

11.12.21

Mr. Charles Goodman, AIA, CCHP
Principal
Brinkley Sargent Wiginton Architects
5000 Quorum, Suite 600
Dallas, Texas 75254

Re: Waller County Assessments
Hempstead, Texas
JQ Project No. 3210155

Dear Mr. Goodman:

JQ Engineering (JQ) performed a limited, structural review of three buildings for Waller County, the historic 1955 Courthouse, the 1954 Jail building, and the County Hospital on June 16 and 17, 2021. The purpose of the review was to assess the structural condition of the buildings for the purpose of providing recommendations for repair.

Building Locations:

- Waller County Courthouse: 836 Austin Street, Hempstead, Texas, circa 1955
- Waller County Jail: 646 9th Street, Hempstead, Texas, circa 1954
- Waller County Hospital: 925 5th Street, Hempstead, Texas, circa 1949

The following construction documents were available for review after our site visit:

- Waller County Court House, by Herbert Voelcker & Associates, dated May 17, 1954
- Waller County Jail, by Herbert Voelcker & Associates, dated January 15, 1954
- Waller County Hospital, by John Linn Scott, dated December 20, 1949

Our findings are as follows:

Building Description

Courthouse Building

The courthouse structure is a four-story concrete framed building constructed in 1955 with the following components:

Roof Structure

- The roof structure is a cast-in-place concrete pan joist system consisting of 12" deep x 30" wide pans with a 3" slab resulting in 6" wide x 15" deep joists at 3'-0" spacing.
- Concrete girders are provided at column lines and vary from 16" to 30" deep.

Second through fourth floors

- The typical floor structure is a cast-in-place concrete pan joist system consisting of 12" deep x 30" wide pans with a 3" slab resulting in 6" wide x 15" deep joists at 3'-0" spacing.
- Concrete girders are provided at column lines and openings and vary from 16" to 64" deep.

First floor

- The first-floor structure is suspended over a crawlspace with a precast concrete channel system with 9" typical depths and 12" depths in the southernmost bay.
- Cast-in-place concrete girders supports the precast channel system.
- Foundations are drilled and under-reamed concrete piers bearing approximately 12'-6" below the finish floor.

Jail Building

The jail consists of a two-story cast-in-place concrete structure. The framing system of the second floor and roof consist of cast-in-place concrete one-way slab and beam system. The ground level is concrete slab-on-grade. The foundation consists of drilled and under-reamed concrete piers bearing 8'-6" below the finish floor. See photograph 14.

Hospital Building

The structure of the one-story hospital consists of precast concrete channel roof and ground floor over a crawlspace supported by cast-in-place concrete beams and columns. The foundations consist of drilled and under-reamed concrete piers bearing 11'-0" below the finish floor.

Observations

Courthouse

The following items were noted during our site observation:

- The upper levels of the structure, level 2 and above, were almost entirely covered with finishes and were not observable during the site observation; see photographs 1 and 2.
- The crawlspace was accessible in three locations. The observed framing has experienced significant corrosion of the reinforcing steel in each compartment of the crawlspace; see photographs 3, 4, and 5. The estimated number of precast channels experiencing visible spalling and corrosion is 25%, 50% and 90% in the three compartments observed.
 - A sample of the precast channel concrete was obtained for pH testing of the concrete with phenolphthalein to determine the depth of carbonation. The concrete was none reactive, indicating a pH less than 8.5; see photograph 6. See the discussion section of this report for further comment.
- Crawlspace ventilation was not observed during the site visit. The crawlspace was generally dry at the time of the site observation.

- The exterior brick veneer does not have any control joints installed; see photograph 7.
- The parapets of the brick veneer have been pushed out at the building corners due to volumetric change of the brick veneer over time; see photographs 8 and 9.
- The site retaining walls show signs of lateral displacement; see photographs 10 and 11.
- Joint sealants in the exterior retaining walls have failed in multiple locations; see photograph 12.
- Crack in the brick veneer at the southeast retaining wall corner; see photograph 13.

Jail Building

- The exterior brick veneer façade does not have any control joints; see photograph 15.
- The exposed concrete structure is in generally good condition; see photograph 16.

Hospital Building

- The crawlspace has limited access, and observations were limited to the area immediately adjacent to the access hatch.
- Reinforcing steel corrosion in the precast concrete channels and the cast-in-place concrete grade beams in the crawlspace was extensive; see photographs 17, 18, 19 and 20.
 - A sample of the precast channel concrete was obtained for pH testing of the concrete with phenolphthalein to determine the depth of carbonation. The concrete was none reactive, indicating a pH less than 8.5; see photograph 21. See the discussion section of this report for further comment.
- Standing water was present in the crawlspace; see photograph 20.
- Passive crawlspace ventilation was provided with small vents in the grade beam walls.
- The plaster soffit at the roof overhang has been removed, exposing the precast channel roof structure; see photograph 22. We understand the County demolished the plaster soffit as sections had fallen and the remaining soffit was considered a safety hazard.
- The precast channel roof structure has corrosion of the reinforcing steel on the soffit; see photographs 22, 23, and 24.
- A metal canopy was added and is supported by the brick veneer; see photograph 25.
- A hole in the exterior load-bearing wall appears to have been caused by impact; see photograph 26.

Discussion

Courthouse

The majority of the upper levels of the Courthouse, which are cast-in-place concrete, were not observed due to finishes. There were no signs of distress in the finishes indicating the structure is performing as originally intended.

The crawlspace is experiencing extensive corrosion of the precast channels, while the cast-in-place concrete grade beams did not show signs of deterioration. In general, hardened concrete has a pH between 11 and 13.5 which provides corrosion protection of the embedded steel reinforcing. Over time the concrete pH can be lowered due to environmental exposure to carbon dioxide or salts which causes carbonation of the concrete. The test results determined a reduction of the pH of the concrete within the

precast concrete channels, which indicates the natural corrosion protection provided by the concrete is no longer present.

Hospital

The precast concrete in the hospital building is experiencing extensive corrosion of the precast channels to an even greater extent than discussed in the Courthouse. Similar to the Courthouse, the testing of the precast concrete channels indicated a reduction of the pH in the concrete. The corrosion attack discussed above in the Courthouse section of this report is much more extensive than found in the Courthouse, and the repair of this floor is no longer a feasible option in the hospital crawlspace.

Recommendations

Courthouse

1. Replace the precast concrete channels, including the floor slab in the crawlspace, with new structural framing that is supported on the existing cast-in-place concrete grade beams. In order to perform this work, the entire first-floor slab and all finishes supported by the slab will need to be replaced. Due to the invasive nature of this solution, it is likely to be cost-prohibitive to the overall project to be a viable option.
2. As an alternative to the above replacement, the precast channels could be repaired, and a penetrating corrosion inhibitor applied to the surfaces of the concrete. Application of the inhibitor to all concrete surfaces would be difficult due to limited construction access in the crawlspace. Due to the constructability challenges with applying the penetrating corrosion inhibitor, future concrete repairs should be expected and budgeted for by the County. These future repairs are difficult to predict when and where they may occur and may impact future building operations. The owner should carefully consider the impact on future operations before determining the viability of this option.
3. Add mechanical crawlspace ventilation to meet the current building code requirements.
4. Repair the parapet brick veneer at the building corners.
5. Cut in vertical control joints in the existing brick veneer within four feet of the building corners and at 30 feet on center.
6. Replace joint sealants in cast stone caps in the retaining walls and at the building parapets.
7. Repair the brick veneer at the southeast retaining wall corner and cut in a new control joint.

Jail Building

1. Cut in new vertical control joints in the existing brick veneer within four feet of corners and at 30 feet on center.

Hospital Building

Due to the extensive structural repairs required to rehabilitate the building structure that would require the removal and replacement of all finishes and the structural elements, it will be cost-prohibitive to rehabilitate the structure. Therefore, we recommend that the hospital structure be replaced with a new structure.

Disclaimer

The opinions and comments provided in this report are based upon field observations as part of our scope of services. JQ has ascertained to the best of our ability the visually apparent defects in the building structures. However, as field observations were conducted on structures in which the majority of the structural elements are concealed, JQ cannot be responsible for failing to ascertain deficiencies which were not visible due to the existing conditions in the buildings. No warranty, expressed or implied, regarding the condition of the building structures is intended. In addition, no representation as to the expected useful life of the building structures or other components identified in this report is made.

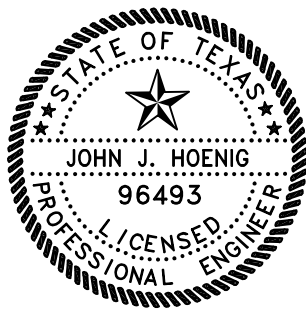
If you have any questions, or if we can be of further assistance, please contact us.

Sincerely yours,

JQ Engineering, LLP

Texas Registered Engineering Firm: 1294


John Hoenig, PE
Partner





Photograph 1 – Interior corridor.



Photograph 2 – Interior of the courtroom.



Photograph 3 – Reinforcing steel corrosion in the crawlspace.



Photograph 4 – Reinforcing steel corrosion in the crawlspace.



Photograph 5 – Reinforcing steel corrosion in the crawlspace.



Photograph 6 – pH test results showing a pH less than 8.5.



Photograph 7 – North façade elevation.



Photograph 8 – Parapet displacement in the brick veneer.



Photograph 9 – Parapet displacement in the brick veneer.



Photograph 10 – Retaining wall displacement on the south site wall.



Photograph 11 – Retaining wall displacement at the south site wall.



Photograph 12 – Retaining wall displacement on the south site wall.



Photograph 13 – Damage retaining wall brick veneer southeast site wall corner.



Photograph 14 – Jail building overall photo.



Photograph 15 – North façade of the Jail Building.



Photograph 16 – Exposed concrete structure.



Photograph 17 – Reinforcing steel corrosion in the crawlspace.



Photograph 18 – Deteriorated concrete and reinforcing steel corrosion in the crawlspace.



Photograph 19 – Deteriorated concrete and reinforcing steel corrosion in the crawlspace.



Photograph 20 – Deteriorated concrete and reinforcing steel corrosion in the crawlspace.



Photograph 21 – pH test results showing a pH less than 8.5.



Photograph 22 – Exposed roof overhang structure and corroded reinforcing steel.



Photograph 23 – Reinforcing steel corrosion in the soffit.



Photograph 24 – Exposed roof overhang structure and corroded reinforcing steel.



Photograph 25 – Metal canopy supported by the brick veneer.



Photograph 26 – Impact damage in the exterior load-bearing wall.