LIGHTHOUSE ENGINEERING, L.L.C.
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Thursday, September 04, 2014

TO: Our Client

RE: Initial Engineering Evaluation – Foundation Performance
Anywhere in North Texas

The following report constitutes the engineering opinion requested on the foundation of the subject residence. This report has been prepared in general accordance with the requirements of a "Level B" survey as defined by the Texas Chapter of the American Society of Civil Engineers (ASCE) and the Texas Board of Professional Engineers (http://texasce.affiniscape.com/associations/10803/files/RepairGuidelines.pdf). This report is provided for the exclusive use of the person or persons this report was prepared for as shown above. We have no contractual relationship with, or obligation to, any party other than the party for whom this report was prepared. The purpose of this inspection was to evaluate the foundation and determine what, if any, foundation repairs are necessary. The foundation was visually inspected and a floor elevation survey was performed. The opinions contained herein are based on the experience and judgment of the writer, as well as conditions observed without taking soil samples, performing plumbing leak tests, removing floor or wall coverings, or performing invasive tests or procedures. The opinions offered herein are based solely on the observations made at the time of the inspection, and do not take into consideration any changes in the condition of the foundation after that date. This report does not predict or warrant the future performance of the subject foundation. You are encouraged to review the "Agreements and Limitations" attached to the end of this report for other important limitations and standard recommendations.

Observations

This structure is a one - story wood framed structure with brick veneer and siding on the exterior. The home has a hip roof and composition shingles. The interior walls are drywall with various finishes over the drywall. The foundation is a concrete slab-on-ground. The home was constructed in 1962 per the Dallas County Appraisal District Records. All directions in this report are annotated by left, right, front and rear as if looking at the front door.

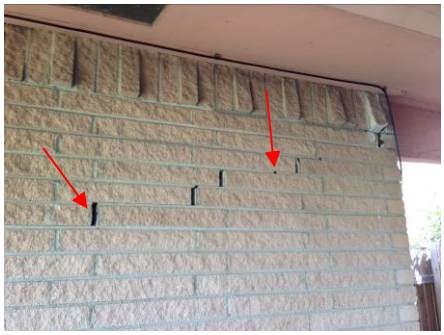
Observations and Discussions:

1. Jason Conklin, Engineer (under the direct supervision of Mike Gandy, PE) physically inspected the above referenced residence to make an evaluation of the current foundation performance and to offer recommendations for repair, if needed. I performed a Level "B" engineering analysis as defined by the Texas Chapter of the ASCE. I made careful observations of the interior and exterior for signs of drainage and foundation distress. I performed an interior elevation survey as shown on Drawing No. 1001.
2. This engineering inspection was performed for the current homeowner.

Photo 1: General view of the front of the home.

3. Numerous brickwork separations and frieze-board separations were identified around the home. Loose bricks were noted at multiple corners of the home.



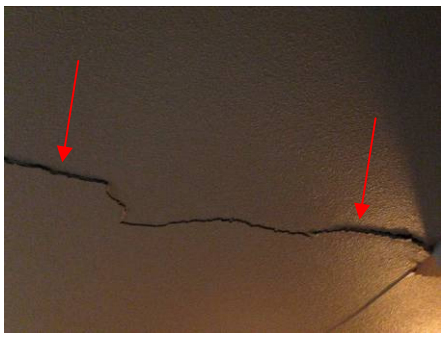


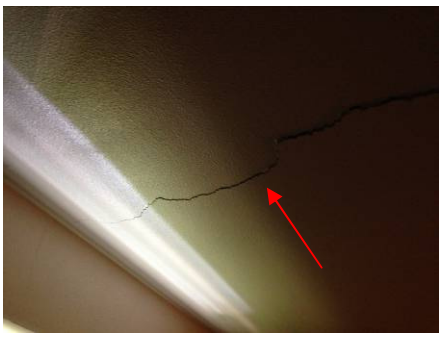

Photos 2 – 5: Brickwork separations and loose bricks identified around the home.

4. A gutter downspout located along the rear of the home was noted to be discharging into a disconnected perforated pipe. It is recommended to remove this perforated pipe and replace the pipe with a solid gutter extension. Extend all gutters at least 36" away from the home's foundation.

Photo 6: Disconnected gutter downspout along the rear of the home.

5. Slopes in the floor were noticeable when walking across numerous rooms along the rear portions of the home. The most noticeable sloping was identified in the master bedroom area.
6. Numerous drywall separations were identified throughout the interior of the home. The largest separations were noted in the master bedroom and bathroom area ceilings.





Photos 7 – 15: Drywall separations identified throughout the interior of the home.

Interior Elevation Survey

Interior floor elevations were taken with a Technidea Pro-2000 Ziplevel. Elevations were recorded to the nearest 0.1-inch throughout the home. A benchmark of 0.0 was established in the main entry area and is shown on Drawing No. 1001 with a star. An adjustment was made for floor coverings if they were a different elevation than the floor covering at the benchmark location. Elevation differentials varied by a maximum of 4.6 vertical inches in thirty-five (35) horizontal feet. It should be noted that the elevation measurements include effects of elevation variation in the original construction which normally are 0.6 inches to 1.0 inches. A sketch of the house with the elevations is attached as Drawing No. 1001.

Conclusions

An elevation survey was performed on the home and the cosmetic damage was reviewed to evaluate the performance of the foundation. The soil where the home is located has high shrink swell capacity. This soil can heave or settle depending on the moisture content in the soil. Some minor movement of the exterior driveways and sidewalks should be expected.

Reviewing the distress and the elevation survey the home is concluded to have settlement around the exterior of the foundation. The settlement in the foundation appears to be due to the moisture content in the soil lowering over time. As the moisture content in the soil is lowered the soil can consolidate and settle under the pressure of the above structure. Foundations are supported by the soil, and if the soil settles unevenly, the foundation may move unevenly resulting in structural distress and slopes in the foundation.

Recommendations

NOTE: This plan of repair is intended to even the slopes and support the home's foundation. Some slopes will remain after these repairs are completed.

1. Install twenty (20) Concrete Pressed Piling Piers in the locations shown on attached Drawing No. 1001 and to the pier specifications listed below. Piers are intended to reduce the slopes in the foundation, alleviate structural distress, and prevent future settlement in the area they installed. A pier plan showing the recommended locations is attached to this report (see Drawing No. 1001). After the piers are installed, the slopes in the home should be reduced to the most practical extent possible.
2. Perform a post lift plumbing leak test and repair any plumbing leaks that are found.
3. Maintain a watering program in the dry months of the year to prevent the soil around the home from drying and cracking. If soaker hoses are used, place the soaker hoses 1' – 2' away from the foundation and run for 30 – 60 minutes every other day as needed. Do not over water the foundation; this can be as detrimental as under watering.

Pier Specifications: Piers to be constructed using pressed pilings of concrete per attached Drawing No. 1003 and pressed piling specification. Pressed pilings are to be pressed to refusal of at least 12 feet or rock. The pilings dimensions should be 6" diameter by 12" length concrete cylinders. Each section of concrete piling should interlock with an acceptable interlocking technique. The top of the piling should consist of a double wide concrete block that adequately supports two 6" diameter by 12" length concrete cylinders. Finally, steel shims should be used between the final two cap piers and the footer of the foundation. Steel

shims should be used to adjust to final elevation. The foundation company should warrant the piers against vertical settlement for the lifetime of the installation.

Agreements and Limitations

Use of this report for any reason implies consent to all agreements and limitations of this report. This report is the professional opinion of Lighthouse Engineering, LLC and is based upon a limited evaluation of the property. This report is provided for the exclusive use of the addressee. We have no contractual relationship with, or obligation to, any party other than the addressee of this report.

This report does not constitute a structural warranty or performance contract with the purchaser of this report to or with any other party. It only states conditions observed at the time of the inspection. The evaluation of the property included a visual examination of the exposed interior and exterior finishes of the structure and the ground surfaces adjacent to the structure and to the taking of relative floor elevations. The taking and testing of soil samples was not included. Unless written in the report, the original design drawings and any design conditions were not known. Determination of construction to Building Code is best done during the original construction and is not a part of this evaluation. Testing for plumbing leaks was not performed but is recommended after foundation work is performed.

It is possible that future repairs could be required for the subject foundation. This evaluation only addresses the current condition of the foundation. Lighthouse Engineering, LLC does not offer or imply any warranty for the repairs or for the repair company's acts or omissions or for any other person conducting the repairs.

The fee collected is for this inspection only. Additional engineering services are available at an additional cost. Requests for these services must be made in a timely manner before commencement of work. Please contact this office for additional inspection scheduling and fee arrangements.

Sincerely,

Michael Gandy, P.E.
9/4/2014
Registered Engineering Firm F-9334

PRESSED PILING SPECIFICATIONS

HOLES

1. Minimum depth is 2 feet below the bottom of the grade beam.
2. Minimum penetration below slab is 6 inches or the width of the grade beam: whichever is greater but not more than 12 inches.
3. Minimum width under grade beam is 20 inches.
4. Holes should be spaced so that undisturbed dirt sufficient to support the foundation remains between holes.
5. All excavated material is to be placed on plywood or paved surfaces until the repair is complete. All material is to be removed.

PILINGS

1. In the absence of a load bearing strata, minimum acceptable depth below the grade beam is 10 feet.
2. Where the load bearing strata are encountered, the minimum depth can be the depth of the load bearing strata.
3. Maximum hydraulic-pressure to be applied to a cylinder is 50% of laboratory rated crushing pressure (i.e. for a 4 inch cylinder made of 3,000 psi concrete 20,000 lbs.)
4. All cylinders that crack or crush during installation are to be removed and replaced with new cylinders. If a cylinder cannot be removed after it cracks or crushes, the piling is to be abandoned. A new piling should be driven as close to the abandoned piling as possible.

HYDRAULIC UNITS

1. The recommended hydraulic unit is an OTC model B Electric Two Stage Pump.
2. All units must be fitted with pressure gauges.

CONCRETE

1. Minimum strength is 5,000 lbs.

CYLINDERS

1. Maximum ratio of height of diameter of 3:1
2. Ends of cylinders to be flat so that cylinders stacked end to end do not rock.
3. Plane passing through end of cylinder to be at an angle of 90 degrees to line passing through long axis of cylinder plus or minus 2 degrees.

CAPS

1. Minimum width is 12 inches.
2. Minimum height is 8 inches.
3. Minimum depth is 8 inches
4. Tops should be smooth and flat so that cylinders placed on top of the cap stand vertically and do not rock.

PADS

1. Minimum thickness is 2 inches.
2. 2. Minimum length is 8 inches.
3. Minimum width is 8 inches.
4. Tops and bottoms should be smooth and flat so that a cylinder stacked on pads will stand vertically and not rock.

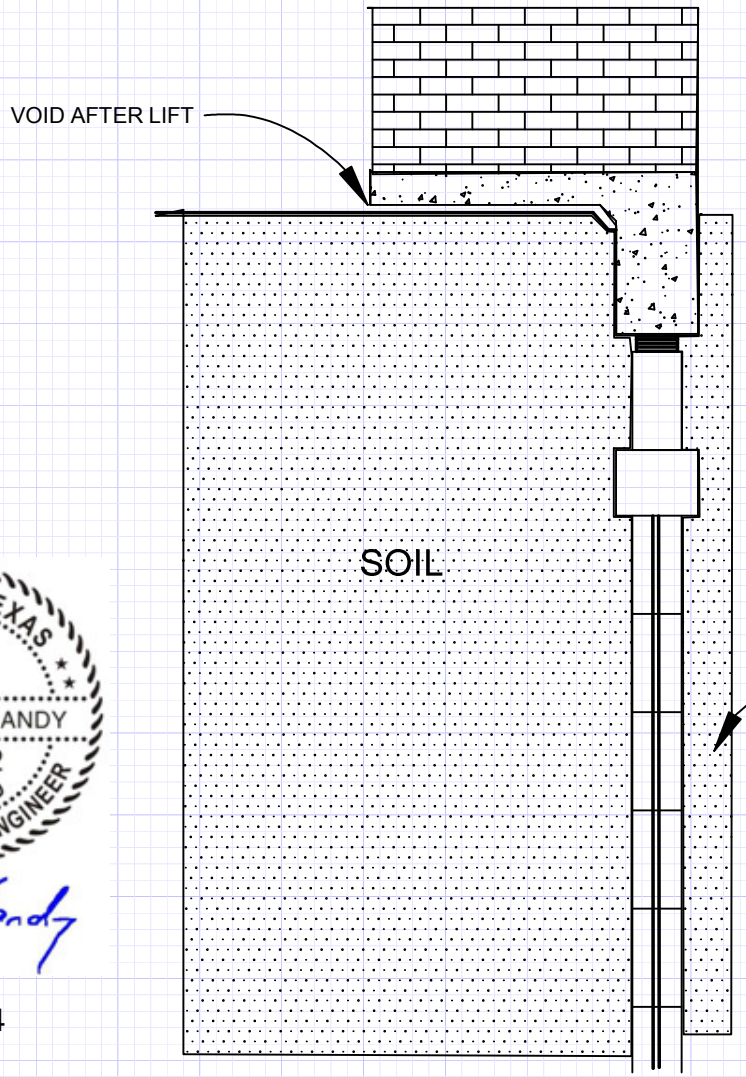
PENETRATION OF SLABS

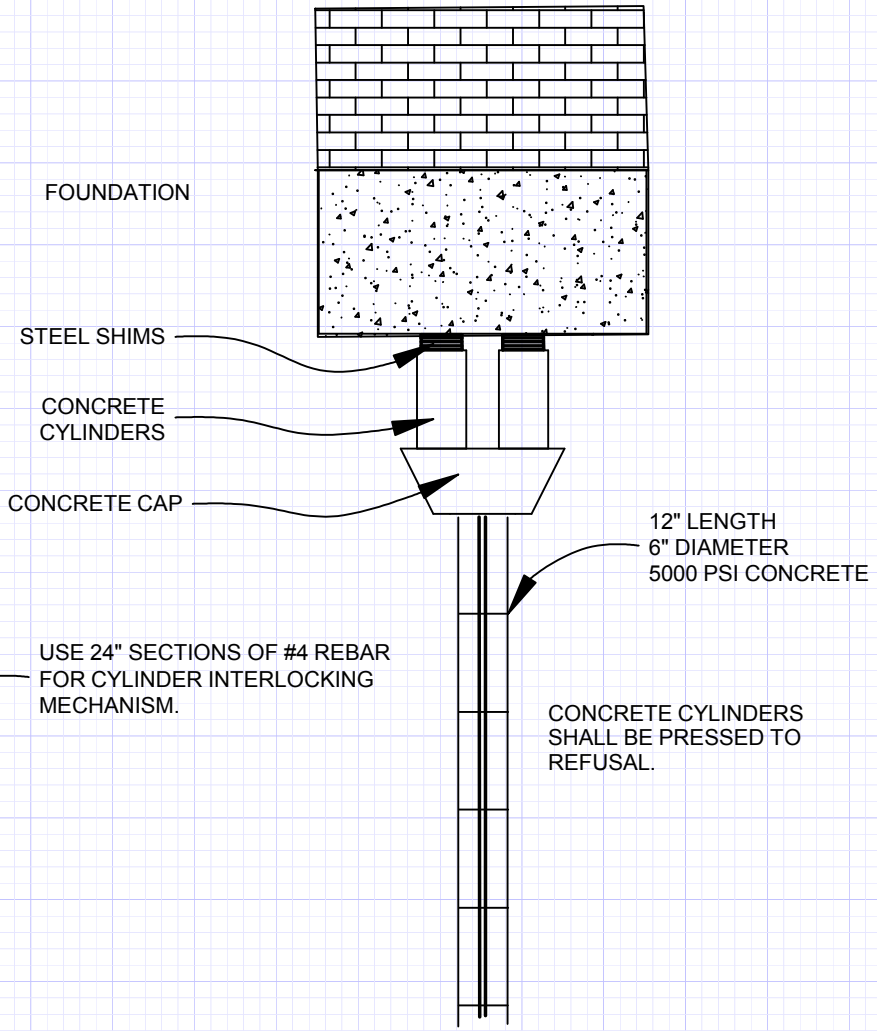
1. Penetrations through slabs weaken the subject slabs.
2. No penetrations are to be made through post tension slabs within 6 feet of the nearest cable anchor.
3. The following is to be use when penetration slabs:
    a. Mark the boundaries of the hole;
    b. Saw cut the slab to a depth of one inch;
    c. Use sledgehammers of jackhammers to breakout the concrete; use points and not chisels on jackhammers.

1/21/2014

Registered Engineering Firm F-9334

THIS REPORT DOES NOT PREDICT OR WARRANT
THE FUTURE PERFORMANCE OF THE FOUNDATION





01/02/2014
REGISTERED
ENGINEERING FIRM
F-9334

APPROX. SCALE 1" = 10'

CONCRETE PRESSED PILING

Lighthouse Engineering
Michael Gandy, P.E. Phone: 214-577-1077
E-Mail: MikeGandy@LighthouseEng.com
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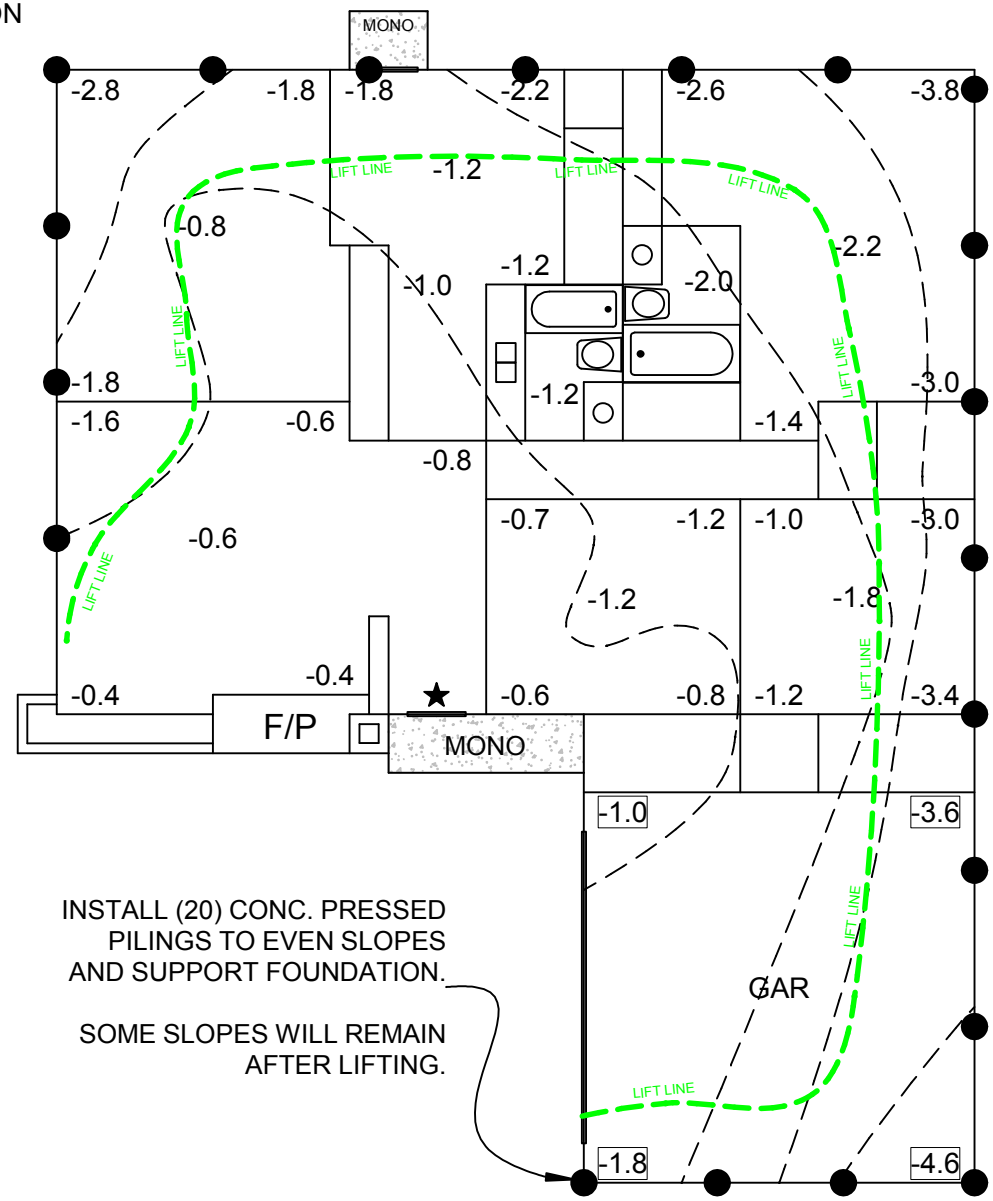
DRAWING NO. 1003

THIS REPORT DOES NOT PREDICT OR WARRANT
THE FUTURE PERFORMANCE OF THE FOUNDATION

PRE-LIFT ELEVATION
MEASUREMENTS

STATE OF TEXAS
MICHAEL D. GANDY
95672
LICENSED
PROFESSIONAL ENGINEER

DATE



INSTALL (20) CONC. PRESSED PILINGS TO EVEN SLOPES AND SUPPORT FOUNDATION.

SOME SLOPES WILL REMAIN AFTER LIFTING.

APPROX. SCALE 1" = 10'

● LOCATION OF NEW PIERS

★ BENCHMARK ELEVATION 0 INCHES
ELEVATIONS ARE SHOWN IN TENTHS OF AN INCH

ELEVATION SURVEY DRAWING

Lighthouse Engineering

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ADDRESS:	ANYWHERE IN NORTH TEXAS	FILE NO.:	XXXX2014	DATE:	DATE	DRAWING NO.	1001