Call, Rosemarie

From: Maxwell, Micah
Sent: Tuesday, June 19, 2018 11:58 AM
To: Call, Rosemarie
Subject: Fwd: Old FS 45
Attachments: FS 45 Conditions Report - 2008.pdf

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From: Rice, Scott
Sent: Monday, June 18, 3:28 PM
Subject: Old FS 45
To: Maxwell, Micah

Micah,

The attached includes the text only of the executive summary of the FS 45 evaluation. I believe questions were answered accurately at the Work Session as it starts out stating the building is suitable for substantial renovation and ends with recommending replacement of the exterior cladding, roof and windows. The report indicates that contract drawings are dated August 1973.

This report is dated 2008 and the condition evaluated against the 2004 Florida Building Code. I would expect some code revisions since that time that could potentially affect the evaluation.

We will also be looking for info on the HVAC system, asbestos and other items that could impact future use.

I will bring the full report to Strategy tomorrow.

Scott

From: Benwell, James
Sent: Monday, June 18, 2018 3:03 PM
To: Rice, Scott <Scott.Rice@myClearwater.com>
Subject: FS 45 Site

Attached is the PDF for the beginning summary of the report on Old FS 45. This is what I sent to Ms. Patrick when she was interested in acquiring the property and building.

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Section One:

Executive Summary

The City of Clearwater – Fire Station 45 ("Fire Station 45") has been studied to determine its appropriateness for a substantial renovation - both architecturally and structurally. This renovation may include elements of the building envelope, interior partitions, Mechanical-Electrical Plumbing (MEP) systems, finishes, and a possible addition. This building is suitable for a substantial renovation; however, replacement of major elements of the building envelope should be considered..

Section Two:

ARCHITECTURE

Introduction

This study evaluates the existing condition of Fire Station 45. Existing contract drawing information dated August 6, 1973 was provided by the City of Clearwater ("City") and reviewed. In addition, on –site observations were made to further confirm the existing condition of the facility.

The existing drawing information provided by the City is not the final construction drawings as several instances in the drawings vary from the built work. However, where necessary, architecturally reasonable assumptions were made and documented. In addition, the existing Mechanical, Electrical and Plumbing system were not considered in the report. It is likely, during a substantial renovation, these systems may be substantially upgraded or replaced in their entirety.

Site Observations

In addition to analyzing existing documentation, field observations were made to verify the as-built conditions wherever possible. These observations yielded dimensional verification and provided images which have been referenced in the body of this document.

Upon instruction from the City, destructive testing was not undertaken during the field observations, including: removing existing drywall, removing existing insulation, coring of slabs and walls, digging etc. The scope of the field observations also did not encompass utilizing x-ray imaging equipment, sub-surface imaging equipment or chemical analysis. These methods may be rendered at a later time to further the conclusions presented in this document.

The areas generally observed as part of the report include:

- Architecture
    1. Roofing system
    2. Exterior cladding system (brick)
    3. Glazing system
    4. Finishes
    5. Other Observations

Most areas were generally observable; however, existing building infrastructure systems and finishes rendered some areas difficult to observe.

1.0 Roofing System

General

This building employs a tar and gravel, built-up roofing system. The parapets are topped with a metal cap and the backside of the taller parapets are clad with a metal panel while the lower parapets show the roofing membrane being brought up and under the parapet cap. The penetrations through the roof generally utilize a lead boot or flashing assembly, and the major pieces of mechanical equipment are set on equipment curbs.

Observation

Areas of the roofing system showed signs of material fatigue in the form of cracking. The layers of a tar and gravel roofing system are prone to UV degradation specifically where the gravel has blown away or otherwise been moved and the layers of the asphalt and tar paper are exposed to direct sunlight. Figure 11 shows a location where the roofing system has been compromised and likely is letting water into the exterior wall assembly. There were no reports of leaking in the building and staining due to roof leakage, was not observed.

Additionally, the lower roof over the administration offices has excessive water 'ponding'. It is reasonable to assume part of this ponding is a direct result of the southern most roof drain being clogged with debris. However, the roof assembly appears to be slightly sloped away from the drains causing the water to pond. This may have occurred during construction or be an event that has occurred over time. This is not known.

The parapet metal caps appear to be in good condition. The standing seams and lap seams which join the pieces appear to be holding up well. Some joints between pieces of the metal cap system have gaps where water can potentially intrude. This is especially true at the inside and outside corners. The current metal parapet caps appear to be a later addition as they do not appear in the construction drawings.

Metal panels have been employed to protect the back side of the taller parapets. This appears to be a later addition to the building as this assembly is not shown on the drawing documents. The metal panels appear in good condition. The panels have remained in place over time, and their joinery appears solid. The lower parapets do not have the metal panel system employed, and the tar and gravel roof system is exposed to direct sunlight.

The anticipated life span of a tar and gravel roof is between 10 and 20 years depending on location and installation. The site observation did not yield evidence that this roof had been significantly patched, although it is quite evident that certain aspects of the roofing system have been altered after the initial construction. It is also not known if this roof has ever been replaced in its entirety.

The roof structure is a poured gypsum assembly on steel joists. This type of roof, while serviceable, is somewhat limited to retrofit for today's standards.

2.0 Brick Cladding System

General

The exterior cladding of this building can be considered a brick veneer system on masonry or concrete back-up. This system is widely used today, however certain aspects of this system have evolved over the years. The Brick Institute of America (BIA) and the International Masonry Institute (IMI) are two organizations which set the standards for design and construction of masonry buildings. Within these standards are techniques and assemblies which support good masonry practice. These practices include, among other items, moisture control techniques and material stress relieving techniques.

Observation – moisture control

The exterior of the building, " the building envelope," showed signs of possible water intrusion in several areas. Those areas were:

- Exterior cladding system at the corbelled brick assembly
- Exterior cladding system at recessed architectural cladding feature
- Exterior cladding at the brick planters

A potential indicator of water intrusion is discoloration of the brick cladding. This discoloration can either be dark or light depending on the type, quantity, and duration of exposure to moisture. The corbelled brick at the south face second level of the facility shows a white coloration, see Figure 6. This coloration may be due to efflorescence. As moisture naturally migrates through the brick, it brings with it the minerals / salts that are present within the brick. These minerals are often times seen as a white powdery substance on the face of the brick.

Based upon a review of the drawings provided, it appears the design of the veneer and back-up assembly used a minimal cavity between the brick veneer and the back-up system – potentially 3/8" or less. Today's contemporary detailing strongly suggests a minimum air space of 2". This airspace allows the masons to properly work the back side of the brick and maintain a consistent air space. In addition, the airspace allows any moisture that does find its way into the cavity a way to escape via weeps and through-wall flashing. The existing brick veneer construction is a great deficit to the performance of the building.

In addition, it appears that an attempt was made to seal the brick (at the corbelled section) by applying some type of caulk or sealant to the surface of the brick. Over time , the sealant has degraded and become chalky and likely not repelling water as it was intended, see Figure 6. It is reasonable to assume that at some time moisture migrated through the brick cladding and negatively affected the building's performance. Indication of moisture was not seen on the interior finish, however.

The external brick planters are shown to have a 'damp-proofing' material applied to the brick. This membrane appears to be a trowel-on type of system. This membrane is showing signs of wear and degradation, see Figure 3. The intention of this damp-proofing system is to keep whatever moisture that is present in the planter from entering the porous brick and working its way into the building. Should this damp proofing membrane be compromised, moisture may work its way into the building.

Several steel lintels spanning openings show signs of rust. This is seen both on the exterior and interior of the space. This level of rust appears to be at a cosmetic level. However, stronger detailing should be considered when contemplating a substantial renovation of the facility.

Observation – stress relieving
The exterior of the building exhibited several areas where the veneer system has cracked. There are three main reasons why the brick veneer may have cracked:

1. A force, external to the building, has been applied to the brick
2. A force from within the building has been applied to the brick
3. The brick itself exerted a force from within.

The architectural brick planters have cracked in several places. This cracking is most likely due to the forces being exerted on the brick from the plant material within the planters, see Figure 10. The technique used to construct the planters as illustrated in the drawings shows the planters are open to the earth below. This allows larger plant material – trees – to exist in the planters. However, it also allows the trees to grow large enough to significantly 'push' on the brick planter walls and initiate cracking. This type of cracking is of little consequence on the performance of the building envelope or structure of the building and may be replaced.

Many cracks in the brick veneer have occurred at the corners of the building, see Figure 12. It is likely these cracks have formed due to the lack of expansion joints in the veneer itself. The veneer system as constructed utilizes a minimal amount of expansion joints. Expansion joints are a typical technique to relieve stress built up in the brick as the brick heats up and cools down throughout the day. Adding expansion joints at this time to the corners may eliminate further cracking; however, the existing brick would need to be either tuck pointed or reset to diminish the existing signs of cracking.

3.0 Glazing / Opening System

General
The existing glazing system is comprised of non-insulated glazing units in aluminum frames described in the drawings as Kawneer 1 ½" frame. There appears to be a mix of operable and non-operable units. The glazing appears to be clear, although the original drawings indicate the units to be 'Type A'. The exact specifications of Type A are not known as a specification set was not part of the information forwarded for review.

Observation
The existing openings have a retrofit shutter assembly applied to the exterior of the building. This evidence suggests that the existing units are not impact rated. Evidence of leaking was not seen.

Replacement of these units would greatly improve the impact rating and thermal performance of the openings. The use of Low E glazing and double-glazed, thermal pane units will greatly reduce heat gain.

The existing glass doors in the apparatus bays are also protected by an applied shutter assembly. It has been reported that these doors are often out of plumb and 'bind'. Likely causes are wear on the moving parts of the door such as the hinges. It is not likely the openings are being deformed due to structural failure.

The existing chain drive overhead doors appear to be in fair condition with evidence of one door on the south side previously being replaced. In the event of a substantial renovation, the City may wish to consider replacing these doors for a more 'hardened' door type.

4.0 Finishes

General

Apparatus Bays
Much of the apparatus bay walls are finished with a cement plaster system approx ¾" thick. The floor is a concrete slab on grade with a minimal lip to inhibit water intrusion under the bay doors. The lighting is fluorescent and the overhead door operators are chain drive.

Interior spaces
Adjacent to the apparatus bays on the first level are spaces whose walls have been constructed using several methodologies including block and gypsum partitions. Lay-in ceilings have been employed with a mix of flooring material.

The second level uses primarily gypsum partitions with lay-in ceiling and fluorescent fixtures. Carpet and tile are the dominant floor finish.

Observations – apparatus bays
The west wall has cracks in the finish. These cracks are believed to be in the cement plaster finish and not the wall underneath, see Figure 13. There appears to be a lack of control joints in the plaster which may have relieved the stress and minimized the cracking had they been installed. Similarly, the ceiling of the apparatus bays shows cracks in the suspended plaster assembly. It is likely additional control joints would have minimized the cracking.

On the east side of the garage the cement block finish is paint. Near the hanging heater at the south bay doors there is a crack that travels along the mortar joints of the block, see Figure 15. There appears to be previous surface patch over the crack to render it less unsightly.

Upon reviewing the construction drawings, it appears a footing was not utilized to support the weight of this block wall. Further, it appears the block wall is set on the concrete floor slab. With this arrangement, it is reasonable to assume the load of the block overloaded the floor slab and initiated settlement over time. This settlement is visible in the cracking of the block wall.

Although this crack appears to be substantial, it is a crack in a non-structural component of the building. This wall is a partition between two spaces. Therefore, this wall can be removed and a new wall constructed in it place. It is recommended that a new wall be constructed with proper support.

Observations – interior spaces

The second floor of the station shows cracking in certain partitions, most notably along the south wall between the kitchen area and the media room, see Figure 15. Observation confirms the partitions likely cracked due to the specific installation technique. Contemporary techniques typically utilize a 'slip track' at the head of the wall. This installation technique allows for movement in the structural system of the building without cracking partitions attached to that structure. The existing partitions which do not have the slip track may be retrofitted to eliminate any future cracking.

5.0 Other Observations

Additional observations were made during the walk through. Several of these observations may not have affected the building to date; however, they may affect the building in the future.

Along the east exterior face of the building, there is a pipe which directs water to the base of the wall, see Figure 16. Over time, this condition may render the ground 'mushy' which may affect the structural integrity of that portion of the wall

There are tree limbs which protrude over the Administration portion of the building. While this undoubtedly aids in protecting the building from the sun, the limbs have the potential to damage the roofing system should a branch fall on to the roof. Additionally, the trees provide a constant influx of organic material to the roof which promotes the growth of small plants. This too is harmful to the roofing system.

Section Three

STRUCTURE

Introduction

The structure consists of a concrete post and beam frame with un-reinforced masonry infill walls. The concrete frame supports a bar joist floor and roof framing. The floor is concrete on metal deck, and the roof consists of poured gypsum on bulb tees. Overall, for the age of the building, the structure is in acceptable shape.

Based on the age of the building, it was most likely designed under the 1969 Standard Building Code or the 1967 National Building Code. We were unable to obtain a copy of the 1969 Standard Building Code, but did acquire a 1976 Standard Building Code. In the code book, significant changes from the previous code are usually indicated. There were no major revisions indicated in the wind loading for the 1976 Standard Building Code. Based on our review of the 1967 National Building Code and the 1976 Standard Building Code, the wind loads at that time were slightly less than that of the 2004 Florida Building Code. The wind uplift on the roof was significantly less than calculated using the 2004 Florida Building Code.

The 1969 National Building Code indicates the horizontal wind load to be 20 psf with a roof uplift of 25 psf. The 1976 Standard Building Code horizontal wind load is based on a 105 mph fastest mile wind speed. In 1995, the basic wind speed was redefined by ASCE 7 to a 3 second gust wind speed. The wind pressures under the 105 mph fastest mile wind speed are nearly identical to the 130 mph 3 second gust wind speed of ASCE 7. The 2004 Florida Building Code references the ASCE 7 for wind load determination, and ASCE 7 has been used to determine the wind pressures for this study.

The lateral load system of the Fire Station has been analyzed for the code required 130 mph wind speeds. In addition, we have generally identified the approximate limiting wind speed for the particular component being analyzed.

The wind exposure of the building is classified as 'B' for the reason that it is not located within 1500 feet of the coast, and it is located within an urban or suburban area. The average roof height is 31'-0" and the roof slope is nearly flat. By code the building will have an importance factor of 1.15, and that has been used in determining the wind pressures. Wind pressures vary based on tributary area. For this study, the wind loads have been determined according to the tributary areas of the component being investigated.

1.0 Roof and Roof Diaphragm

This fire station has two types of roof diaphragms. The first type is a concrete on metal deck diaphragm. This is located on the west side of the building over the office area. The diaphragm is concrete because the roof was designed to be a future floor. The other type of roof is a poured gypsum on bulb tee system. This diaphragm is located above the second floor and forms the high roof over the second floor. This type of roof system has little to no diaphragm capacity. There are no physical connections between the roof diaphragm and the un-reinforced masonry wall structure. In order to have the building withstand 130 mph wind pressures, additional diaphragm capacity is required at the high roof.

The gypsum roof does not have enough dead load to resist the current code prescribed uplift. In addition, based upon site observations and the drawings provided, the existing bar joists have not been designed for uplift. It is important to note that the roof probably had adequate uplift capacity when it was designed, but under the current building code it does not have adequate uplift capacity.

If a substantial renovation occurs, both the diaphragm capacity and uplift capacity issues can be resolved. The diaphragm capacity can be increased by removing the gypsum roof structure and replacing it with a metal deck roof. The uplift capacity can be improved by either providing additional bracing and supplemental reinforcement to the existing bar joists, or by providing an additional roof framing system of structural steel beams directly above the roof bar joists.

2.0 Exterior Wall

The exterior wall consists of masonry with horizontal joint reinforcing at 16" on center and no vertical reinforcement. This is considered to be "un-reinforced masonry". The un-reinforced masonry spans between concrete tie beams and columns. The masonry for the typical exterior wall is capable of supporting 130 mph wind pressures. The masonry at the North stair is capable of supporting 91 mph wind pressures. The stair on the East side of the building is capable of supporting 100 mph wind pressures. The hose tower is capable of supporting 130 mph wind pressures.

The roof parapet on the west side of the building is experiencing horizontal cracking at the location of the high roof. This is most likely due to overloading the parapet by wind. It is unclear from the existing drawings and site observations how the parapet is supported laterally.

The capacity of the stair's exterior walls could be increased by adding a horizontal girt on the inside of the stair wall at the second level. The parapet could be reinforced from behind to provide additional lateral support, or it could be removed down to the roof elevation, and a gravel stop could be added. Either of these options could be done only when the roof diaphragm and uplift issue are corrected.

3.0 Main Lateral Load Resisting Concrete Frame

The main lateral load resisting frame is capable of supporting 130 mph wind pressures. There are four concrete tie columns that are overloaded at the 130 mph wind pressure; however, there are additional concrete columns and a concrete diaphragm that will allow for the force to redistribute to columns with excess capacity. If a substantial renovation occurs, these four columns could be reinforced to provide capacity to support 130 mph wind pressures.

The lateral system is unique in the respect that it has a concrete frame with un-reinforced masonry wall infill. The un-reinforced masonry wall infill acts as an un-reinforced masonry shear wall. In order for the concrete frame system to take load, the un-reinforced masonry shear wall system must become overloaded and crack to engage the concrete frame system. This is probably the cause of some of the cracks in the west wall of the second floor.

4.0 General Observations and Recommendations

In the event a substantial renovation is done, it is suggested that the bottom of the existing metal deck and bar joists be cleaned to remove the existing surface rust, and then sprayed with a rust inhibiting coating, see figure 17. In addition, removing water from near the building foundation is a necessity to reduce the potential for settlement of the structure. Cracking between the brick planters and building proper is most likely due to settlement of the building and not of the planter along with possible pressure from the planting material. This could be repaired by cutting in a control joint or removing the planters altogether.

Overall, the structure appears to be in good shape for the age of the building. With remediation, the building will be able to meet the wind load requirements of the 2004 Florida Building Code.

Structural Conclusions

The building has a few weak links that can be corrected. The following table summarizes the approximate limiting values of the components.

	Limiting MPH
Roof Uplift	90
Exterior Masonry Walls	
Typical Exterior Masonry Wall	130
North Stair North Wall	91
East Stair East Wall	100
Hose Tower Walls	130
Channel under strip windows	130
Main Lateral Load Resisting Concrete Frame	130
High Roof Diaphragm	0
Second Level Diaphragm	130

Architectural Conclusions

The building envelope of Fire Station 45 has several deficient elements. The following recommendations have been included to improve the performance of the building. In addition, the interior spaces – specifically the finishes – show signs of wear but may be completely removed during a significant renovation.

Architectural Recommendations

1. During a significant renovation, extensive portions of the exterior brick cladding should be removed and a new cladding system installed using contemporary design techniques. This should minimize areas of concern regarding water infiltration. Should it please the City, the skin may be removed in its entirety and a new cladding system installed which would employ contemporary design and construction techniques further reducing the possibility of future water infiltration and veneer cracking.
2. During a significant renovation, the roofing system should be removed and a new system installed. This system will likely differ from the current roofing system. Further, it will be possible to upgrade the thermal performance of the roof (add insulation) as well as its ability to meet the performance criteria associated with a high velocity wind zone.
3. The existing windows and glazing system should be replaced with a system recommended for a high velocity wind zone. This would eliminate the need for an external 'hurricane-type' shutter. Additional options such as coating the glazing will potentially reduce cooling costs.

Questions regarding this investigation should be directed to the undersigned.

Respectfully Submitted,

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