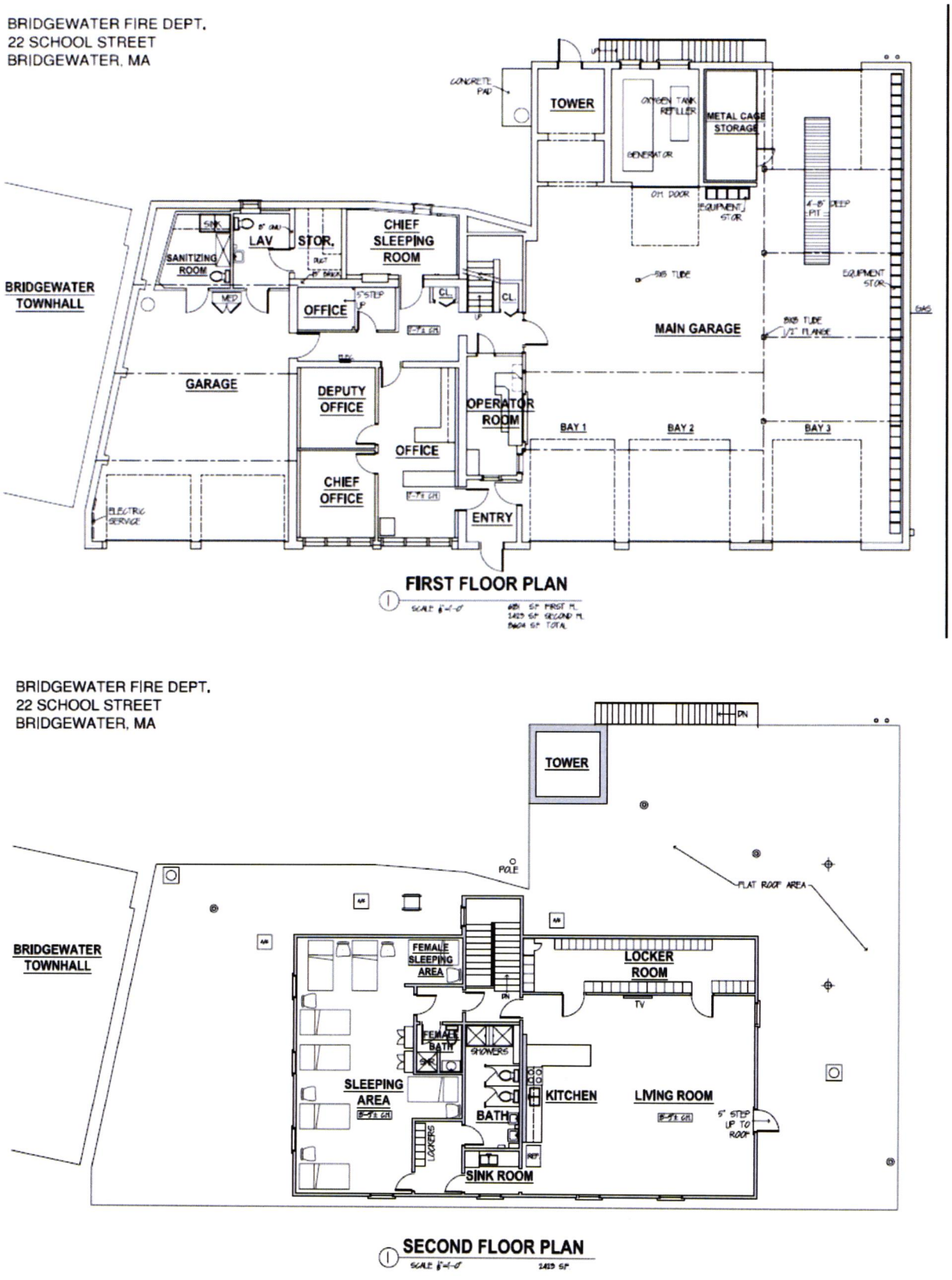
3. In the absence of structural drawings for any part of the building, the cost of retrieving, for engineering analysis and design purposes, sufficient information and data regarding existing structural members and materials would be significant. Structural materials (wood, steel, concrete, masonry) would have to be investigated and tested to determine material properties, and field measured to determine geometric properties. Invasive exploration would have to be done in order to accomplish this as well as to be satisfied that there are no hidden conditions of deterioration. Connections between members (nails, bolts, etc.) would have to be evaluated to insure that connection devices are not a "weak link" in what might be an otherwise reasonably sound existing structure.
4. Even after such renovations and upgrades, the Town would be left with a building that would, in terms of functionality, likely be a compromise between that which is ideally preferred and that which is practically and economically justifiable.
5. Such a building would almost certainly be less likely to survive a natural event than would a new building built completely to current code requirements in all respects.

This concludes our report to you regarding the subject building. If you have any questions please don't hesitate to contact us.

Very truly yours,

Edward J. LeNormand, PE

COMMONWEALTH OF MASSACHUSETTS
EDWARD
JOHN
LeNORMAND
No. 27136
REGISTERED
STRUCTURAL ENGINEER


BRIDGEWATER FIRE DEPT.
22 SCHOOL STREET
BRIDGEWATER, MA
CONCRETE PAD
TOWER
OXYGEN TANK RETLLER
METAL CAGE STORAGE
GENERATOR
OH. DOOR
EQUIPMENT STOR.
4'-8" DEEP PIT
BUS TUBE
EQUIPMENT STOR.
BUS TUBE 1/2" FLANGE
GAS
BRIDGEWATER TOWNHALL
SINK
LAV
STOR.
CHIEF SLEEPING ROOM
SANITIZING ROOM
MED
OFFICE
5" STEP UP
CL
CL
MAIN GARAGE
GARAGE
DEPUTY OFFICE
OPERATOR ROOM
BAY 1
BAY 2
BAY 3
OFFICE
CHIEF OFFICE
ELECTRIC SERVICE
ENTRY
FIRST FLOOR PLAN
SCALE: 1/8"=1'-0"
685 SF FIRST FL
1403 SF SECOND FL
2088 SF TOTAL

BRIDGEWATER FIRE DEPT.
22 SCHOOL STREET
BRIDGEWATER, MA
DN
TOWER
POLE
FLAT ROOF AREA
BRIDGEWATER TOWNHALL
FEMALE SLEEPING AREA
LOCKER ROOM
TV
FEMALE BATH
SHOWERS
SLEEPING AREA
KITCHEN
LIVING ROOM
BATH
5" STEP UP TO ROOF
LOCKERS
REF
SINK ROOM
SECOND FLOOR PLAN
SCALE: 1/8"=1'-0"
1403 SF

Figure 1.

Photo 4.: Corrosion completely through the web of Apparatus Room steel wide-flange column.

Photo 5.: Photo of Hose-Drying tower. Wood roof framing of the tower has deteriorated and suffered partial collapse, and masonry walls near the top of the tower show cracking and other damage.

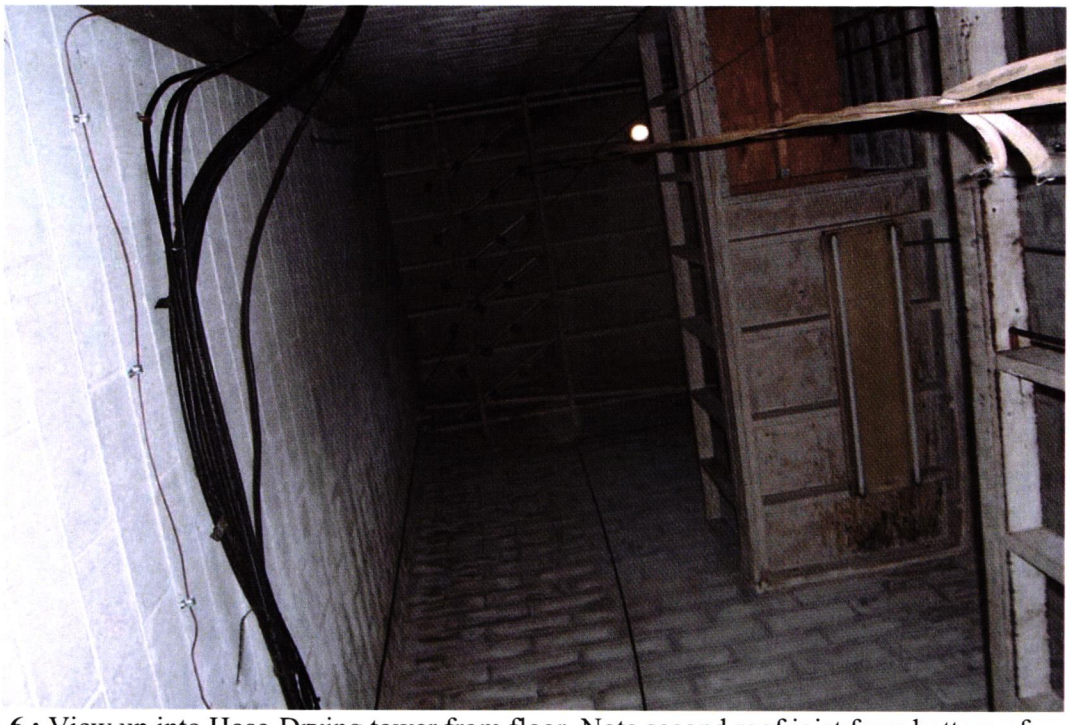


Photo 6.: View up into Hose-Drying tower from floor. Note second roof joist from bottom of photo is skewed, due to roof failure and partial collapse.

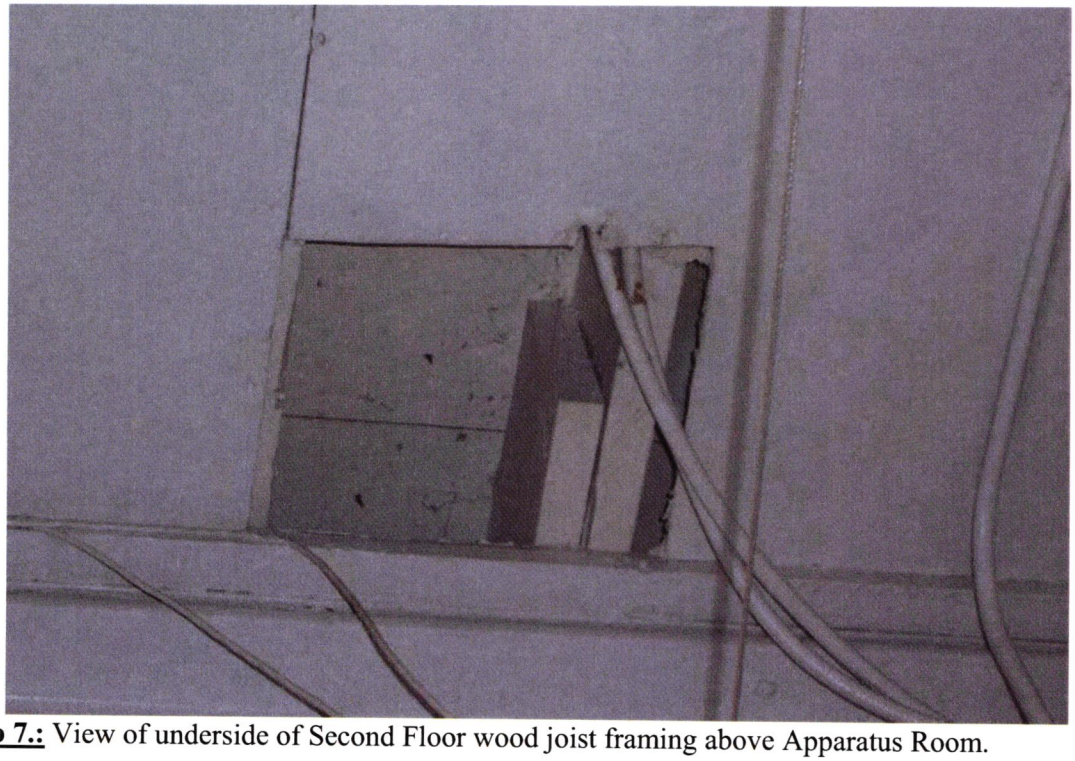


Photo 7.: View of underside of Second Floor wood joist framing above Apparatus Room.

Photo 8.: View above ceiling of Second Floor, showing gable-pitched wood roof truss.

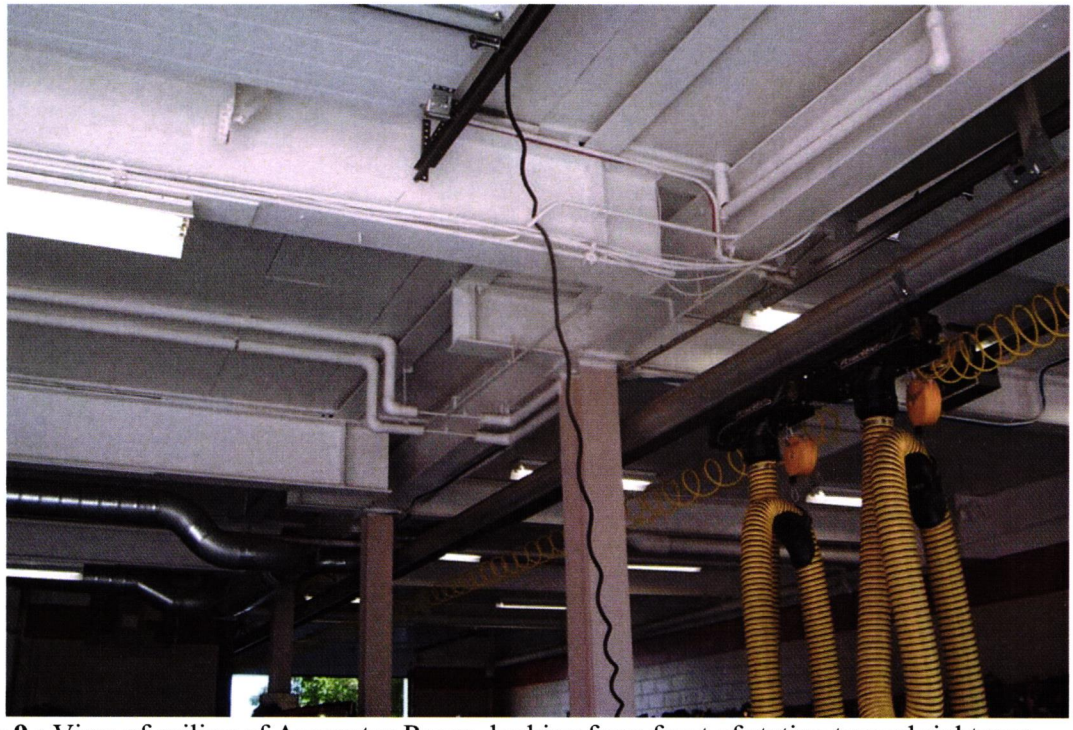


Photo 9.: View of ceiling of Apparatus Room, looking from front of station toward right rear corner. About midway between the black door track at the top center of the photo and the steel beam that extends from the upper right corner down to lower left, can be seen the bottom flange of a steel beam that is parallel to both. This steel beam is aligned with the east end wall of the Second Floor above. The rather complicated framing scheme seen in this photo was accomplished to allow the front-to-back columns line to be moved to the east a short distance, thereby allowing wider apparatus into this space.

Photo 10.: Underside of roof framing at ceiling of Emergency generator Room.

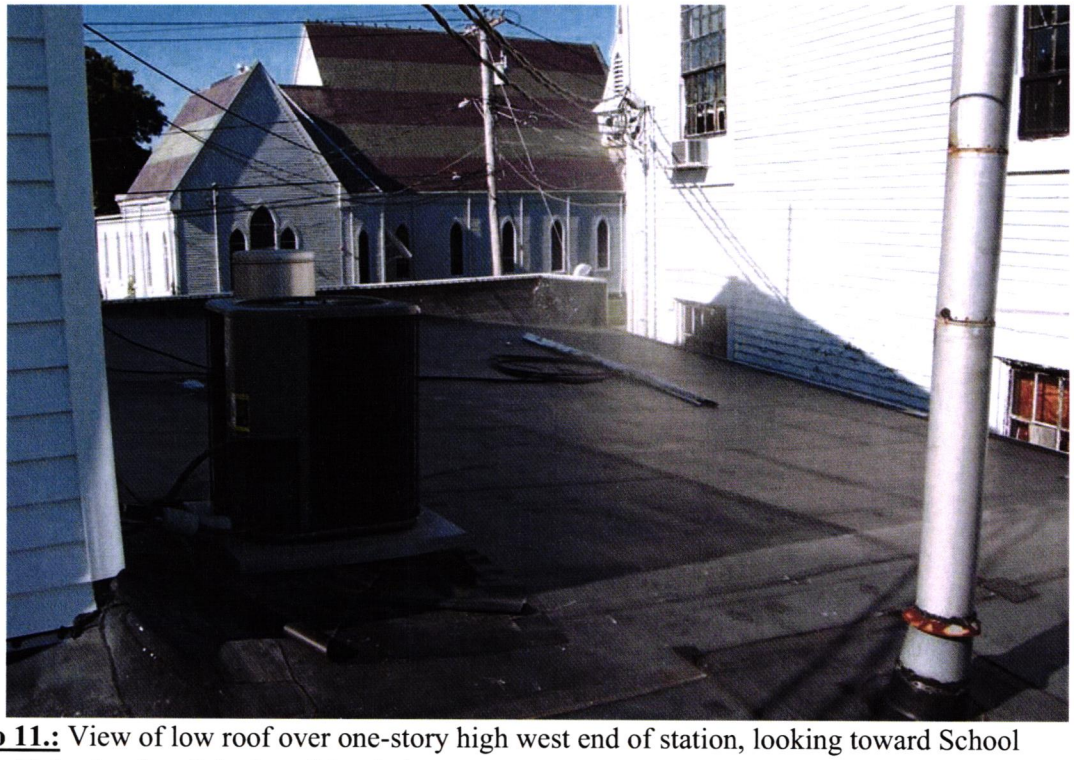


Photo 11.: View of low roof over one-story high west end of station, looking toward School Street. Note steeply-pitched roof for drainage.

SECTION 3

DC Engineering
Mechanical/Plumbing and Electrical Report

440 E Corporate Dr.
Suite 103
Meridian, ID 83642
Phone: 208.288.2181
Fax: 208.288.2182

September 7, 2010

Mr. Walter Yarosh
Yarosh Associates, Inc.
#10 Cape Dr.
Mashpee, MA 02649

Subject: Mechanical and Electrical Site Survey, Bridgewater Fire Department, 22 School Street, Bridgewater, Massachusetts 02324

This letter is a summary of the pre-engineering mechanical and electrical site survey made at 22 School Street, Bridgewater, Massachusetts, on August 19, 2010. The goal of the site visit was to observe the conditions of the existing facility and to identify any major mechanical, electrical, or plumbing issues that may need correction or attention prior to or in concurrence with a potential remodel.

General

Overall the facility's mechanical and electrical systems had a variety of conditions; some of the equipment had been replaced in the recent past, and some of the equipment needs to be replaced.

MECHANICAL

The mechanical systems serving the fire station vary in age and configuration. Additional air conditioning equipment has been added on the building over the years either during remodels, as older equipment stops working, or as current equipment fails to satisfy heating and cooling loads.

The Fire Chief's office, Deputy's office, open secretary office, and former secretary space are served by a split DX air conditioning system. The 2.5-ton condensing unit sits on the ground north of the building. The fan coil unit is located in the former boiler room accessed through the first floor restroom. The overall system appears to be approximately 14 years old and seems to provide adequate temperature control. The outdoor condensing unit is in good condition. The indoor fan coil leaks excessively, which could be caused by either a blocked drain line or a hole in the internal drain pan. The fan coil appears to have an overflow drain connection point, but there is no piping connected to it.

The former secretary space is also served by a wall-mounted ductless split DX system. The 1-ton condensing unit sits on the ground north of the building. The evaporator section is mounted high on the wall in the space. During inspection, it was determined this system is no longer operating.

The officers' room and first floor restroom were served by a rooftop-mounted packaged unit located above the space that has not been working for some time. Ductwork from this unit has been disconnected and abandoned above the ceiling. Station personnel report roof leaks in the vicinity of this unit and it appears that the abandoned rooftop unit may be the cause of weather infiltration.

The officer's room is currently served by a 0.5-ton packaged terminal air conditioning unit (PTAC) mounted in the exterior wall. The unit is in good condition, but is probably inadequate to control room temperature on particularly warm days.

The watch room is served by a ductless split DX system. The 1-ton condensing unit sits on the low roof above the officers' room. The evaporator section is a ceiling-mounted cassette unit. This system is approximately five years old, appears to be in good condition, and provides adequate temperature control.

The downstairs restroom is exhausted by a ceiling-mounted residential grade fan. It is vented to the exterior wall with a flexible duct. The fan is in good condition.

The day room and bunk room are each served by a split DX air conditioning system. The 2.5-ton condensing units are located on the low roofs over the garage bays on each side. The condenser on the west roof serving the bunk room is sitting precariously on a wooden sleeper and is not well attached. The fan coil units, which only have 2-ton evaporator coils, are located in the attic above each space and are ducted to diffusers in the ceilings. The systems are in good condition and are less than 10 years old. However, the systems are undersized and not do not maintain adequate temperature control in the summers. To provide additional air conditioning, station personnel have installed a window-mounted PTAC in the bunk room, and both a window-mounted and a wall-mounted PTAC unit in the day room. Even with the additional cooling, drapes are kept closed on all windows and the systems run at all times during warm weather.

An exhaust fan on the west roof serves a hood below in the decontamination room. According to station personnel, the hood and fan were donated from a prior use at a commercial kitchen. The fan shaft appears to be bent, causing it to wobble and make significant noise. This reduces the capacity of the fan and will most likely lead to a premature failure.

The various garage bays are served by three (3) ceiling-hung unit heaters that are in good condition. The flues extending through the roof for each unit heater show extensive rusting and should be replaced.

Each garage also has an exhaust fan through the roof and an intake vent on the exterior sidewall intended for vehicle fume exhaust. Station personnel report that this system did not work well partly due to the relatively close proximity between the fan and intake louver,

causing air to "short circuit". These exhaust systems are not used and are abandoned in place. A new "source capture" vehicle exhaust system was installed recently and performs very well.

Louvers at the north wall of the garage area serve the emergency generator exhaust air and intake. Personnel indicated that the exhaust louvers were rusted shut and caused severe strain on the garage door that encloses the room as it flexes to allow supply air into the room. An exhaust flue through the roof is rusted and could use replacement.

PLUMBING

The downstairs restroom consists of a single water closet and lavatory. Both were replaced within the last five (5) years with low water consumption fixtures and are in good condition.

The decontamination room also has a water closet that is in good condition. In addition, this room has a stainless steel 2-comparment sink with drain boards and a metal drain pan in a drying area. The drain from the pan has been piped over to a floor drain after installation and somewhat restricts standing room in front of the 2-compartment sink.

Two (2) water heaters sit on the concrete slab outside the decontamination room. They appear to serve the downstairs plumbing fixtures and are in good condition. A third water heater is located in a closet under the stairs and is completely covered with plastic covering. The building seems to be adequately served with hot water.

The kitchen in the upstairs day room has been remodeled within the last five (5) years. The stainless steel sink is in good condition. The prior kitchen is now in a pass-through hallway and a single compartment stainless steel sink remains. It is also in good condition, but is used sparingly.

The main restrooms were also partially remodeled at the time of the kitchen remodel. The two (2) lavatories are different models, but both are in good shape. The two (2) water closets are also different models (one a 1.6 gal/flush, the other a 3.5 gal/flush) and in good condition. The two (2) showers in the room also appear to function well. The floor of one shower shows significant rust staining due to the condensate from the ductless evaporator serving the watch room being pumped up and discharged here.

An additional restroom is located off the bunk room and consists of a water closet (3.5 gal/flush), lavatory, and shower. All appear to be in good working condition.

Drainage of the building appears to be adequate, but station personnel reported that during heavy rains, storm water can back up through the floor drains in the garage bays. This likely indicates that the drains from the garage bays empty into the street gutters and raises concern about contaminants (such as oil or gasoline) making their way to the storm sewer.

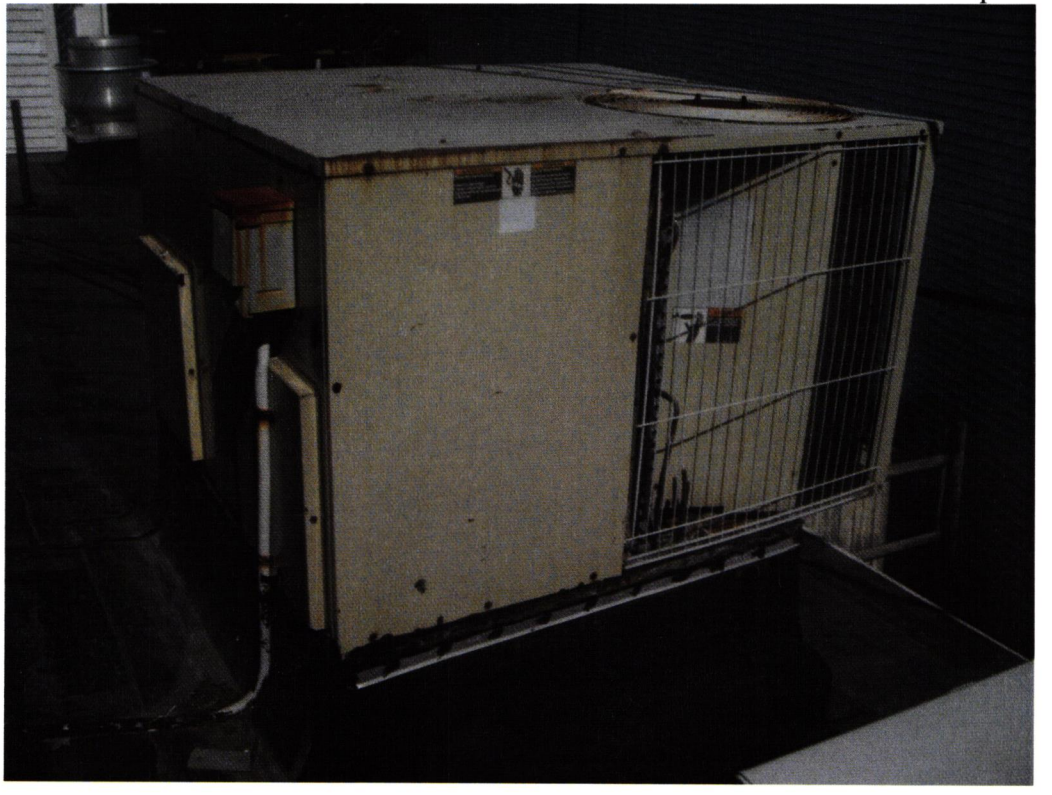
Bridgewater Fire Station
PBER Picture Survey
Bridgewater, MA

NO. 1 Exterior Condensing Units

NO. 2 Rooftop Equipment

NO. 3 Rooftop Condensing Unit and Generator Flue

NO. 4 Abandoned Rooftop Unit



NO. 5 Leaking Fan Coil

NO. 6 First Floor Restroom

NO. 7 First Floor Water Heaters

NO. 8 Decontamination Room

NO. 9 Second Floor Shower

ELECTRICAL

Building Exterior Lighting

The building front was lit by a single HPS fixture although there were additional fixtures not in use. The building sits in a residential area and probably needs to minimize its light trespass when extra light is not needed.

Current building codes require battery-backed lighting fixtures to be placed at each exit from the building so that a minimum level of lighting is maintained during a power outage. This building does not have any exterior battery-backed egress lighting. This would need to be added with a remodel.

Interior Lighting

The existing lighting system within the fire department was predominantly fluorescent fixtures with a few incandescent fixtures. In addition there were emergency battery pack spots installed to accommodate any egress lighting requirements.

Service

The building is served by a three phase, overhead electrical line. The pole-mounted transformer provides 120/208V three phase 400 amp service which appears to be in good condition. The main service and primary distribution panels were relatively new and in good condition. The existing peak demand over the past 12 months was 28.5 kW which is the equivalent of 80 amps. The existing service should be sufficient to serve the existing building for a future remodel, assuming the size and function of the fire station remains the same.

Electrical Distribution

The primary panels, A and A1, were both Square D, 200 amp load centers and are in good condition. There were 7 spaces available within these two panels for future loads. Panel D is a 100 amp sub-feed out of panel A1 and is also a 200 amp load center. This panel has space for 12 additional new loads. All three of these panels are in good condition and could be reused.

There were additional panels in the boiler room (panel E), the upstairs locker room (panel B) and in the generator room (panels C, C1, and C2) that were old and should be replaced. The existing panel E had records and other items stored in front of the panel and was inaccessible; this is an NEC code violation that should be corrected.

Generator / Backup Power

The existing generator is a Cummings 125 kW standby generator with an 800 amp main circuit breaker. The output of the existing generator feeds into a distribution box within the generator room with three 150 amp breakers. These breakers feed the fire department, and

city hall. The third breaker appears to have fed the police department, but the existing weather head feed on the roof has been abandoned. The automatic transfer switch (ATS) is an ASCO 300 series, 3 pole transfer switch. This will need to be replaced with a 4 pole transfer switch since the generator feeds multiple buildings. It is necessary to switch the neutral since separate grounds need to be established at each building. This issue should be corrected regardless if the remodel takes place or not.

Phone Service

The phone service to the building was a 100 pair cable. The existing phone protector system appears to be an older generation, probably installed a minimum of 40 years ago. If a call center is to be added to the fire station, the phone protector should be upgraded and consideration should be given to adding a fiber line to establish a high speed connection.

Summary

The fire station has some issues, as could be expected with an older building that has been pieced together. The electrical service has been upgraded and should be sufficient for future use. Some of the panels need to be replaced and brought up to current standards. The generator system (ATS and feeders) needs to be upgraded as it is not to code.

Mechanical and plumbing systems appear to be in decent condition overall. However there are some significant items that will need to be addressed depending on the actual needs and configuration of the remodel. These include replacing gas flues, maintaining or replacing the exhaust louver, repairing/replacing the leaking fan coil serving offices, and replacing second floor split systems with properly sized equipment.

Thank you for the opportunity to provide this report of our findings for you. If you have any questions or need clarification, please call our office at 208-288-2181.

Respectfully,

DC ENGINEERING P.C.

John W Clausen, PE Electrical Engineer	Kory Nash Mechanical Engineer

Attachments:

1 – Mechanical firehouse photo survey

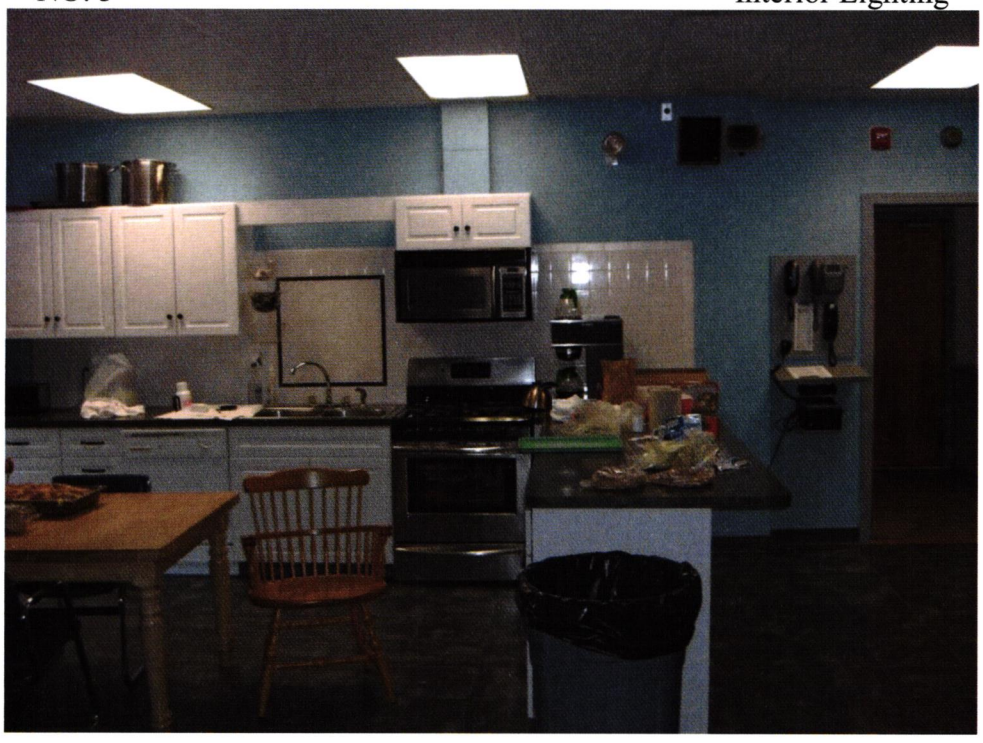
2 – Electrical firehouse photo survey

Bridgewater Fire Station
PBER Picture Survey
Bridgewater, MA

NO. 1 Building Exterior

NO. 2 Interior Lighting

NO. 3 Interior Lighting



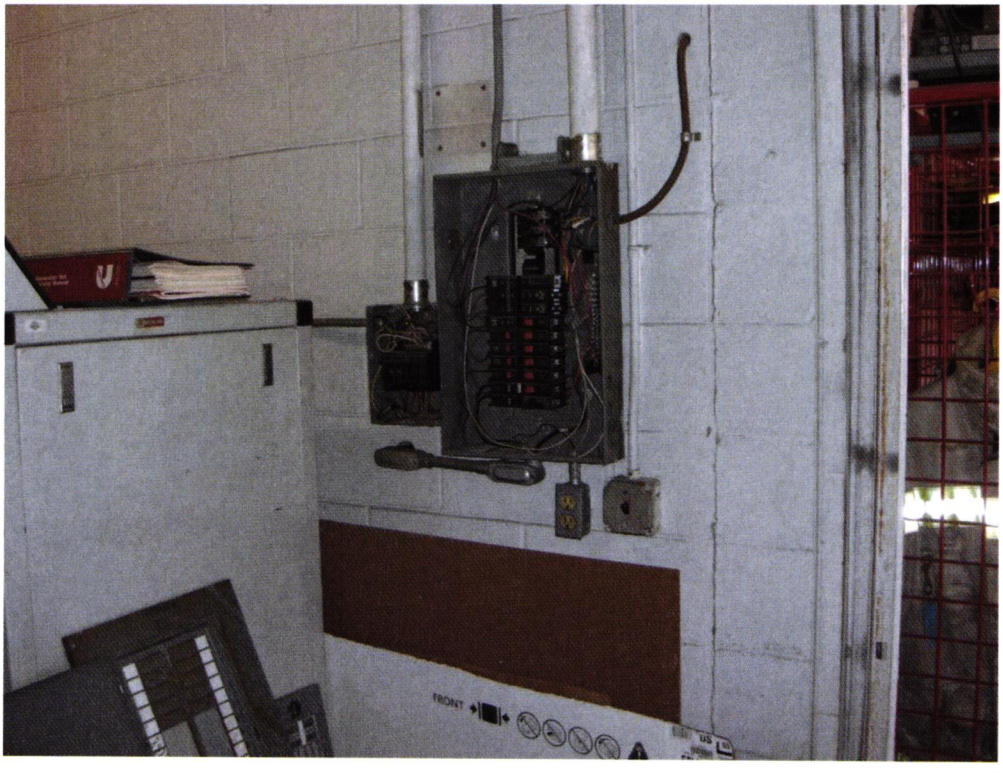
NO. 4 Interior Lighting

NO. 5 Interior Lighting

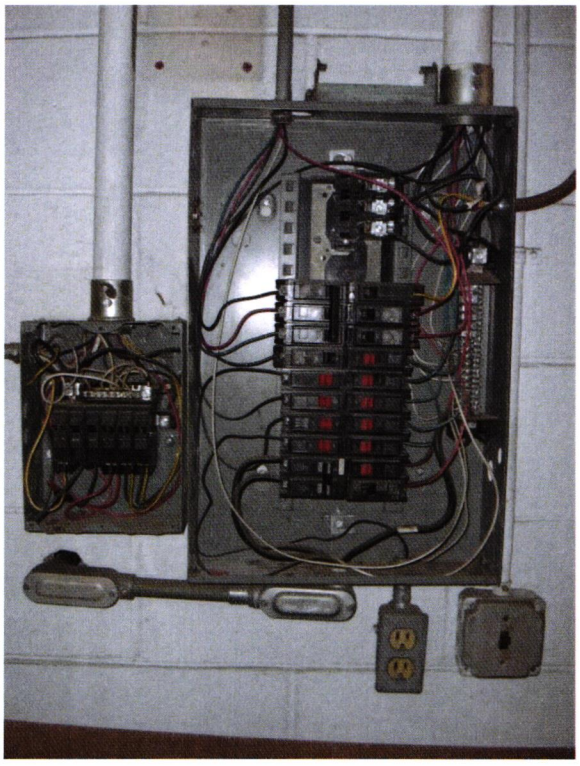
NO. 6 Incoming Utility Service

NO. 7 Overhead Electrical Services

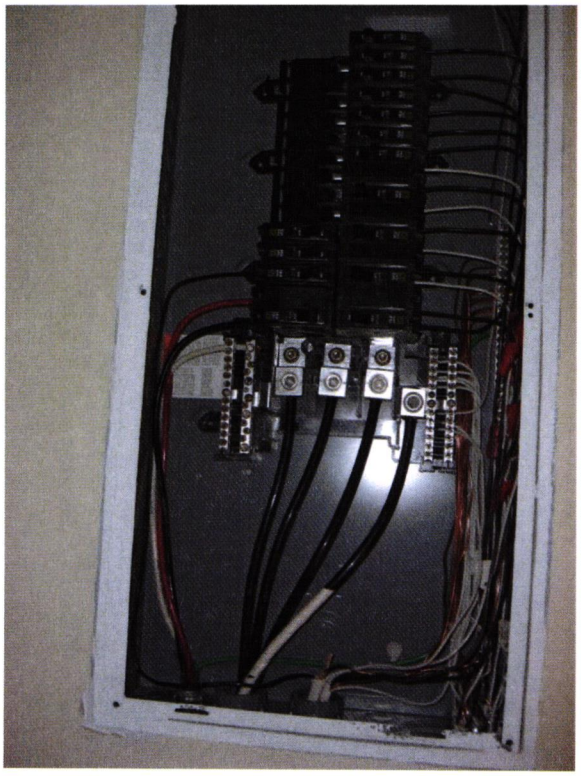
NO. 8 Power Distribution



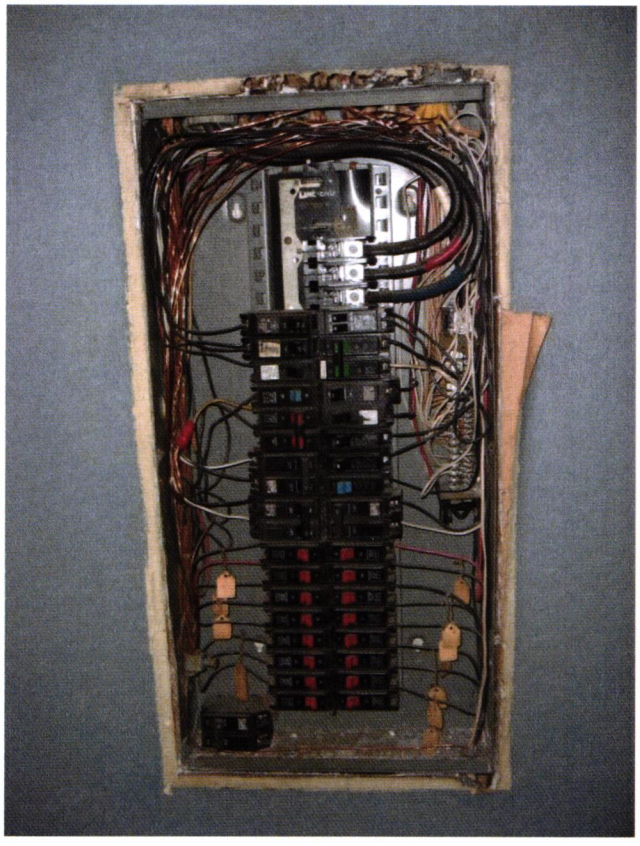
NO. 9 Power Distribution



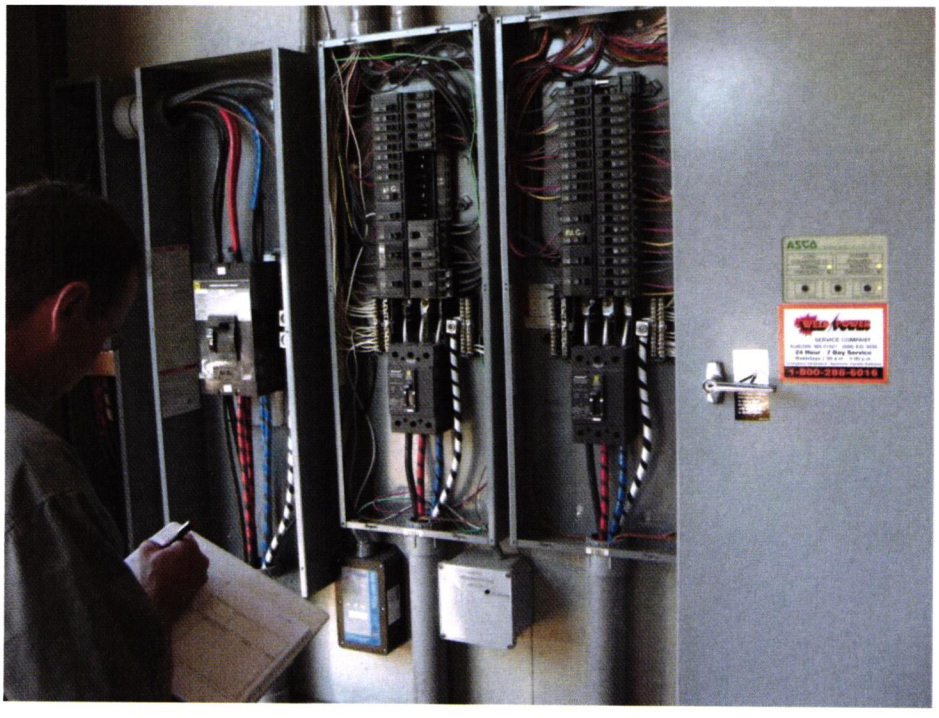
NO. 10 Power Distribution



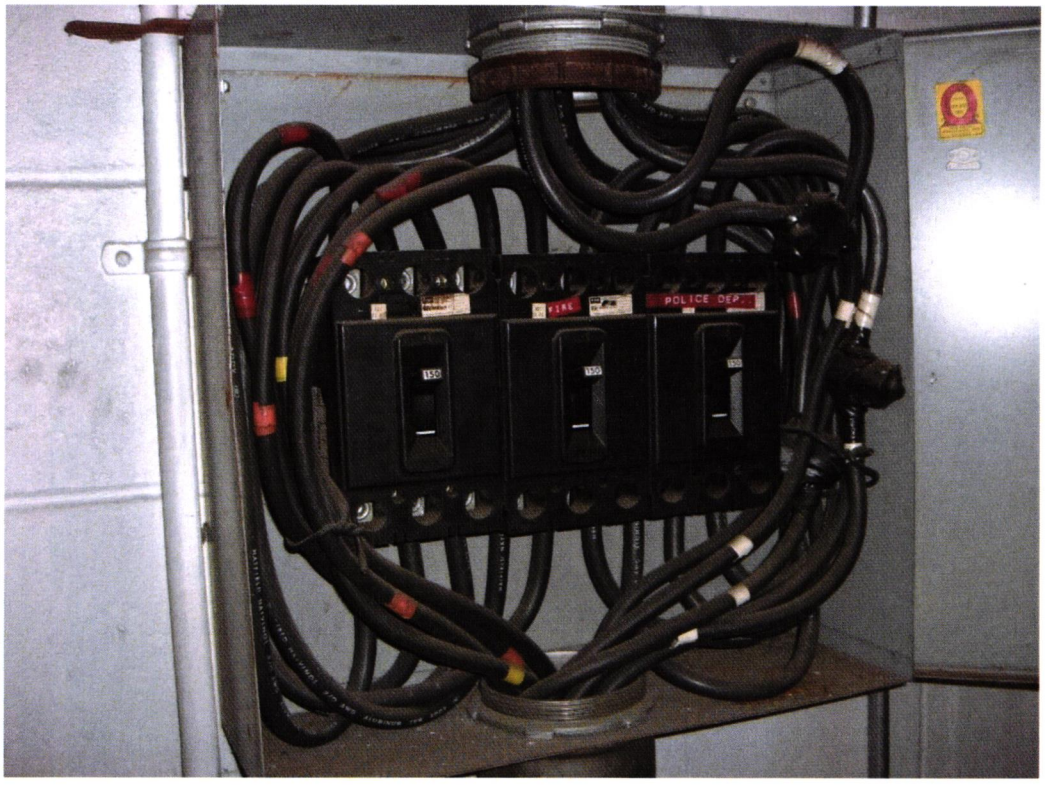
NO. 11 Power Distribution



NO. 12 Power Distribution



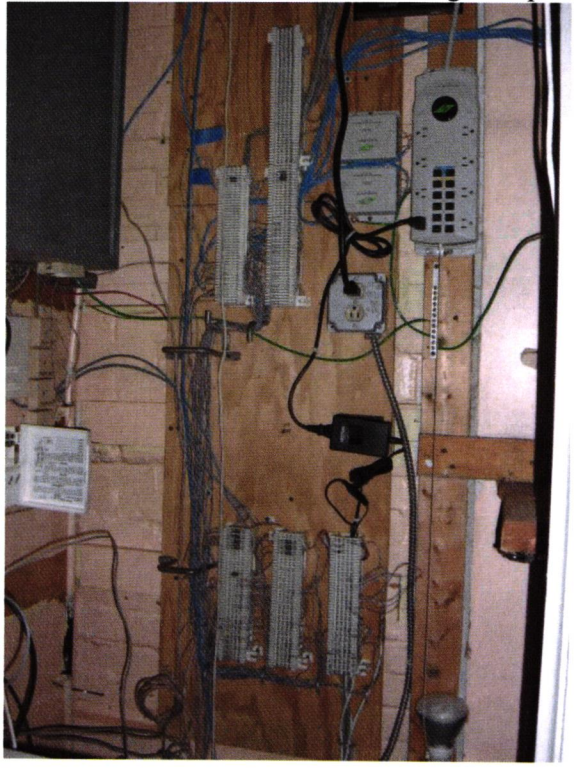
NO. 13 Generator Distribution



NO. 14 Generator Distribution

NO. 15 Existing Incoming Telephone Service

NO. 16 Existing Telephone Terminal Board



SECTION 4

Station Questionnaire

Bridgewater Fire Department – Station Questionnaire 8/08/10

1. Station Type: What are your current uses?

    - Staffed; Engine – 3, Ambulance – 2, Desk – 1 **Total Staffing – 8**
    - Reserve; Two Engines, Ambulance, Forest Fire, Airboat
    - Reserve outside; pick-up truck
    - Fire Prevention; Deputy Chief
    - Fire Administration; Chief and part time secretary (Monday – Thursday 0800-1430)

    What are your future uses?

    - Emergency Operation Center (relocate)
    - Training room
    - Regional Dispatch?
    - Weight/exercise room
    - Community space

    What are your reserve apparatus storage needs?

    - Ability to house Tower truck
    - Ability to house utility vehicles inside

    What are your building/facility needs?

    - Height, length and turning restrictions on all apparatus bays
    - No training room
    - No conference room
    - Roof leak from water with damage
    - Five different HVAC systems that frequently fail
    - Lack of DECON room
    - No medical storage

- Hose tower failing/relocate all radio antennas to radio tower
- Gutter, drains and downspouts not adequate – flat roof compromised
- Dispatch space inadequate
- Unable to open windows in office (old garage doors)
- Need EMS Office
- Bunk room inadequate for female employees (recommend dorm style for 8 personnel)
- Need cameras for apparatus bays and building surveillance
- Old pit for changing oil in apparatus floor needs to be filled
- Generator for building inside needs to be located outside (noise and space problems)
- Elevator and second stairs to second floor

2. Support Facilities:

   What are your procedures when returning from a call?

   - Personnel dismount and assist backing apparatus into station

   How do you restock and store materials?

   - Supplies are stored at Station 2 for medical and fire. Companies need to go there to restock
   - Fire Engines use hydrant in front of station to fill with water (no inside fill capabilities)
   - Air supply and oxygen stored and filled on site
   - Hose cleaned on front apron
   - No hose washer or gear washer/dryer at headquarters
   - Mechanic room – tool crib for light repairs

   Hazardous Materials storage and clean up?

   - Clean up and storage done at station 2

3. Staffing Levels:
    - Staffed; Engine – 3, Ambulance – 2, Desk – 1. **Total Staffing – 8**
    - Fire Prevention; Deputy Chief
    - Fire Administration; Chief and part time secretary (Monday – Thursday 0800-1430)
    - Future Fire Prevention Captain
    - Frequent Paramedic ride-along
    - Future Administrative assistant
4. Living Quarters:

    Do you anticipate having dorm or bunk rooms?

    - Dorm rooms for all personnel
    - Lockers will be in dorm rooms (doubles bunks with 8 lockers in each)
    - Separate dining/kitchen from dayroom
    - Gang restroom showers for on duty personnel
    - Single restrooms for Administrative offices (male and female with showers)
5. Public Interaction:

    Lobby size; How many visitors come into station and how frequent?

    - 10 – 15 per day to fire prevention office 0800 - 1600
    - 10 per day to dispatch 0800 – 1800, maybe two after 1800 hours

    Counter service - How do you serve the public from this station?

    - Dispatch greets and directs accordingly

    Office area; what type of work environment is best for your operation (open or closed)?

    - There is no privacy for the Chief in our current operation. Visitors have direct access if the secretary is not at her desk
    - Closed operation would work better – relocate all offices too second floor from front vestibule

Public use rooms – yes or no?

- I think the idea of a community room for the public is a good idea other than who will clean and maintain?

Security issues?

- We have no security (remote locking mechanism or security cameras)

Will the fire station be designated as an EOC in a disaster?

- Move EOC from current location into this building – 24 x 24 operations room, 12 x 14 radio room, three offices and storage space

Are all forms of transportation considered? Yes

Is public art a requirement for your project? Unknown

SECTION 5

Conclusion and Recommendations

CONCLUSION AND RECOMMENDATIONS.

In conclusion, the existing Fire Station's design (layout) was based off of additions and alterations over a period of 150 years, which resulted in what is at the site today. A new design would be more efficient and user-friendly for all operations. In trying to remodel the entire station to maximize its layout potential would be cost-prohibitive and most likely not fix all the current problems facing the operations. The program would be to add more space to combine other agencies within the building, which would also require reconfiguration of the ground level area with regard to circulation and public and employee access, move offices to the second level, and re-work the ground floor.

Based on the structural code requirement limitations required to renovate the existing building and the increased needs and operational facilities, it is unlikely this can be done using the existing building with a major addition or renovation. Phasing of this while trying to be in operation would become unsafe and extremely costly for monies spent and timeline to complete.

Most structural work to the existing building would require extensive reinforcing of CMU and steel systems to meet current code compliance issues if the existing building is used for support. Building an independent structure over the existing building would create problems with new foundation supports and wall height tie-ins connected to the existing building below it. A small renovation or addition will trigger the structural code compliance requirement. Based on the IEBC 2009 requirements.

The mechanical systems would need to be new on the second floor addition and would require relocation of existing units presently located in areas under new area. The circulation system, elevator, stairways, and egress would need to be designed to meet all new code requirements and require more space than is presently used on both levels.

The electrical service would have a minimal disturbance and renovations. Certain panels will need to be replaced as indicated in this report.

Therefore, a major renovation to this building is not recommended because of cost, phasing, and, its completion will not result in the best design for future operations for the time and money spent.

If the Fire Station is to remain as is with no addition, the report spells out items that should be addressed to provide a more usable, better-maintained building. This would include items in Russo Barr's Building Report. It would also include removal of the tower and items listed in architectural, structural, mechanical, and electrical sections of this Report.

If the current location is desired to continue with new, long-term operations, then a new fire station should be developed on this site with an updated layout and facility operations with removal of the existing building. A temporary off-site station would need to be reviewed to service the existing area.

Please review all aspects of this report for a true understanding of its content.