BOW SAFTEY SERVICES BUILDINGS

Structural Observation

June 14, 2006

For
Mr. Eric Palson
Sheerr McCrystal Palson Architecture, Inc.
224 Main Street
New London, NH 03257

Prepared by
Omega Strutural Engineers, PLLC
Alex Azodi, PE SE

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16 June 2006

Mr. Eric Palson
Sheerr McCrystal Palson Architecture, Inc.
224 Main Street
P.O. Box 1500
New London, NH 03257

Re: Structural Observation
Bow Safety Complex
OSE project: 06-121

Dear Mr. Palson:

Per your request, a site visit was made to the Bow Police Station and the Bow Fire Station on May 23, 2006. The purpose of this initial site visit was to perform a walk through of the existing facilities in order to provide a professional engineer's opinion of the structural condition of said facilities. This evaluation was limited only to visually accessible areas. The structural drawings for these buildings were not available at the time this report was written. No destructive testing was performed during this visit. No analyses or calculations have been preformed for this report. Conclusions and recommendations are based on observations, experience, and professional judgment. Present at the site during observation were you and Mr. Chris Lizotte of your office, Mr. Mark Vincello, mechanical engineer, and Mr. Wayne Whippie, electrical engineer, both from WV Engineering in Keene, NH, and the writer.

Observations:

The existing facilities for the Police and Fire Departments are in two separate locations. The Police Station Building is described first followed by a description of the Fire Station Buildings.

Police Station: The existing Police Station building is located at, 12 Robinson Road, and is shared by the Police department and the Public Works Department (town garage). This

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building appears to have been built in 1967. The front portion of the building, which houses the police department, has a footprint of approximately 40' long x 80' wide. This portion is a two-story masonry structure with floor heights of 12' each, a flat roof, and no basement. The floor and roof framing consist of open web steel joists with a metal deck. The perimeter walls are constructed with Concrete Masonry Units (CMU) and serve as bearing walls and shear walls. The rear portion of the building is a prefabricated steel structure with a gable roof. This portion of the building is currently used as the town garage; it has a poured concrete floor and no basement. The garage has 9, approximately 20' wide, bays along its length and is approximately 80' wide (pictures 3 and 4). There is a partial mezzanine in the garage which is accessible from the police station and is used for storage by various departments (pictures 11 and 12).

Fire Department: There are two separate buildings serving the Fire and the Safety Services Department located at, 2 Knox Rd. The larger building, which appears to be the older of the two, has a brick façade, and is constructed of two prefabricated steel structures built side by side. These two structures are separated by a CMU wall; each of the steel structures has a gable roof, is approximately 14' high at the eaves and 21' high at the ridge, and is approximately 50'wide. One of these structures has a partial basement, and is occupied entirely by the Fire and Safety Services Department; while the other structure is used mainly as a public gym. To the rear of the gym section there is a small area that is also utilized by the Fire and Safety Services Department (pictures13-16).

The smaller building appears to have been constructed circa 1982 and is two-stories high. The first floor is used as a garage, and the second floor is used as a meeting room. The building has a footprint of approximately 30' long x 24' wide and floor to ceiling heights of 12' and 8' for the first and second floor respectively. The walls are constructed of cast-in-place concrete, CMU, and wood studs. The floor framing is constructed of wood joists and beams. The roof consists of prefabricated wood trusses with clear spans across the width of the building.

Conclusions and recommendations:

In general, with the exception of the items noted below, these buildings did not exhibit major structural deficiencies or issues that are of immediate or major concern (eminent collapse or partial collapse). The buildings observed appear to be in acceptable structural condition for the purpose of General Occupancy Buildings. General Occupancy Buildings are classified as Category I Buildings in the International Building Code (IBC) 2000. The IBC 2000 is the governing code for structural design of non-residential buildings in the State of New Hampshire. The IBC 2000 classifies Fire, Rescue and Police Stations as Category III Buildings. Category III Buildings include buildings designated as Essential Facilities. Essential Facilities are structures, the failure of which would result in the loss of facilities required for post disaster (flood, hurricane, earthquake, blizzard, etc.) operations. The IBC 2000 requires much more stringent standards, including a higher importance factor, in the design of these facilities. In addition to specific architectural components, there are more stringent design requirements for the details, connections and attachments. There are also additional inspection requirements during the construction of the building's structural components as well as its mechanical, electrical, and architectural components.

In general, and based on the performance of this type of building in the past, the observed Bow facilities are likely to be of low seismic risk and expected to survive an earthquake with damage mainly to non-structural elements; however, the functionality of these buildings after an event is questionable and will most likely depend on the performance of the non-structural elements.

During an earthquake, the survival of critical equipment and contents in a facility may be just as important as the survival of the buildings. Damage to such components can lead to extended interruptions of a facility's function. In the case of facilities required for emergency response, damage to nonstructural components could lead to delayed response and consequently loss of life. Past experience indicates that non-structural elements are often damaged in earthquakes when they are not properly anchored or braced. Components can fall, topple over, and/or slide, breaking piping or utilities. Of special concern are the life safety hazards and delayed functionality associated with components damaged in

earthquakes. In recent years, seismic codes have begun to deal with the non-structural problems associated with building loss.

Without a review of the original structural drawings for these buildings, the original design intent cannot be determined. It is my recommendation that if these buildings are to continue to function as Essential Facilities, a detailed review and investigation of these facilities be performed to establish the functionality of these facilities after a major natural disaster such as a hurricane or earthquake to identify deficiencies and to provide recommendation for upgrade, as necessary, to protect the public safety and the public interest.

The following structural issues were observed during the walk through; some require immediate attention and the others are of post disaster functionality importance to buildings being used as Essential Facilities.

1. Rusted columns were observed in the basement of the Fire Station Building (pictures 20 and 21). Standing water was observed in the basement at the time of this walk through, and it appears that the basement has been regularly flooded with water. These columns need immediate attention and repair to prevent any structural compromise of the framing.

2. In one location in the police building, the removal of a ceiling panel revealed the roof diaphragm connections to the CMU wall were absent (pictures 8 thru10). These connections are important in the performance of the building during a wind or seismic event and can compromise the post disaster functionality. As part of a detailed structural review, these conditions should be investigated and, if necessary, corrected.

3. Some CMU walls appeared to have minimal or no top support. The proper support is important for the performance of the building and the components during and after a major event. These should follow the same recommendation as in item 2.

4. Efflorescence and mold were noted on the wall of the Police Station. Other evidences of water penetration were also noted during the walk through. Although, by

themselves, these are not necessarily structural issues; the source of the water needs to be determined and corrected, if necessary, in order to prevent any structural damage in the future.

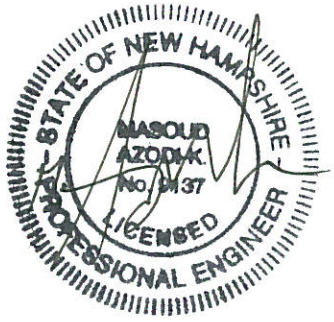
5. One face of the smaller building used by the Fire Department appears to have insufficient lateral load resisting elements (shear walls, etc.)(Picture 19). The lateral adequacy of the walls is important to post disaster functionality. This condition should be reviewed and corrected if necessary

6. Unrestrained objects shifting or equipment collapse may cause harm to occupants and impose hardship during an event and can also affect post functionality of a department. To prevent this circumstance, a thorough evaluation of the stability and the connections of each departments' equipment and contents should be part of the recommended review.

This completes the scope of this report. Please note that the opinions stated in this report are based on the limited observation during the walk through and do not express or imply any warranty of the structures or that all conditions have been observed. Thank you for this opportunity to provide you with this structural engineering service. Should you have any questions, or require additional assistance, please do not hesitate to call.

Sincerely,

Omega Structural Engineers, PLLC



Alex Azodi, P.E.

Attachment: Photographs

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APPENDIX I

PICTURES

211 STATE ROUTE 103 NEWBURY, NH 03255 T 603.938.6222 F 603.938.6288 OMEGAENGINEERING@TDS.NET

1. Police Station, Note: water stains and efflorescence

2. Police Station, Note: efflorescence

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3. Police Station and Town Garage Building

4. Town Garage

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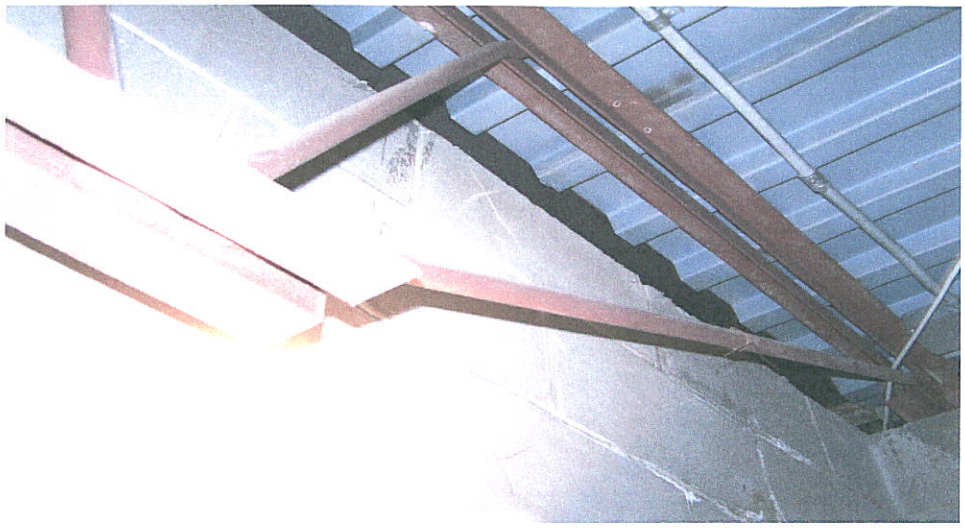
5. Town Garage Interior

6. Town Garage Interior

7. Town Garage Interior



8. Interior Police Dept. Note: lack of diaphragm connection to wall.

9. Interior Police Dept. Note: lack of diaphragm connection to wall.

10. Interior Police Dept. Note: lack of diaphragm connection to wall.

11. Police Building standing on Mezzanine looking at wall of station

12. Police Building, standing, on Mezzanine looking into garage

13. Bow Fire Station, front elevation

14. Bow Fire Station showing the two gable roofs

15. Bow Fire Department, side elevation looking toward the front.

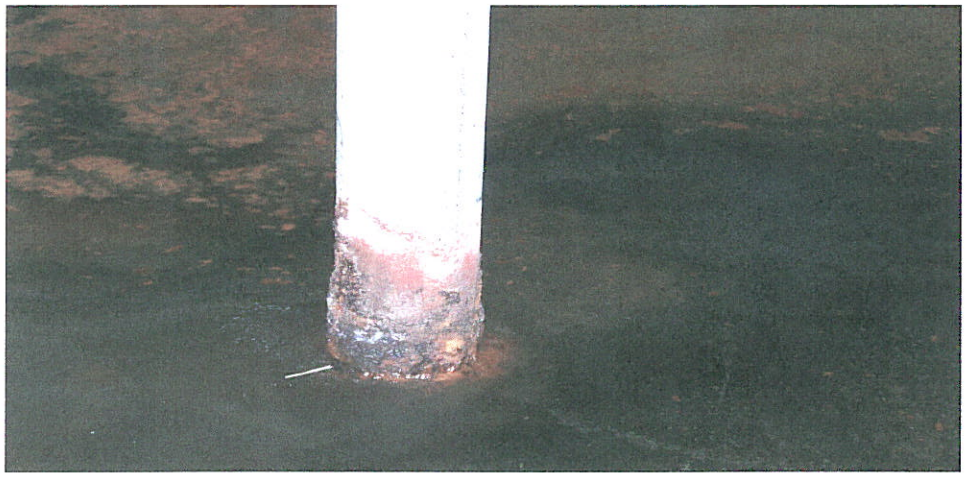
16. Bow Fire Department, rear elevation

17. Fire Department Interior

18. Fire Department Interior

19. Bow Fire Dept., smaller building, Note: apparent lack of shear wall.

20. Rusted basement column, Fire Department



21. Rusted basement column Fire Department

22. Damaged Basement wall, from piping, Fire Department