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October 10, 2007

Mr. Richard E. Fowler, Jr.
Fire Chief
Farmington, New Hampshire
381 Main Street
Farmington, NH 03835

RE: Farmington Fire Station – Farmington, New Hampshire
JEK Project No. Y8N00500

Dear Mr. Fowler:

Thank you for allowing Jacobs Edwards and Kelcey to conduct this visual review of the fire station and ambulance annex. As requested a site visit was made by the undersigned on September 14, 2007. The purpose of this site visit was to observe the walls and exposed structural elements of the two buildings for possible significant structural concerns. For the purpose of this report, the front side of the fire house will be assumed to be the southwest side and the front of the ambulance annex will be assumed to be the northwest side. While at the site we were provided with the following information:

1. The fire station was constructed in 1976 with donated materials and labor.
2. There are no plans or specifications known to exist for the fire station or the ambulance annex.
3. The age of the ambulance annex is not known.
4. In June of this year an awning over the door on the northeast side of the ambulance annex fell off the building.
5. The most northeastern bay of the ambulance annex is no longer used for vehicles and is currently used as storage.

While at the site the attached photos were taken and the following observations were made:

Ambulance Annex

1. In photo 1 the front of the ambulance annex can be seen. In this photo the two overhead doors on the left side of the photo have been used for the ambulances and the remainder of the building is used by the water department.
2. It was observed that there was a significant amount of asphalt in front of the most northeastern door. It appeared that this asphalt was used to divert surface runoff from the north corner of the building. It also appeared that this asphalt had been in place for some time.
3. Photo 3 shows the north corner where it appears that the bottom of the wall is kicked out. A four foot level was used to check the wall on the interior and exterior and it was found that the bottom of the wall leans out approximately $\frac{3}{4}$ " in four feet. When the wall was observed from the middle to the east corner it was found to be plumb.

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4. The northeast wall can be seen in photo 4. In this photo it can be seen that the roof appears to have a high point to the left of the window in the middle of the wall. It can also be seen that there is an outline of where the awning roof was located over the door.
5. Photo 5 is a close up of the area above the door where it is noted that there are nail holes in the siding. It appears that the awning roof was only supported by these nails. It is also clear that the awning was constructed after the siding was installed.
6. The southeast, rear, of the building can be seen in photo 6. It was noted that there was no visible damage to the foundation or the wall. There was a rust stain on the siding which we believe is the result of water running off the roof in this area.
7. On the interior of the building there is a beam consisting of four pieces of dimensional lumber that were nailed together. This beam is located approximately 14 feet off the northeast wall. This is approximately the middle of the space. This beam is supported by steel columns that are approximately 12'-6" apart. This beam and support columns can be seen in photo 7.
8. In photo 8 there is a close up view of one of the support columns and the beam. It was noted that the top plate of the beam is not secured to the beam and that the roof joists appear to be 2x8's. It also appears that the spacing of the rafters is 16 inches on center.
9. It was noted that there was daylight visible in the north corner at the floor. It appears that the sill had been rotted away because the water in this area drained into the corner. It can be seen in photo 9 that the asphalt berm, noted in photo 2, will not allow water to drain under the overhead door. In photo 10 it can be seen along the northeast wall that there are water stains and that the sill under the door has been built up. Also in photo 10 it appears that the sill plate of the wall has been replaced at some point.

Fire Station

1. The northwest end on the fire station can be seen in photo 11. It was noted that the first floor of the building is a single wythe concrete masonry wall with a stucco finish. The second floor is a wood framed gambrel roof. There was no observed or reported cracks or damage in this wall.
2. Photo 12 shows the southwest, front, side of the building. In this elevation there are six overhead doors and one man door. There was no observed damage or crack on this elevation with the exception of the step crack at the south corner.
3. The step crack can be seen in photos 13, 14 and 15. This crack starts at the corner of the man door in the southeast wall and extends around the corner up to the bottom of the bond beam on the southwest wall. It can be seen in photo 14 that the block below the crack on the southwest wall is out slightly. It appears that this displacement is approximately 3/8 to 1/2 inch. In photo 15 it can be seen that the crack is approximately 1/4" wide at the corner of the door and that the sealant between the door frame and the masonry is not broken.
4. Photos 16 and 17 were taken along the northeast wall where it was noted that the wood soffit had been repaired, at one location, by placing a board on it. It is our understanding that this was done to keep the squirrels out of the building. It was also noted that there are control joints in the wall. The first of these is located approximately 20'5" from the exterior east corner of the building. The next joint is located approximately 21 feet from the first and the third is approximately 21 feet from the second. These control joints extend from the top of the foundation to the underside of the bond beam. It can be seen in photo 17 that the masonry wall is slightly inside the edge of the foundation wall.
5. The interior of the south corner can be seen in photo 18. It can be seen in the photo that the stucco has been repaired in the area of the crack and that the patch has cracked.
6. There is a similar patch on the southeast wall near the middle of the wall. This patch appears to be over a control joint. Please refer to photo 19.
7. Photos 20 and 21 show the interior of the northeast wall. In these photos it was noted that the control joints are clearly visible. In photo 21 it can also be seen that there is a patch over the man door.

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8. The patch over the man door in the northeast wall can be seen in photo 22. It did not appear that there were any new cracks in this patch.
9. The fourth control joint in the northeast wall can be seen in photo 23. In the photo there is a horizontal crack at the top of the control joint that runs a couple of feet along the mortar joint at the base of the bond beam. On the left side of the photo is the opening to the hose tower. In the photo it can be seen that the blocks in the top of this opening are open and there is no lintel supporting them.
10. Photo 24 was taken on the north side of the opening to the hose tower. At this location it can be seen that there is a step crack and that two of the blocks in the opening appear to have been broken off.
11. Photo 25 was taken on the south side of the opening where, again, it appears that three courses of blocks have been removed from the top of the opening. It was also noted that the lower portion of the wall is an 8 inch thick block and the upper portion is a 12 inch thick block.
12. Photo 26 was taken looking up into the cells of the blocks in the opening. It was noted that none of the cells are grouted and there appears to be a bond beam three courses above the opening.
13. On the hose tower side of the opening, the framing for the second floor is exposed. It appears that the framing consisted of 2x12 floor joists at 12 inches on center with a sub floor of 8 inch wide boards. This can be seen in photo 27.
14. On the second floor there was no observed or reported cracks. Photo 28 shows the south corner which is above the step crack shown in photo 13.
15. The framing of the mansard roof can be seen in photos 29 and 30. These photos were taken through an access panel in the east corner of the second floor. In these photos it can be seen that the roof is framed with 2x4's and board. There is also some water staining on the ends of the floor joist indicating that the mansard has leaked in the past.

In conclusion, based on our observation and the assumed construction of the buildings, it is our professional opinion that there is no immediate risk of structural failure. However, there is one location that, in our opinion, does possess a life safety concern. That location is the opening to the hose tower. As it currently is constructed there is no support for the three courses of 12 inch blocks above the opening. It is our opinion, that at any time one or more of these blocks could fall. Therefore it is our recommendation that this opening be immediately shored. This shoring may be constructed of wood or steel, however, it will be necessary to anchor the shoring to the masonry. If you would like to have us design this shoring we would be pleased to provide you with a written proposal.

Another area of concern is the northeast wall of the ambulance annex. The northern end of this wall is significantly out of plumb and, based on our observations, has been for some time. It appears from our limited observations that the wall is currently stable, however, if there is a significant snow load placed on the roof it is our opinion that there would be a concern with its stability. Also, if the roof rafters are 2x8's spanning 14 feet as it appears, it is our opinion, that they would be undersized for the current design snow load. Therefore, we recommend that the roof be shoveled immediately following a snow event. An alternative to shoveling the roof would be to construct a temporary wall no more than 10 feet from the beam and 4 feet off the northeast wall. This wall would have to directly support the roof rafters, not the ceiling joists, and it could bear on the existing concrete floor slab. It is further recommended that a more detailed analysis be conducted on this building to determine if the roof structure meets the current building code requirements for snow loading.

The step crack in the masonry at the south corner of the fire station is of some concern. It appears that this crack has existed for some time and that there may have been some movement over the past few years. At the time of our observations, it did not appear that the lower portion of the wall was significantly out of plumb. It is clear that there is some displacement of the crack on the southwest side and this is allowing water into the masonry. We would therefore recommend that this crack be sealed on the exterior and that further analysis be done to determine a long term repair. It should be noted that the

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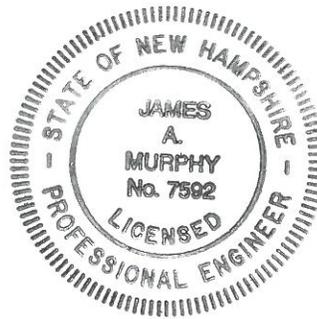
entire masonry construction of the fire station appears to be un-reinforced and would not meet the current building code. In our opinion, it would be extremely costly to bring this building into compliance with the current building code and it may not be possible to make the building comply with the current seismic building code requirements. In the event of an earthquake the performance of an un-reinforced masonry building has been historically very poor. However, if you wish to presume modifying the building to bring it into compliance with the current building code, Jacobs Edwards and Kelcey would be please to provide you a proposal to conduct the investigation and prepare recommendations.

If you should have any questions concerning this matter, or if we may be of further assistance, please contact our office.

Very truly yours,



James A. Murphy, P.E.
Senior Engineer
NH PE 7592



c: File
Photos Attached

Farmington Fire Station Report 9-26-07



Photo 1 – Ambulance annex northwest elevation



Photo 2 – Northeastern most overhead door, note the asphalt has been significantly built up to near the corner of the building.



Photo 3 – Northern corner looking along northeastern side. Note the bottom of the wall is pushed out.



Photo 4 – Northeastern wall of ambulance annex. Note the outline of a roof over the door.



Photo 5 – Close up view of roof outline over door. Note the nail holes where the framing was nailed to the wall.



Photo 6 – Southeast side of ambulance annex, note there is no visible damage to the foundation or this wall. Also note the rust stain on the wall.



Photo 7 – Inside ambulance annex, note the built up beam and the rafter splices. This beam is between the two overhead doors at the northeastern end of the building.



Photo 8 – Closer view of column beam connection and rafters. Note the top plate of the column does not appear to be secured to the beam.



Photo 9 – North corner, note the built up asphalt under the overhead door and that daylight can be seen in the corner.



Photo 10 – Sill of door on northeastern elevation. Note the concrete is built up and the water stains. Also note, the sill of the wall appears to have been replaced and is not treated lumber.



Photo 11 – Northwest elevation of fire station. Note the first story is masonry and the gambrel section is wood framed.



Photo 12 – Southwest elevation of fire station. Note there are no visible or reported cracks in the masonry except at the south corner.



Photo 13 – South corner, note the step crack starting at the top of the man door on the southeast side of the building and extending around the corner to the bottom of the bond beam on the southwest side.

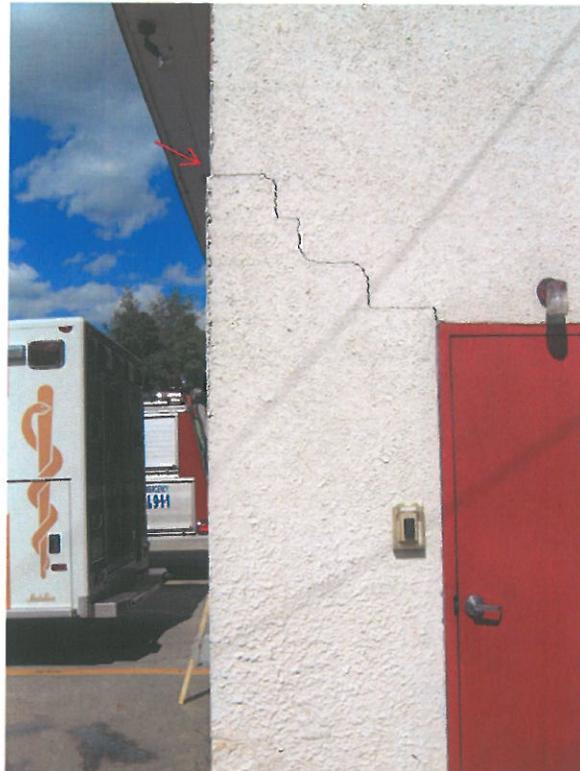


Photo 14 – view of step crack on southeast side. Note that there is displacement of the wall on the southwest side.

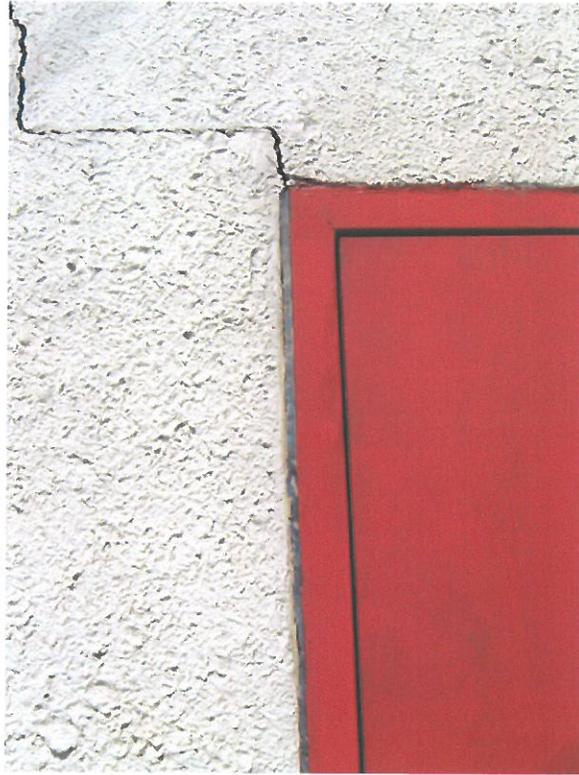


Photo 15 – Close up view of crack at corner of man door. Note the width of the crack is approximately $\frac{1}{4}$ inch wide and that the sealant between the door jam and the masonry is not broken.



Photo 16 – Northeast wall, note the repair to the wood soffit.



Photo 17 – Control joint on northeast wall approximately 20.5 feet from the east corner. Note the wall is slightly in from the foundation at the left side of the photo.



Photo 18 - Inside the fire station at south corner, note the repair to the wall and the step crack in the repair. This is the same crack that is in photo 13.



Photo 19 – Southeast wall near the middle of wall, note the patch which appears to be at a vertical control joint.

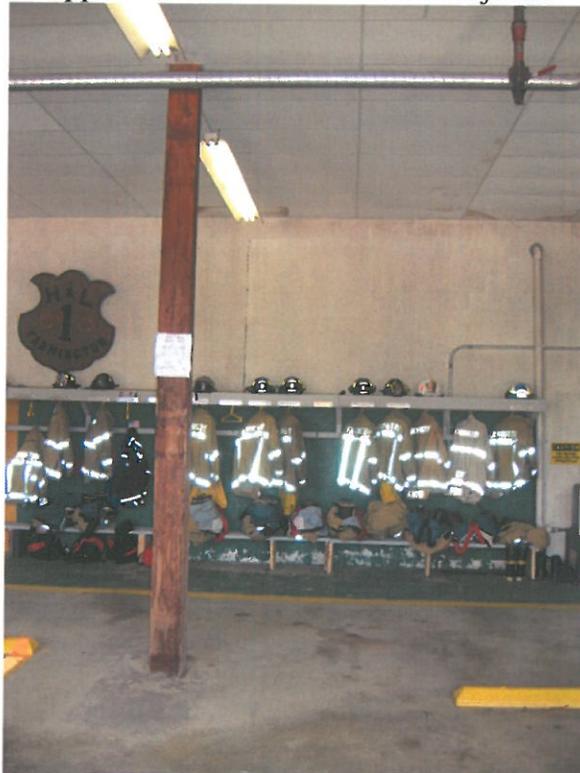


Photo 20 – Northeast wall approximately 19 feet from east corner. Note this is the same control joint shown in photo 17.



Photo 21 – Northeast wall, note control joints are approximately 21 feet apart. Also note the patch over the man door at the left of the photo.



Photo 22 – Closer view of patch over man door in northeast wall.



Photo 23 – Vertical control joint to the northwest of photo 22. Note the crack goes to horizontal at the bond beam. Also note the exposed block in the opening to the left of the photo.



Photo 24 – Step crack at the northwest side of the opening in photo 23. Note the blocks have been broken on the vertical.



Photo 25 – Southeast side of opening in photos 23 and 24. Note the wall thickness appears to change from 8 inch to 12 inch and that three courses of 12 inch blocks appear to have been removed.



Photo 26 – View up through cells in opening. Note that none of the cells are grouted and there appears to be a bond beam up 3 courses above opening.



Photo 27 – Wood framing for second floor inside hose tower. Note the floor framing is 2x12's at 12 inches on center.

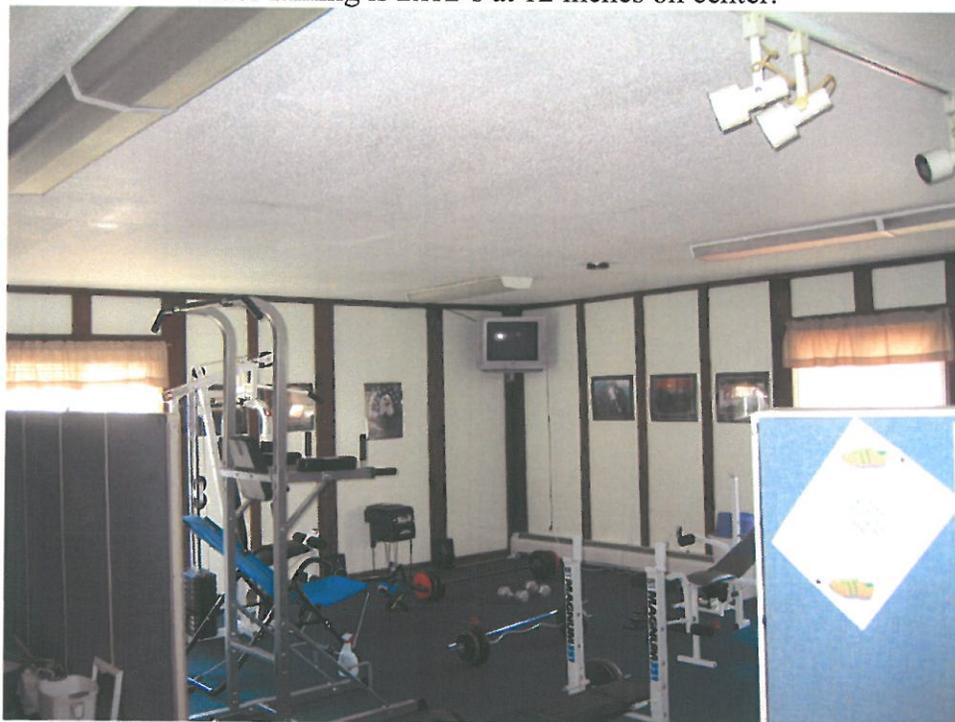


Photo 28 – Second floor south corner. Note there are no visible cracks in the ceiling or walls in the area above the crack at the first floor.



Photo 29 – Looking northwest along northeast side from east corner. Note the mansard framing and the floor joist cantilevered out over the first floor wall.



Photo 30 – Same location as photo 29 looking up at connection between mansard and roof.