

Date: March 9, 2023

Attention: Bruecher Foundation Services Inc and Property Owner (via email)

Subject: Post-Repair Foundation Repair Evaluation
Slab Foundation
13814 Klaus Ln., Elgin, TX

Good Afternoon:

Bruecher Foundation Services Inc (the contractor) retained Crosstown Engineering (CE) to visually inspect foundation repairs completed by Bruecher Foundation Services Inc.

This report provides our reasonable professional opinion of the condition of the foundation on the date of our inspection and does not take into consideration any changes in the condition of the foundation or soils after that date. The contents of this report supersede any verbal comments made regarding the structure before, during or after the inspection and this report was prepared for exclusive use of the person or persons this report was prepared for and we do not have any obligation or contractual relationship to any other party other than the party this report was prepared for. Observations for compliance with any code or specification other than those explicitly stated are not included.

Scope of Work:

The subject foundation was visually inspected and a floor elevations survey was performed in areas that were accessible at the time of the inspection. The opinions provided within this report are based on the experience and judgment of the inspector and the information provided at the time of the inspection. This report also gives engineering advice with regard to the best and most economical repair method assuming normally expected subsurface conditions and conventional construction methods. It is known to all educated engineers with knowledge of the active soil supporting the structure that a full repair plan would include the underpinning of the entire structure and is not economically feasible due to the cost vs. benefit and the risk of resulting damages.

Scope of Work Limitations:

This report is for informational purposes only and is not intended to provide a detailed inventory of defects or a technical evaluation of the structure, drainage system or the overall property. The inspection excludes plumbing tests or procedures, verification of previous foundation repairs, framed superstructure, detached buildings, privacy or retaining walls, general site drainage away from the structure, material and soil sampling/testing, and verification of concrete reinforcement or knowledge of the location of interior grade beams, boxed structural members not in plain sight or previous repair work.

The client or individual ordering this report agree that Crosstown Engineering is not responsible for knowledge of the subsurface conditions without extensive geotechnical investigation including on-site drilling or testing of samples.

The future performance of this foundation cannot be predicted due to variables out of the control of the inspector. Therefore, this report does not predict or warrant the future performance of the subject foundation and the reader is encouraged to read the entire report.

Document Review:

The contractor provided a limited repair plan that included the pier locations and pre-lift elevations for the structure for our review. No other information was provided regarding prior engineering reports, recommendations for foundation repairs or construction documents relative to this structure. If existing piers are shown in the limited repair plan, their locations were provided by the client and are approximated. We do not certify their performance or existence. If the reader would like to determine if they are present, they must contact the owner or contractor to obtain an engineering certificate for them.

Documents that provide original structural design drawings, design conditions, or “as-built” drawings or slab elevations at the time of construction were not available at the time of the inspection. Therefore, knowledge of interior grade beam locations or other foundation information is unknown.

General Observation:

For the purposes of this report directions will be described using the terms left, right, front, and back with the front referring to the side of the structure indicated on the limited repair plan.

The structure is one story tall with a slab-on-grade foundation. The primary structural system of the structure is a wood framed system with exterior stone veneer and interior drywall with various finishes. The foundation was not exposed during our inspection and was covered with various floor-covering types.

Grading, Drainage, Erosion and Vegetation Observations:

The terrain immediately surrounding the structure was visually observed during the inspection. We observed the following:

- The gutter system is inadequate and needs improvement.
- The drainage system is adequate.
- The terrain is landscaped with grass, several trees, and some shrubbery. No trees and/or shrubs are close to the foundation.
- Disturbed soil in the area of the repairs was observed.

Floor Elevation Discussion:

A relative elevation floor survey was performed using a Zipllevel Pro-2000B to map the surface topography of the floor of the living area and garage (if present). The floor plans and the elevations are illustrated on the limited repair plan. The elevations were adjusted based on the flooring type encountered to be on the same plane as the base point floor type. If a garage was present, the garage ceiling was measured and adjusted to be on the same plane as the foundation. Garage floors are designed to slope and are not as effective in measuring foundation movement.

Visual Observations:

Based on our observations and review of the limited repair plan provided by the contractor, the structure has experienced general foundation movement over the life of the structure, resulting in multiple areas of the structure being low with respect to the rest of the structure. Drywall cracks, ceiling cracks, floor tile cracks, mortar cracks, trim separations and sticking doors were observed.

Foundation Repair Details:

Bruecher Foundation Services Inc performed the following in the approximate location of the structure as indicated on the limited repair plan:

- Installed 58 total pilings (23 exterior, 35 breakouts).

The purpose of the installation was to provide support and mitigate downward movement in the areas of the installation. To the best of our knowledge the contractor has performed the limited repairs in substantial conformance with their provided limited repair plan, including any approved changes.

Maintenance Opportunities:

We recommend post-lift plumbing tests be performed on the sewer and potable plumbing lines and any leak be immediately repaired. The results of the tests should be provided to our office. We also recommend the homeowner install a fully functioning gutter system.

Maintaining a fully functioning gutter system will minimize ponding, soil loss and erosion, and will help control seasonal movement near the foundation. The gutter system should direct storm-water discharge away from the foundation through downspouts to a well-drained area that is graded away from the foundation. Optimally, we recommend the gutter system discharge via in-ground solid pipe to a low-lying area far away from the foundation.

Vegetation maintenance and a foundation and yard-watering program will also help control seasonal movement. Maintaining consistent moisture levels in supporting soils at all times of the year is necessary. It is important that the soils be stabilized and maintained with grass or ground cover around the perimeter of the structure to prevent erosion and an exposed or improperly embedded foundation. Large to medium-sized trees, and even large or numerous shrubs, growing too close to a foundation can dramatically effect the moisture content of the soils within the zone of influence beneath the structure. Root systems extract large quantities of water from underlying soils and result in large volumetric changes in the soils (shrinkage). As the tree absorbs water from the soil and the soil volume decreases, the foundation will settle in unsupported. If problematic roots are observed, we recommend removal or installation of tree root barriers.

Grading of the soils around the foundation is a critical element to your foundations health. Sloping the soils away from the home and preventing water from ponding near the foundation is needed to prevent soil "heave". If ponding is noticed near the foundation during the rainy season, consult with an engineer or a drainage contractor immediately. Over-saturated soils can cause "heave" or settlement and contribute to foundation movement.

Expectations of the Limited Foundation Repairs:

This limited repair plan is intended to provide a reasonable repair and to improve the foundation and is not intended to level the foundation. The contractor determined the amount of elevation correction needed based on the reaction of the structure during the lift in order to minimize damages and additional stress.

Because the structure has endured pre-repair foundation differential movement, residual differential elevation and other cosmetic issues may remain following the foundation limited repair, such as interior and exterior wall distress, door sticking, and doorway leaning.

The soils beneath and surrounding the structure are known to shrink and swell as the seasonal soil moisture content fluctuates. Moving forward, we anticipate that some cracks in the interior and exterior walls will surface due to seasonal movement within the soils, even after foundation repair (if performed). Periodic repair of this type of cracking may be needed. However, if cracks appear to worsen and there are new indications of foundation movement, we recommend re-evaluating the structure.

Underpins (a.k.a. Pilings or Piers) are constructed of steel or concrete and cost and performance will vary. Generally speaking, the deeper a piling is installed, the better it will perform. Shallow installations may be acceptable if they are terminated into rock. This information is meant to serve as a guideline and the owner must decide a reasonable cost/benefit on the property. Piling design is best done with data from a site-specific soils investigation. Such an investigation was not provided and is not a part of this scope of work but we strongly recommend obtaining this data. If this data is not provided, our pier design is only intended to be a minimum standard based solely upon average soil conditions in the general location of the property and as such, may not necessarily provide maximum performance.

Disclaimer:

It is known to educated professional engineers that the soils in this area are subject to movement due to expansion, contraction, or densification of the soils. This soil movement could possibly cause the foundation to move after the remediation plan has been implemented and may impact the stability of the foundation and cause damage.

We do not warrant the future performance of the subject foundation and the reader is urged to review this entire report. The limit of liability is limited to the fee paid for this opinion. No further agreement shall be made, altered, or varied except by written instrument. Diligent foundation maintenance to maintain consistent soil conditions along the perimeter should reduce further problems after the recommendations within this report have been implemented. However, seasonal moisture variations, water leaks, erosion and other factors may affect the stability of the foundation and put it in danger of further damage.


Neither Crosstown Engineering, its sub-contractors, nor Adam Green, P.E., are responsible for liability to the owner or others for acts or omissions of the contractor to carry out the repairs in accordance with their agreement or for the construction means, methods, techniques, sequences, procedures or the safety precautions incident thereto. The contractor is solely responsible for the warranty of the work performed in accordance with their agreement.

Thank you for choosing us to evaluate your foundation.

Sincerely,

Crosstown Land Development Services
Texas Engineering Firm (F-15944)

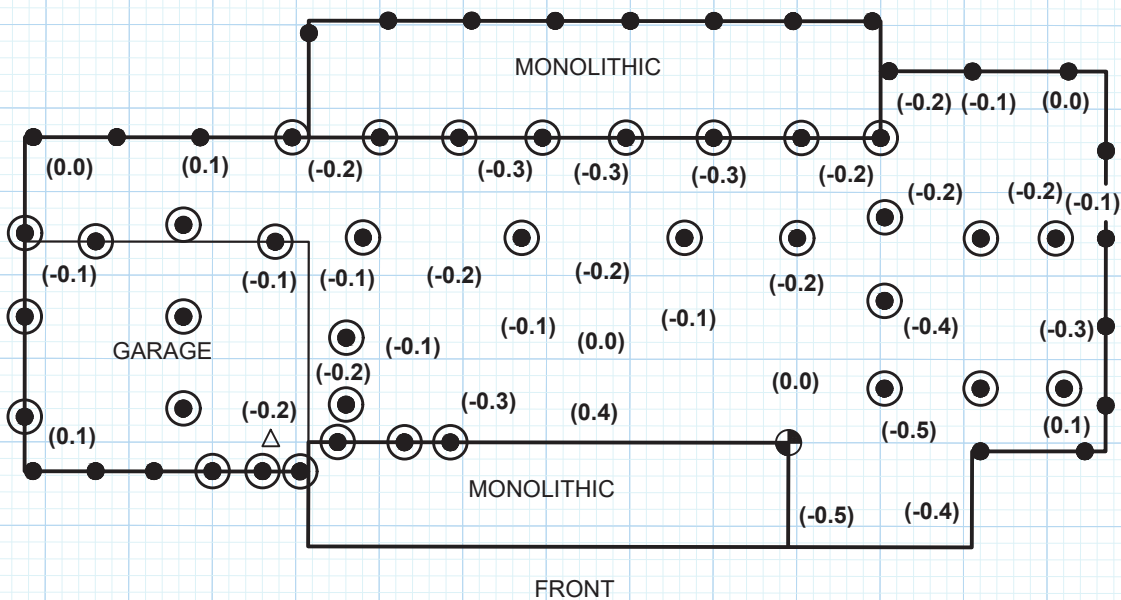
Adam Green, P.E., MBA
Professional Engineer (TX #116597)


03/09/2023



CONSTRUCTION NOTE: IF INTERIOR PILING LOCATIONS ARE SHOWN ON THIS MAP THEY ARE APPROXIMATED AND ARE LOCATED WITHOUT KNOWLEDGE OF THE LOCATIONS OF THE INTERIOR GRADE BEAMS. THE CONTRACTOR SHALL MAKE FIELD JUDGEMENTS BASED OFF OF THEIR GRADE BEAM INVESTIGATIONS AND OBSERVED SLAB QUALITIES TO FIELD LOCATE THE FINAL INTERIOR PIER LOCATIONS. FINAL SCOPE CHANGES SHALL BE APPROVED BY THE ENGINEER OF RECORD.

PLEASE NOTE: IF EXISTING PILINGS ARE SHOWN ON THIS MAP, THEIR LOCATION WAS PROVIDED BY THE CLIENT AND IS APPROXIMATE. CE DOES NOT CERTIFY THEIR PERFORMANCE OR EXISTENCE. IF THE READER WOULD LIKE TO DETERMINE IF THEY ARE ACTUALLY PRESENT, THEY MUST CONTACT THE OWNER OR CONTRACTOR TO OBTAIN AN ENGINEERING CERTIFICATE FOR THEM.



- INSTALLED 58 TOTAL PILINGS (23 EXTERIOR, 35 BREAKOUTS).

LIMITED REPAIR PLAN

PRE-LIFT ELEVATIONS BY CE () 0.0

NOT TO SCALE - ALL LOCATIONS APPROXIMATE

POST-LIFT ELEVATIONS BY CE (03.08.23) (X.X)

LEGEND

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|---------------------|---------------------|-------------------------|
| ELEVATION BASEPOINT | INSTALLED PAD/BLOCK | EXISTING PIER |
| INSTALLED BEAM | EXISTING PAD/BLOCK | INSTALLED BREAKOUT PIER |
| EXISTING BEAM | INSTALLED PIER | EXISTING BREAKOUT PIER |

Adam Green
 3/9/2023



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