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PRELIMINARY REPORT–RECHS FIELD HOUSE

Submitted To: Robstown ISD

Project: Field House Building

Location: Robstown, TX

FR #10182024A

Attachments:

Job No: 2428

Original, September 9, 2022 – Final Revision, October 17, 2024

Project: Investigation of the Foundation and Superstructure for the Robstown ISD Field House Building (Men's and Women's Locker Room and Weight room), 609 West Highway 44, Robstown, Nueces County, Texas

As requested and authorized, Wheaton Engineering/HNS Engineering performed a visual inspection of the foundation and superstructure of the above captioned building. Original visual inspection, performed on August 30, 2022, was completed in accordance with RISD's direction. Subsequently, a detailed, slab elevation survey and static plumbing drain line test were performed. This report provides findings regarding the structural adequacy of the field house.

DESCRIPTION OF STRUCTURE:

To the best of our knowledge, the building is constructed as described in the following paragraphs. It should be noted that this information is based on our visual inspection and general knowledge of accepted construction practices in this vicinity. No geotechnical investigation was furnished for this particular site. Original structural plans, but not specifications for the building were available during Wheaton's latter investigation. The inspection was limited to the locker rooms, offices, and weight room areas only. Reference is made to photographs taken during our inspection that are attached at the end of this report and shown on the plan Exhibits.

The structure is a single-story pre-engineered metal building approximately seventeen (17) years old (see photographs 1 through 4). The foundation appears to be a mild steel reinforced concrete slab-on-grade. According to plans there is a waffle beam grid. No construction proof was obtained. The superstructure is a pre-engineered metal building with interior walls

constructed of Concrete Masonry Unit (CMU) block walls. The exterior walls consist of steel girts covered with metal sheathing and brick veneer at the perimeter the building. The roof consists of metal deck supported by metal purlins.

Drawing FP-1.0 – Original Structural Design Overlay (Exhibits):
Wheaton engineering has created a drawing by overlaying the original foundation design drawing with the as built floor plan for the Robstown Independent School District Early College High School Fieldhouse. The intention of the overlay drawing was to discover whether or not failing CMU wall sections were located above dedicated foundation beams. The net result of the overlay was a discovery that only a few short sections of wall are actually supported directly on foundation beams. The remaining CMU walls, and the majority, are only supported over the 6-inch webbing slab area. This is a definite indication of cause for structural cracking and subsidence visible at the facility. Detailed notes based on observations using the overlay system are as follows:

1. The condition of CMU wall installation not being vertically placed over concrete foundation beams is significant because it limits the support of the wall and creates stress on the concrete foundation system at the point of contact. Additionally, typical vertical CMU block wall reinforcing rebar cannot be firmly anchored in the foundation due to the fact that it would be inserted directly into the 6-inch-deep slab rather than into the 36-inch-deep beam of the building foundation. There is no indication in the original plans that vertical reinforcing was required in the CMU block walls. Notes provide for horizontal reinforcement only.

2. A section of significant damage in the CMU wall system specifically evident at the entryway into the boy's locker room supports the observation in item 1 above. Physical openings in the boy's locker room entry wall in the lentil support column zone provide a window showing clearly that there is no concrete fill or reinforcing. This is a critical support wall with substantial member weight concentrated on the bearing wall at the edge of the lentil, a point which would definitely require vertical reinforcing.

3. Minimal lentil supports at the boy's and girl's locker room doors leading into the weight room area have created a substantial separation in the block wall bordering the coach's bathroom area. Some reinforcing bar horizontally placed in the lentil was found above the doors when work was completed on the temporary supports, however there is no indication that any vertical reinforcing was provided, and again the wall is not over a beam where it could be anchored properly.

4. Areas observed on the overlay drawing where the wall system is most removed from the beams appear to be the heaviest areas of damage. This would be the expected result because the greater the distance from support beam the higher the Delta movement in the webbing portion of the slab. The higher the movement the more significant the damage in the CMU wall block would be. Generally, this observation would indicate that the foundation drawings is a true or very close depiction of what was actually installed.

5. Movement at the girl's coach's office window area appears to be slab related and is

causing compression of the ductwork and wall system indicated.

6. Metal building columns are not located at beam intersections. This may have been a coordination problem between the floor plan layout and the metal building foundation design. Assumptions may have been made that the beam is connected between the vertical truss columns

The overlay data and access to the original design drawings has essentially confirmed original observations. The fact that a majority of the CMU walls do not set on beams was somewhat unexpected in the original review, the general observation would have been that some were misaligned but not to this extent.

PLUMBING TESTS:

Plumbing static drain testing was performed September 2024, by Shoreline Plumbing, Corpus Christi, TX directly for RISD, report is in exhibits. Static tests failed twice indicating plumbing leaks. A water level "about 4.5" below slab level" was recorded. Plumbing leak appears to be affecting the slab structure based on topographic results. See drawing S1.0 specifically independent outlier depressions in shower and laundry areas.

FOUNDATION PROFILE:

Topographical Survey Results-Drawing TS 1.0 and TS 1.1 (Exhibit)

Topographical survey results were completed and obtained on September 26, 2024, work was performed by Brister Surveying Inc., Corpus Christi, Texas. Brister was tasked with completing a survey of the top of the interior slab of the Fieldhouse, the purpose of this was to determine the movements and potential failure points within the building foundation. The results of the survey are published on sheet TS 1.0 along with isometric development of differential elevation lines to indicate patterns and levels within the foundation. These isometric lines were then transferred to a highlighted version of the floor plan indicating where the CMU walls are located in conjunction with the original design indicated beam system. Resulting observations from the survey and drawing work are as follows:

1. Isometric lines follow a very concentric pattern almost exactly duplicating the weight zones and proliferation of CMU walls within the floor plan. Foundation elevations indicate a depression slope toward the center of the building with the lowest point being centralized in the locker shower area on the girl's side of the facility. Total depression movement across the main section of the foundation exceeds 3.2 inches. Maximum deviation from the survey is 4.2 inches, although this may have incorporated some slope in the porch area at the front entry and may be further evaluated. Maximum slopes found exceed 1 inch and 12 feet indicating foundation failure.

2. Highlighted rings of foundation depression found primarily in in the front of the building in areas where maximum CMU damage was also found, and more commonly within the regions around the laundry facility. Plumbing static pressure test failure indicating that there is leakage from the plumbing drain system below the slab. The

highest probability for erosion created by this failure is in the laundry area due to the fact that drain flow is actually forced by the discharge pumps on the washing machines. Other drain systems within the facility would be gravity flow such as from shower systems. Multiple depressions are obvious inside of the laundry facility, illustrated on TS1.0 and TS1.1.

3. The highest elevations on the surveys exist at the north center point and northwest corner of the weight room area. The northwest corner definitely appears to have lifted to some extent. However, the central point areas of elevation could be created by thickness of rubber matting on the floor and were not critical in the evaluation.

4. Drawing TS 1.1 illustrates some very interesting principles, primarily it illustrates that the largest concentration of wall area, or weight load on the foundation creates most of the deflection as seen in the survey. The dark gray or black outline at the perimeter of the building is an exaggeration of the exterior beam elevations indicating or providing a visual image of the movement in the perimeter of the building. These perimeter movements are actually documented on sheet TS 1.0. Deviations in the perimeter of the building actually exceed 1 inch on both the north and west side of the facility. Substantial deviations indicated on the east side arch, may be attributed to the sloped porch slab being surveyed at the edge, as noted in number one above. There is substantial movement in the building perimeter on everything except the south wall.

FIELD OBSERVATIONS:

The following observations were made during the original general visual inspection of the building:

EXTERIOR (S1.0):

1. Grade beam crack associated with a concrete surface crack was noted on the North side wall (see photograph 6).
2. Honeycomb and spalling on the North side wall near the overhead door was noted (see photograph 8).
3. Honeycomb and spalling on the West wall was noted (see photograph 9).
4. Concrete corner crack and spalling noted on the South-West corner (se photograph 10).
5. Concrete spalling and erosion along the South side wall noted at several places (see photographs 11, 13, 16, and 18).
6. A grade beam crack associated with concrete surface crack on the Southside overhead door was noted (see photograph 12).
7. Few grade beam cracks on the Southside wall were noted (see photographs 14, 15, and 17).
8. Wide separation between the foundation of the building and the concrete walkway on the southside was noted (see photograph 19).

INTERIOR WOMEN'S LOCKER ROOM (S2.0):

1. Overall view of the women's locker room is shown as viewed from East side (see photographs 40, and 41).
2. Several Horizontal, diagonal and corner cracks in the women's locker room CMU wall were noted (see photographs 22, 23, and 24). Note that the CMU opening from hallway to the locker room has no support column and vertical separation at corner was also noted.
3. Vertical corner separation associated with horizontal crack in the women's restroom were noted (see photographs 26, and 27).
4. In women's shower, several vertical, diagonal and horizontal cracks in the shower area were noted (see photographs 28 thru 38).
5. Separation of the interior CMU wall from structural steel members associated with some horizontal displacement was noted (see photographs 42, 43, and 47).
6. Air condition ducts passing through the CMU wall were crushed and displaced creating opening between the ductwork and the CMU wall at several places (see photographs 44, 45, and 46).
7. The hallway opening to the weightroom show various cracks in the CMU wall and crushed ductwork (See photographs 48, 49, 50, 60, and 61).
8. In women's coach's office, vertical crack in the common CMU wall was noted (see photograph 51).
9. In women's coach's bathroom and shower area, several horizontal, vertical cracks with few separations at the corner were noted (see photographs 52, 54, 55, and 57).
10. Vertical and diagonal cracks in the common CMU wall between women's locker room and weight room was noted (see photographs 58, and 59).

INTERIOR WEIGHT ROOM (S3.0):

1. Overall view of the weight room as viewed towards southwest side (see photograph 75).
2. Several horizontal, vertical and diagonal cracks associated with separation that are significant in the common CMU wall between men's and women's locker room and weight room were noted (see photographs 62, 63, 64, 65, 66, 67, 69, 70, 71, 72, 73, and 74). Note that the door between the office and weight room was out of alignment.

INTERIOR MEN'S LOCKER ROOM (S4.0 and S5.0):

1. In men's hallway opening to the weight room, CMU wall cracks with diagonal, and vertical crack associated with horizontal displacement were noted (see photographs 76, 77, 78, and 82).
2. A CMU wall crack in the common wall between men's locker room and weight room was noted (see photograph 79).
3. In men's coach office area, several horizontal, diagonal and vertical CMU wall cracks were noted (see photographs 80, 81, 83, and 83A).
4. In men's locker room, displacement with crushed air-conditioning duct were noted (see photographs 84, 85, 86, 108, and 110).

5. Separation of CMU wall and structural steel member associated with cracks was noted in the men's locker room (see photographs 87).
6. Several horizontal, vertical, diagonal CMU wall cracks in the men's shower were noted (see photographs 89, 90, 91, 92, 93, 94, 95, and 96).
7. In men's restroom, Similar CMU wall cracks were noted (see photographs 97, 98, 99, and 100).
8. In men's locker room opening to the hallway, vertical separation above the header beam and below the header beam were noted (see photographs 101 and 103). Note that the CMU opening from hallway to the locker room has no support column and vertical separation at corner was also noted.
9. The supporting CMU wall below the header beam noted in item 8 was spalled and cracked (see photograph 102, 104, 105, 106, and 107). Note the CMU Wall supporting the header beam of the hallway opening has no reinforcement or concrete grout filling.
10. In common laundry room, several vertical, horizontal, diagonal and corner separation in the CMU wall were noted (see photographs 111, 112, 113, 114, and 115).
11. In common trainer's room, common wall between the hallway and the room showed vertical CMU crack (see photograph 21).
12. In men's locker room, several concrete surface cracks were noted (see photographs 116, 117, 118, 119, 120, 121, and 122).

Some areas in the field house were not accessible during the review limiting reporting of those deficiencies.

FLOORS:

At the time of our inspection, the slope of the floors in the Field house building show movement.

NARRATIVE:

According to the information gathered from the RISD, architectural plans and structural plans for the field house were designed by Gignac Architects and were obtained for review post visual inspection. Concrete foundation shows movement along the interior of the building. Also, the concrete floor elevation (height), with respect to the surround soils, indicates several feet of fill was provided to build the foundation pad. It is unknow at this time if the soils were compacted select fill or other fill. Also, the interior CMU walls are constructed as non-reinforced walls which were indicated as such in the design plans. Self-weight of the tall unreinforced block walls caused CMU wall cracks and vertical/horizontal displacement. This is aggravated by foundation slab movement, potentially due to the deep fill foundation pad noted above and plumbing leaks as indentified. Hallway walls supported on the unreinforced CMU have created significant horizontal block movement. The foundation slope appears to be outside normal tolerances of 1" in 12'-0", limiting structural integrity of the foundation system. Survey topographical data shows total foundation movement at 3.2 to 4.2". Specific sections in the foundation show slopes exceeds 1.2" in 12'-0". Substantial foundation repairs and the CMU wall replacement will be required as summarized in the conclusion.

ADVISORY:

Based on engineering experience, and field observations with this type of structure, it is advised that following courses of action should be taken:

FIRST PRIORITY:

1. Maintain building barriers and do not allow entry to the facility.
2. Obtain geotechnical report of the soils, required for any continued work.

SECOND PRIORITY:

1. Review financial options of rebuild vs. new structure and alternate facility use.
2. Prepare rebuild preliminary plans for the building based on the soils report and information gathered. for the purpose of estimating cost.
3. Prepare preliminary new floor plans for CMU block walls based on RISD's needs and for final cost estimate.
4. Prepare MEP and architectural concepts for cost analysis on options.

CONCLUSIONS:

Based on original data from visible observations completed in 2022, new data from plumbing static pressure tests and topical survey information collected in 2024 the following conclusions were drawn:

A. CMU walls are unreinforced and were installed that way in accordance with the design. Lentil systems and opening reinforcement were not included in the construction creating a heavy weak partition system which overloaded the foundation design. Issues were further complicated by the lack of vertical CMU reinforcement which created separation and cracking of the walls themselves and compression of unreinforced doorways.

B. The substantial weight of the CMU partitions and the fact that they were misaligned with foundation beam structures led to the deterioration and failure of the slab system with movement exceeding 1 inch slope and a 12-foot run. Foundation total movement exceeded 3.2 inches with potential beam failure on the underside of the slab. Movement versus weight of partitions is clearly illustrated by drawings TS 1.0 and TS 1.1. Beam misalignment is very clearly illustrated on drawing FP 1.0.

C. The drawings noted above also clearly indicate that there is substantial perimeter movement on three sides of the building. Indicating support issues of the original metal building structure may exist.

D. Plumbing static pressure tests indicate leaks below the slab through the plumbing system and are perpetuated in shower and laundry area zones where substantial depressions in the slab have appeared and are shown on the TS 1.0 and TS 1.1 drawings as well.

REBUILD POTENTIAL:

Rebuilding the structural integrity of the facility will mean replacing all partition walls and a minimum of 12,500 ft.^{2} of the original slab. This will mean removing the floor slab system, all plumbing systems and all wall partitions within the locker room portion of the facility and approximately 1/3 of the weight room facility. Demolition work would be extensive and require the rebuild of the complete foundation and partition system within the confines of an existing building structure. Making the potential rebuild extremely expensive.

Additionally, movement in the perimeter of the building indicates the requirement for underpinning the perimeter beam of the facility before rebuild work could start. It will be critical to stabilize the exterior perimeter of the building to maintain the support of the original metal building structure.

Preliminary design layouts for the rebuild will be required to provide accurate cost analysis of the project. Similar projects designed by the firm within the last year have cost approximately $300 and $400 a square foot for a new system, which did not require restricted access within an existing structure, or the demolition of the large portion of the facility before work started. It will be critical to obtain actual estimates from a builder to accurately develop a cost for this rebuild due to the complexity and restricted access of the work. The structural rebuild would obviously affect the mechanical, electrical and plumbing systems, some of which will be destroyed during the demolition, and some which may be reused such as lighting fixtures.

The cost to rebuild the current facility versus the cost of a new facility may be very similar. Options to rebuild existing sound structures to meet the requirements of the Fieldhouse may be a pertinent choice. Substantial contingency funds will be required to augment project unknowns, Additionally, code upgrades will probably be trigged creating a risk that the original structure can not meet current wind load requirements.

GENERAL COMMENTS:

Professional services have been rendered with care and diligence and in a manner customary for professional involved with structural investigations.

This investigation does not include a detailed analytical study of the structural elements of the building nor does this report warrant the structural quality of any structural members or components which are not exposed and are not readily available for visual inspection or other areas not mentioned in this report; nor does it imply that the structural members or components are free from defects, including but not limited to water damage, code compliance, wood rot, termites or corrosion. No other warranty, either expressed or implied, is made as to the recommendations presented in this report.

The opinions expressed in this report are limited to the matters expressly stated herein, and no opinions are implied or should be inferred beyond the matters expressly so stated. This opinion is of the date hereof, and we undertake no, and hereby disclaim any, obligation to advise you of any matter set forth herein. This opinion is intended solely for the benefit of the

addressee and may not be quoted, in whole or in part, without our written consent. No person may rely on this opinion in connection with any transaction, other than the current transaction at 609 W. Highway 44, Robstown, Nueces County, Texas.

In rendering the opinions set forth herein, we have made and relied upon the assumption that all statements and representations made to us are true and correct and that you have no knowledge of any matters that would affect our opinion that has not been communicated to us in writing. If any new information is provided or achieved by the present addressee, owner and/or other source after the report is released, it is possible that our opinion and recommendations may vary.

We appreciate the opportunity to be of services to you. Please feel free to call and discuss any of the information contained within this report.

Sincerely,

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References:	**Attachments:** 26 **Pages**