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August 1, 2023

David G. Totty
Director of Facilities
Rochester School District
150 Wakefield St, Suite #8
Rochester, NH 03867

Re: **Nancy Loud School – Assessment of Southeast Exterior Wall and Foundation**
5 Cocheco Ave
Rochester, NH

Dear Mr. Totty,

At your request, Foley Buhl Roberts & Associates, Inc. (FBRA) visited the Nancy Loud School at 5 Cocheco Ave in Rochester, NH to assess the current conditions of the southeast exterior wall and foundation wall to develop an opinion as to the structural stability of the building. This letter documents our assessment and presents our conclusions and recommendations.

INTRODUCTION

The Nancy Loud School was constructed in 1880 and consists of one main two-story building with a gabled roof and bell tower, an auxiliary two-story section with a lower roof on the northwest side, and two auxiliary one-story sections to the northeast and southwest sides of the building (Figure 1).

The building is framed with lumber and supported on foundation walls constructed with brick in the top portion and stone below the brick. The first floor is framed with 2x joists that attach to girders supported by brick columns or perimeter beams bearing on top of the foundation walls. There is a basement below the first-floor framing which does not appear to have a slab.

We understand from conversations with you that the southeast exterior wall and foundation wall have been damaged and you have concerns about the structural integrity of the building and safety for occupancy. We also understand that the school district is in the early design phase for a new elementary school which is expected to be completed by 2025 and will host the students currently located at the Nancy Loud School.

Our scope of work consists of the following tasks:

- Visit the site to observe and photograph the structure with the intent of identifying structural damage and instabilities, if any, caused by the southeast exterior wall and foundation movement.
- Opine on the structural stability of the building and determine if the building is safe for occupancy.
- Recommend repairs for structural stability, if needed to reoccupy the building.
- Prepare a letter summarizing our findings providing our recommendations.

We understand that further geotechnical information may become available, and consequently, our opinions, conclusions, and recommendations may be subject to further review and modification as deemed appropriate based on the additional information provided.

SITE VISIT

To assess the current structural condition of the building, Zachary T. Chabot, Senior Engineer of FBRA, visited the site on July 26, 2023. He observed the exterior building walls and exposed portions of the brick foundation walls and entered the basement to observe the interior side of the foundation walls and the first-floor framing in the bays adjacent to the southeast exterior wall. He also walked through the classrooms supported by the first-floor framing along the southeast side of the building.

Our observations are based on what we could observe firsthand. The wall exterior wall assembly, bottom of wall construction and attachment to foundation wall, and second-floor framing are concealed so direct observations of these components was not possible. For the purposes of identifying locations in this report, true north is identified in Figure 1 and the southeast and east walls are labeled for clarity.

We made the following observations of the existing conditions of the building:

- Brick on the exterior side of the west, east, and southeast foundation walls are deteriorated and missing bricks in several locations. There is plywood blocking windows between brick piers along the foundation walls (Photo 1).

- The middle portion of the southeast exterior wall is bulging outward at the top of the foundation wall relative to the rest of the wall. The brick foundation wall piers also appears tilted away from the building (Photo 2).

- Interior brick partition walls in the basement are separated from the southeast foundation wall by over an inch in some location (Photo 3).

- The foundation wall material transitions from brick to stone below grade. The stone foundation is severely deteriorated and missing mortar along most of the southeast foundation wall (Photo 4) and along the southern portion of the east foundation wall (Photo 5). The stone is loose and has large gaps in many locations (Photos 4 and 5).

- Brick piers are separated from the inside face of the stone foundation walls in many locations (Photo 6).

- A wood perimeter beam appears to bear on top of the southeast foundation wall and support the notched, 2x10 first-floor joists (Photo 7). The 2x10 first-floor joists are no longer bearing on the notched perimeter beam in many locations along the length of the southeast foundation wall (Photos 7 and 8). We could not observe the size and position of the perimeter beam during the site visit.

- 2x10 first-floor joists at the southeast wall are supported by wood girders bearing on brick columns approximately 15 ft. from the southeast foundation wall. The joists are notched at

this first interior column line and bear on ledgers which are connected to the girders (Photo 9).

- First-floor joists are supported by previously installed shoring to the northwest of the first interior column line form the southeast wall (Photo 10).

- There is a large depression beneath the first partition wall to the west of the east foundation wall (Photo 11). The brick partition wall is not load-bearing.

DISCUSSION

The stone and brick foundation walls along the southeast side and a portion of the east side of the building are severely deteriorated (Photos 1, 2, 4, 5, and 6). The outward displacement of the brick foundation walls and exterior wood-framed walls along the southeast exterior wall is consistent with the observed deterioration and loss of brick, stone, and mortar in these walls. It is also possible that foundation settlement is a factor in the observed movement of the foundation walls. Evaluation of settlement and the existing stone foundation walls is outside of our expertise and we understand that you engaged a geotechnical engineer (S.W. Cole) to visit the site on Monday (July 31) to evaluate the condition of the foundation and provide their recommendations. S.W. Cole should also evaluate the depressed slab below the interior partition line to determine if other geotechnical issues need to be considered.

Due to the outward movement at the top of the southeast foundation wall, the perimeter beam and exterior wall above are also displaced outward and many of the 2x10 joists supporting the first floor are no longer bearing on the notched perimeter beam (Photos 7 and 8). However, the majority of the 2x10 joists still bear on the ledger attached to the girders along the first interior column line from the southeast exterior wall (Photo 9). Thus, the existing floor joists are effectively cantilevering from the first interior support line toward the exterior wall and are likely only supported by their attachment to the deck. The existing joists are not adequately supported, and this results in an unstable floor construction in this bay. Furthermore, the exterior southeast wall supports a portion of the second floor and roof above. The outward displacement at the bottom of the wall has created a leaning wall which may become unstable if the wall continues to move outward due to further foundation deterioration and movement or if the second floor or roof is loaded beyond the reduced capacity of the wall. The first and second floors are not safe for occupancy due to these deficiencies, and we recommend that the southeast exterior stud wall and first floor joists along the exterior southeast wall be shored prior to reoccupying the building so the existing foundations are not relied upon to support the structure.

The engineered shoring will likely include a line of shoring in the basement adjacent to the existing southeast foundation which support the joists and an additional line of shoring on the exterior side of the wall so needle beams can be installed between the two shoring lines to support the exterior wall above the foundation. The needle beams could be installed through the existing, boarded-up windows in many locations, but penetrations through the existing brick wall will also likely be required to provide enough needle beams to support the wall. Since the southeast exterior wall is a shear wall and supports lateral loads for the building, the interior line of shoring will need to be braced to transfer lateral loads from the exterior wall to the bottom of the shoring. This may be achieved through proprietary shoring configurations or new wood-framed shear walls in the basement. In both cases, new footings will need to be constructed to support the shoring posts or shear walls. Footings for the

exterior line of shoring should be placed below frost depth to prevent frost from causing movement of the shores and building. See Figure 2 for a potential shoring scheme.

We could not observe the existing construction of the exterior wood-framed wall and a small opening should be made in the bottom of the exterior wall to verify the assembly of the wall studs, decking, and perimeter beam construction prior to developing the shoring plan.

The engineered shoring scheme is a temporary solution intended to allow reoccupation of the Nancy Loud School building prior to the beginning of this school year and during the design and construction of the new school. Depending on S.W. Cole's geotechnical assessment, the foundation walls will likely need significant repairs or complete replacement if the school district intends to retain the structure beyond this timeframe.

CONCLUSIONS

Based on our observations of the foundations, first-floor joists, and exterior walls at the southeast end of the building, we conclude the following:

- Since original construction, the brick and stone foundations along the southeast wall have deteriorated resulting in lateral displacement of the foundation wall.

- Many of the first-floor joists are no longer bearing on the perimeter beam along the southeast foundation wall due to the outward displacement of the foundation wall and this has created an unstable floor construction which is not safe for full occupancy.

- The outward displacement of the southeast exterior wood-framed wall above the foundation wall has resulted in a leaning exterior wall which is not restrained at the bottom and may become unstable due to additional movement or further loading. This wall supports a portion of the second floor and roof above and these areas are unsafe for full occupancy.

RECOMMENDATIONS

We recommend the following repairs be implemented at the Nancy Loud School:

- Although the damaged first-floor joists and southeast exterior wall only support a portion of the building, we do not recommend opening any portion of the building to the students or staff until repairs are made or engineered shoring is installed.

- If the school intends to open the building to the students and staff and there is not enough time to make repairs, we recommend installing engineered shoring along the southeast side of the building to support the southeast end of the first-floor joists and exterior wood-framed wall prior to reoccupying the building.

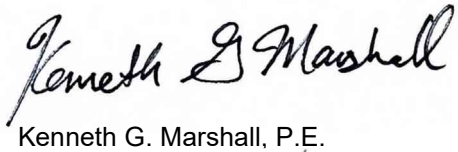
- Engineered shoring is a temporary solution intended to allow reoccupation of the school for the school year 2023 or until students are relocated to the planned new elementary school. If the school district intends to continue using the school after the new elementary school is constructed, we recommend repairing or replacing the existing foundations to support the exterior walls.

- Prior to shoring the building or making repairs, school personnel could be allowed limited access for a brief period of time to remove equipment or supplies from the building.

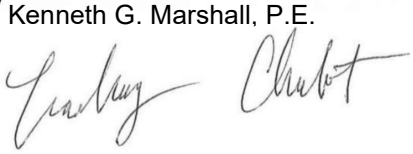
- If additional cracking or displacement is observed or reported, please notify FBRA immediately.

Very truly yours,

FOLEY BUHL ROBERTS & ASSOCIATES, INC.



Kenneth G. Marshall, P.E.



Zachary T. Chabot, P.E.

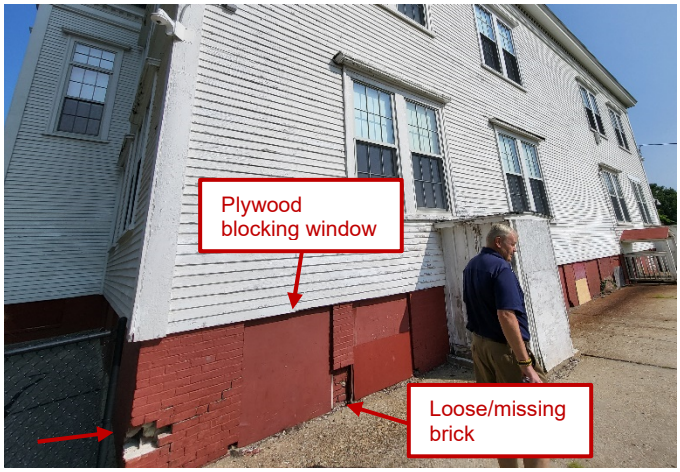


PHOTO 1

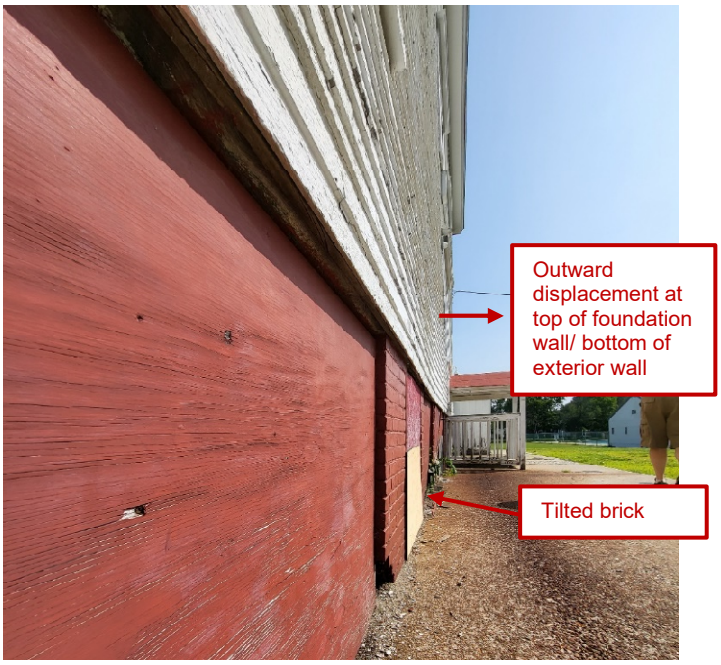


PHOTO 2

PHOTO 3

PHOTO 4

PHOTO 5

PHOTO 6

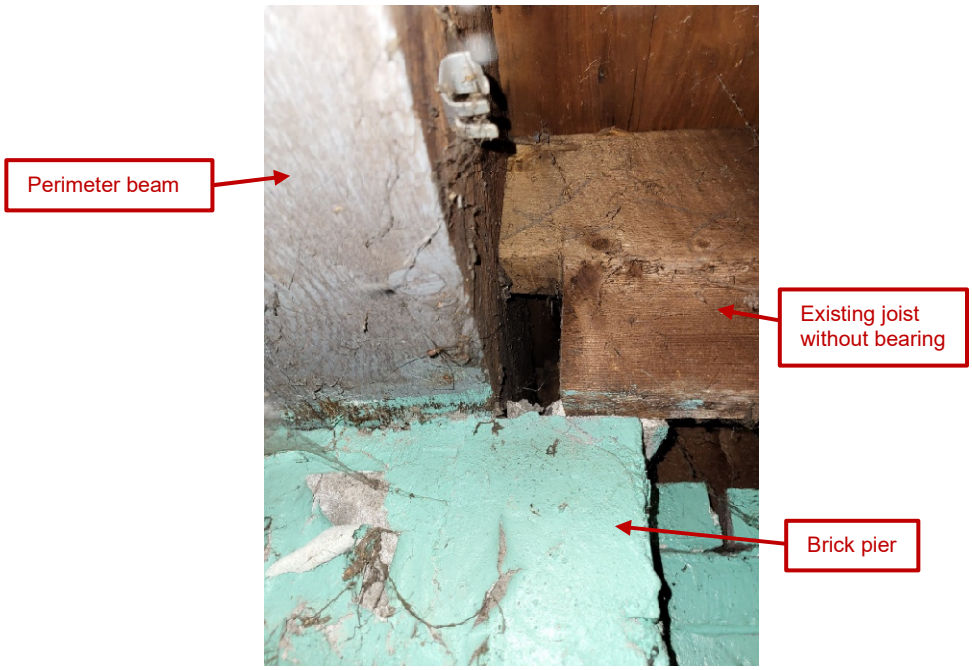
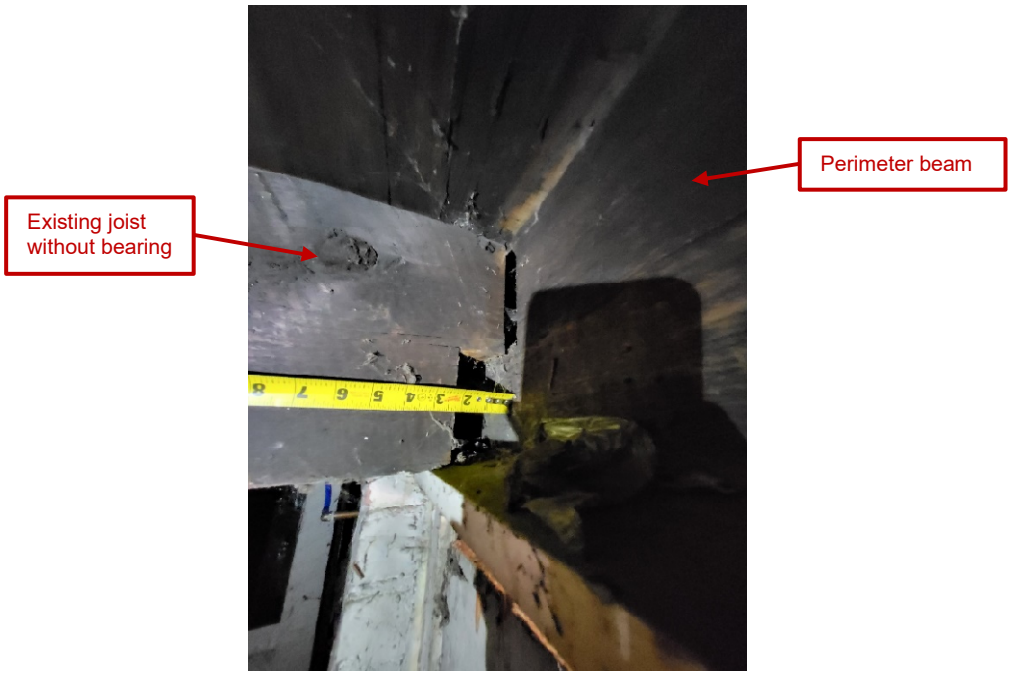


PHOTO 7



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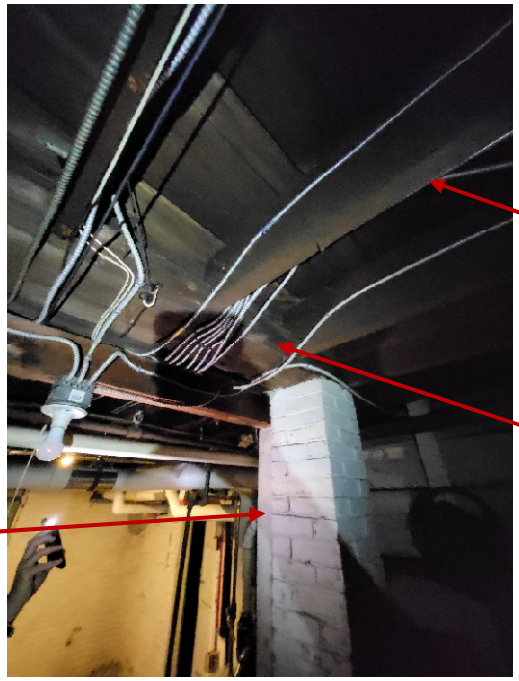

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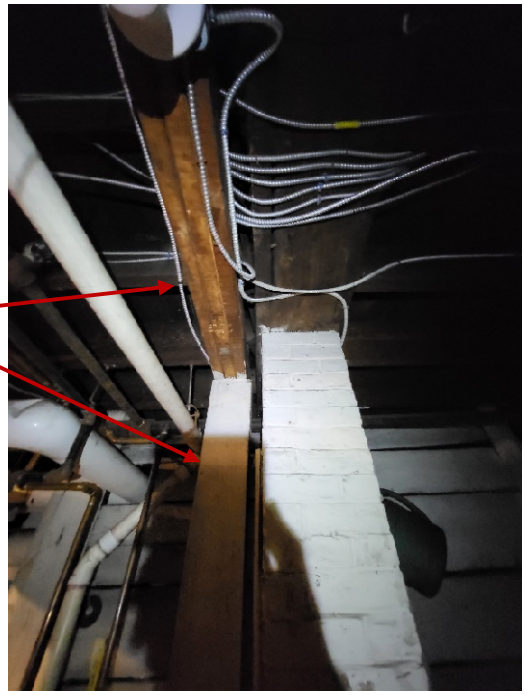

PHOTO 10

PHOTO 11

FIGURE 1
(Image by Google Earth)

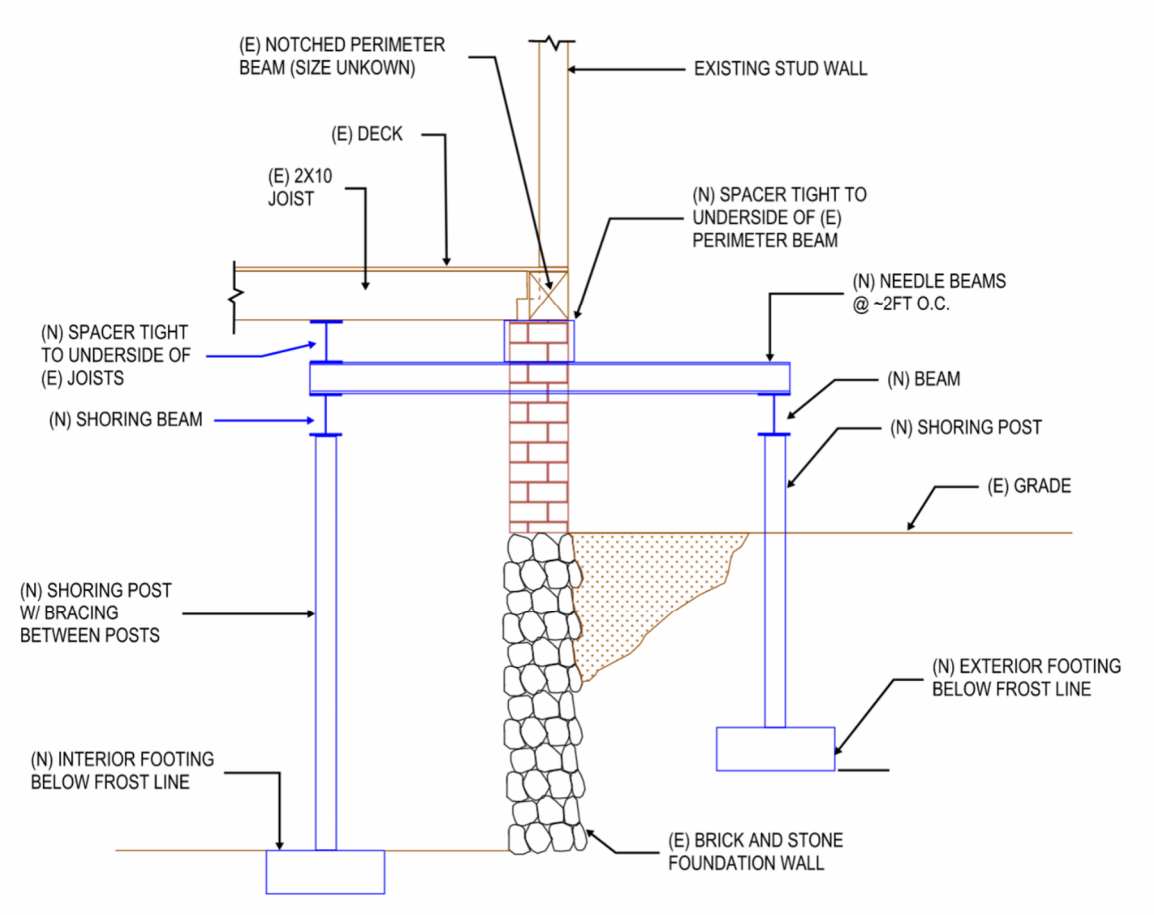
(E) NOTCHED PERIMETER BEAM (SIZE UNKOWN)
EXISTING STUD WALL
(E) DECK
(E) 2X10 JOIST
(N) SPACER TIGHT TO UNDERSIDE OF (E) PERIMETER BEAM
(N) NEEDLE BEAMS @ ~2FT O.C.
(N) SPACER TIGHT TO UNDERSIDE OF (E) JOISTS
(N) BEAM
(N) SHORING BEAM
(N) SHORING POST
(E) GRADE
(N) SHORING POST W/ BRACING BETWEEN POSTS
(N) EXTERIOR FOOTING BELOW FROST LINE
(N) INTERIOR FOOTING BELOW FROST LINE
(E) BRICK AND STONE FOUNDATION WALL

FIGURE 2