MEDLOCK & ASSOCIATES ENGINEERING, PA

October 31, 2019

David "Scottie" Harris
Fire Chief - Town of Black Mountain
106 Montreat Rd.
Black Mountain, NC 28711

Subject: Updated Structural Engineering Assessment Report – Repairs and proposed renovation
Town of Black Mountain Fire Station #1
Project Number: 634619

Dear Mr. Harris:

A Medlock & Associates Engineering, PA (MAE) representative conducted a recent site visit to observe and assess the current condition of the slab floor and CMU walls in the area of the day room, dorms, and training room. This area of the building was the primary area of interest of our assessment provided in the previous report dated March 5, 2012. The purpose of the site visit was to assess any changes since that report and assess the structure related to proposed renovations to this area of the structure shown in a preliminary drawing provided by Hurt Architecture dated February 17, 2017. For this report, we have also reviewed our prior report dated March 5, 2012 and a geotechnical report provided by ECS Carolinas dated September 9, 2011.

Based on the recent site observation, assessment of existing conditions, review of previous reports, review of the proposed renovation, and prior experience with similar situations, we have developed the following comments.

Findings and New Discoveries:

1. Based on our latest visual walk-through assessment and review of previous photographs and reports, it is our opinion that no noticeable changes have occurred in the primary area of concern. If any additional settlement or displacement has occurred, it was not observed in the visual assessment.
2. While on site, we did observe and discuss two new areas of concern: (1) water entering the rear wall of the main truck bay area and (2) water entering the work pit area located in the end bay.
3. Concerns were raised during our site visit regarding water infiltration in and around the basement slab.
4. No additional concerns or detrimental conditions were noted or discussed during the site visit.

Engineering Recommendations:

1. Due to the extent of proposed demolition shown in the preliminary architectural drawings and the fact that new restrooms are proposed, we recommend that new grade beams shall be installed in a North – South direction in the proposed renovated area. These grade beams would be installed from exterior wall (North of structure) to the parallel basement wall below the main hallway.
2. The proposed grade beams would be utilized to provide a tie beam across the floor to the steel channels along the exterior wall to either vertical steel supports or carbon fiber repair recommended in our prior assessment report. We could also utilize the grade beams to support the slab floor system in these areas (and remove the requirement for urethane injection in the bearing soil. This option was noted in our initial report and the prior geotechnical report. We would anticipate the new grade beams and respective wall repairs to be in the range of six feet to eight feet on center.
3. As part of the grade beam installation we would likely cut through the existing slab for installation. If possible, we could maintain the remainder of the existing slab, or remove the entire slab and replace with new. We

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would recommend receiving preliminary pricing from a contractor to compare. Removal and replacement of the slab may be cost effective as new utilities would be required below the slab for the proposed renovation anyway.

4. Based on review of our initial report and the original geotechnical report, it is our opinion that the main risks for the structure would be continued movement in the concrete slab floor system and continuing cracking / movement in the North exterior wall and the opposite basement wall. Both of these concerns would be addressed by the proposed grade beams and wall repairs. Additionally, there does not appear to be any concern regarding additional settlement in the main structural system of the building.
5. Regarding the infiltration of water along the rear of the truck bays, it is our opinion that water is entering at the interface of the building exterior wall and concrete slab. We recommend grading the finished grade along the rear of the building. We observed the soil grade in this location as higher than the adjacent slab. This grade elevation should be dropped and a drainage swale provided along the rear of the structure and directed to the pre-existing storm water drop inlet.
6. Evidence of water penetration was observed in the work pit located in the end bay. We recommend injecting an elastomeric water sealant along the interface of the pit slab and the pit walls with a product such as Sikaflex 1A (or similar product). If water is entering through the slab or walls of the pit, Sikaflex -2c NS EZ mix may be applied on all surfaces. In addition, we recommend that the existing drain should be cleaned out and/or scoped by a company experienced in clearing old drain lines: either a licensed plumber or Rooter system. If the line is clogged or damaged beyond repair, the line should be replaced, or a sump pit provided with new piping.
7. Regarding water issues in the basement area of the structure, it is obvious that prior attempts have been made to prevent or limit the infiltration of water. Areas of the slab have been cut and these areas have been filled with Washed Stone to the top of slab. If water issues persist, we could look into options of providing addition drainage measures such as trench drains and / or floor drains. If required, sump pumps could be installed in the basement area to assist the existing drain system. Also, the grading around the garage door shall be reworked to ensure proper drainage away for the basement slab. As we discussed in the field, this structure was built in a prior low drainage spot based on interviews with individuals and the presence of the large storm drain pipe that continually flows below the basement of the structure. This pipe was likely installed to fill in a prior creek in this area. This pipe may be observed in the drop inlet set adjacent to the North wall of the structure. We have not observed any structural issues in the vicinity of this pipe or attributable to this drain system. However, we would advise that someone should be hired to video this pipe prior to the proposed renovations to ensure the integrity of the pipe.

Conclusion

Basically, it is our opinion that the structure of the building is sound and suitable for renovation and continued use as a city responder facility as long as the issues noted above are addressed. The main structural concerns are the structural support for the exterior North wall, the opposite parallel basement wall, and addressing the cracked slab floor in the dorms area. As design for the renovation proceeds, we strongly recommend that our recommendations above are implemented into the construction documents.

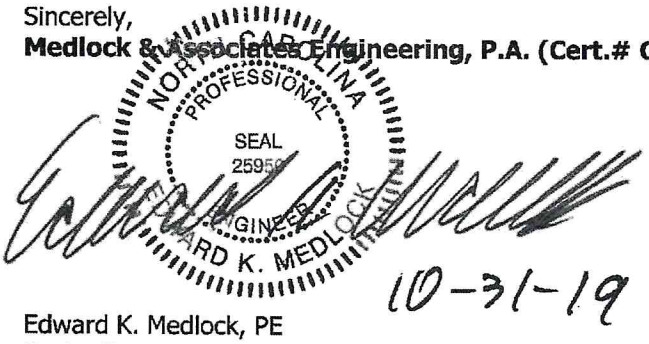
This report shall not supersede the State Code or local building codes as they apply. Any construction shall proceed in accordance with requirements of the current edition of the North Carolina Residential Building Code.

The scope of this report is limited to matters discussed herein. No opinion is offered, and none should be inferred, regarding other aspects of this structure or the structure taken as a whole. MAE makes no claims pertaining to subsurface conditions or their bearing capacity. For further information regarding subsurface conditions we recommend contacting a licensed geotechnical engineer. This report is based on presently known and available facts, data, and information. To the extent that additional or different facts, data, or information is developed or discovered after the issuance of this report, MAE reserves the right to amend, alter, or change the report as needed to reflect consideration of the additional or different facts, data, or information. Site observations are limited to visibly observable areas; we

offer no opinion regarding structural conditions behind finishes or inaccessible areas. If signs of distress are observed or if new information is brought to our attention, invasive testing for further observations may be recommended.

We are pleased to be of service. If you have any questions regarding this report or require further assistance, please call.

Sincerely,
Medlock & Associates Engineering, P.A. (Cert.# C-3133)



10-31-19

Edward K. Medlock, PE
Senior Engineer, President