ENGINEERED FOUNDATION SOLUTIONS

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ENGINEERING OPINION

INSPECTION OF FOUNDATION REPAIR AND LEVELING
RESIDENCE AT 332 10TH STREET, DICKINSON, TEXAS, 77539
Date of Inspection: March 29, 2019
Date of Report: April 1, 2019

An inspection and certification of the foundation repair and leveling performed to the subject house was requested.

PREVIOUS WORK

The structure of the building was inspected in February, and at that time several support posts were found to be rotted at ground level. Recommended replacement of the rotted posts.

INSPECTION

There was visual evidence of replacement of the rotted posts supporting the building and the smaller posts supporting the front deck. The upper level floors were walked and sensed to be level. The doors and windows were square or near-square.

An elevation survey throughout both levels was performed using a Technidea Ziplevel. The floor elevations fall within the generally accepted standard for foundation repair performance. See attached survey.

CONCLUSIONS

The foundation has been repaired properly. The foundation leveling meets generally accepted standards of performance. No further work is needed at this time. The foundation appears to be structurally sound.

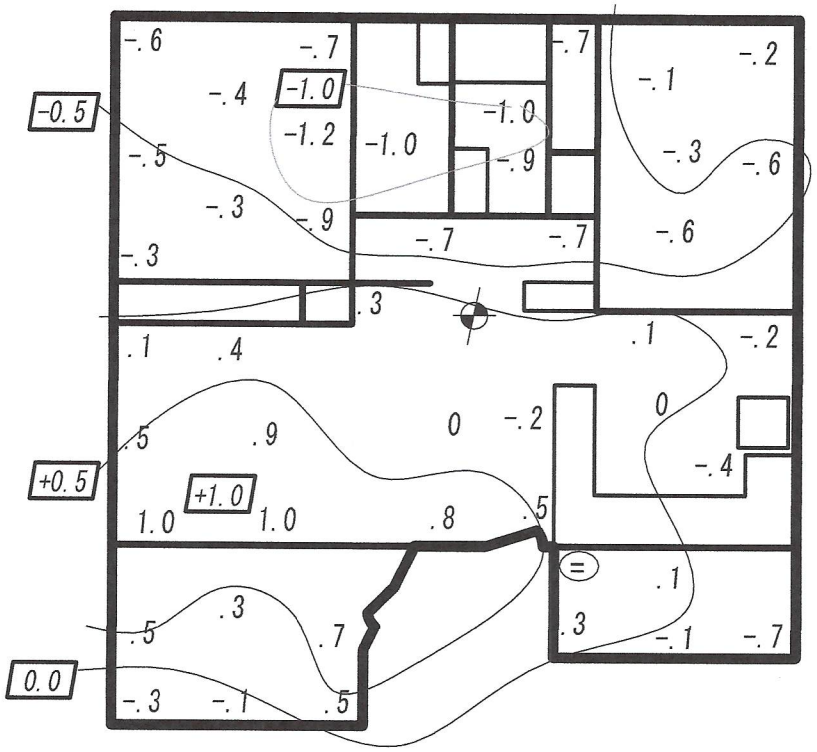
Attachments: Elevation surveys (2)

POST-LEVELING FLOOR SURFACE ELEVATIONS, UPPER LEVEL

332 10th Street, San Leon, Texas, 77539

March 29, 2019

Gerard J. Kuhn, P.E.



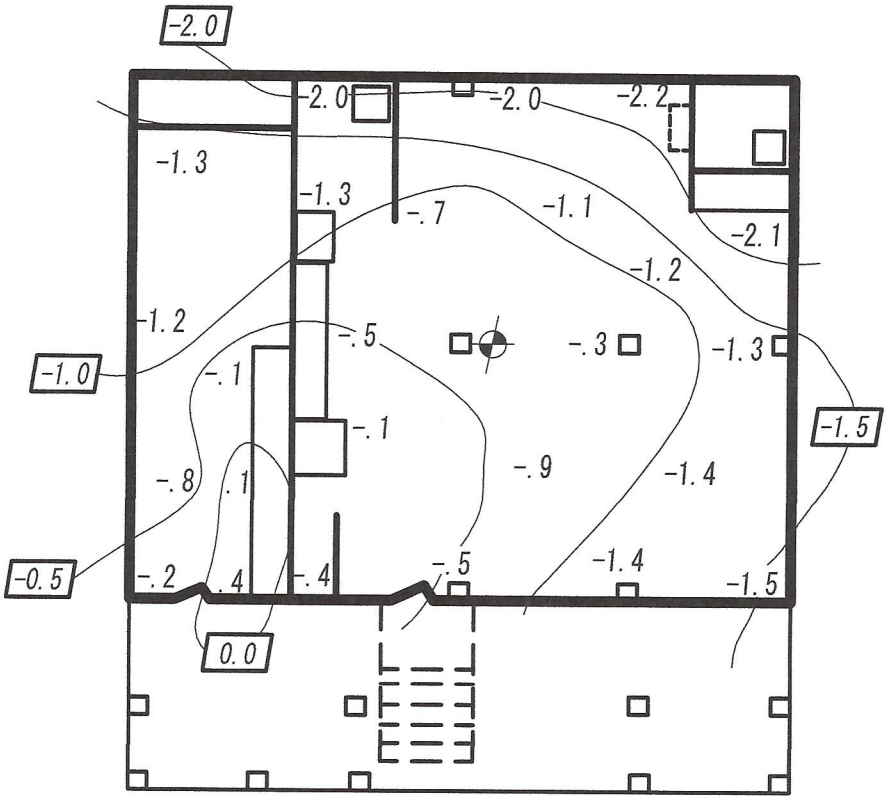
- ELEVATIONS IN INCHES
- CORRECTED FOR FLOORING
- ISO-ELEVATION (CONTOUR) LINES AT .5 INCH INTERVALS

1" = 10'

SLAB SURFACE ELEVATIONS, GROUND LEVEL

332 10th Street, Dickinson/San Leon, Texas, 77539

January 24, 2019



- ELEVATIONS IN INCHES
- CORRECTED FOR FLOORING
- ISO-ELEVATION (CONTOUR) LINES AT .5 INCH INTERVALS

1" = 10'

Gerard J. Kuban, P.E.

ENGINEERED FOUNDATION SOLUTIONS

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ENGINEERING OPINION

INVESTIGATION OF FOUNDATION PERFORMANCE
RESIDENCE AT 332 10TH STREET, SAN LEON, TEXAS, 77539
Dates of Inspection: January 24, February 15, 2019
Date of Report: January 27, 2019

SUMMARY

The foundation is performing inadequately. Foundation leveling and repair will be required.

BACKGROUND

A request was made for an inspection and report on the performance of the foundation of the subject house. I was assisted by Darrell Bowles, P.E. A visual inspection was performed, elevations were measured, and conditions documented with videos (not included).

The following information was provided: There were termite damages in the past. The structure has been under termite contract since.

Convention regarding directions: Front faces the street, left and right are as seen from the street facing the house. Back-right indicates back side, right end. Right-back indicates right side, back end.

Boilerplate and outside references shown in italics.

INSPECTION

Damages and conditions at the exterior are shown on the attached Elevation survey sheet. The exterior is clad in siding; siding does not show damages from foundation movement readily.

Inspection of the exterior found a pine tree at the back right yard outside of influence of the foundation.

The floor joists of the front deck are noticeably deflected, or sagging.

A floor joist has been strapped to prevent further twisting.

Inspection of the 4x8 and 8x8 posts supporting the living level found several posts almost completely deteriorated at grade level. See attached figure.

Damages and conditions at the interior are shown on the attached Elevation survey sheet. No damages indicative of foundation movement were observed.

An elevation survey throughout the house was performed using a Technidea Ziplevel. The reference zero was the middle interior. The elevations have a range of 2.4 inches, highest at the front-left interior, lowest at the back-middle interior. The foundation generally has a high and a low area.

The foundation will be judged by the three following objective criteria.

The elevation deflections measured as bending of a straight line calculate to 1.34/360 (1.34 inches in 28 feet, green line, worst case) which exceeds the generally accepted criteria for foundation performance and repair of 1.00/360 (1 inch bend in 30 feet).

The elevations measured as tilting of a level line across the foundation do not exceed the generally accepted criteria for foundation performance (not repair) of 1.00% (2.4 inch difference across 20 feet).

The elevations measured as slope of floors calculate to 1.33% (.8 inches in 5 feet, red line, worst case), which approaches 2.00% (1.2 inch difference across 5 feet).

See attached elevation survey.

ANALYSIS

The foundation levels fall outside of the objective performance criteria.

There was structural damages observed at several of the support posts.

CONCLUSION

Considering the range of elevations, damages, curvature, tilt, stability, age, and identifiable causes of movement, I find the foundation is performing inadequately.

If recommendations are followed, the foundation should perform well in the foreseeable future.

The foundation appears to be structurally sound.

RECOMMENDATION

Replace the structurally damaged posts.

Adjust the foundation framing connection to the posts to level the living area floors.

We can certify the foundation leveling and repair for an additional $195.

If cracks and other damages appear in the future, call for another inspection. Within two years of today, this inspection may be free, depending on circumstances.

CAVEAT

My approach to the mitigation of foundation problems is to eliminate the source of the problem rather than ignore them and install piers or pilings. The installation of piers or pilings can provide immediate results, but ignoring the causes of the foundation performance problems can result in further foundation problems in future years. Eliminating the cause of the problems can involve years before the foundation has recovered and is stable again, and the foundation may not recover to a level acceptable to the owner or professionals.

I will give you the best advice based on my experience, the experiences provided by other professionals, and the experiences of my clients. I may predict future performance based on generally accepted principles and experience, but factors beyond my control or beyond my ability to observe can affect in unpredictable ways.

This report of observations and opinions was prepared for the exclusive use of the client, and is not intended for any other purpose. Gerard J. Duhon assumes no responsibility whatsoever for the use of this report by any third party. Any third party with an interest in this property should obtain a professional opinion to satisfy their own objectives. This report is based upon information provided at the time of this report. The conditions described are limited to structural and finish issues discovered during a visual, nondestructive survey. The scope of this investigation is limited by financial and time constraints.

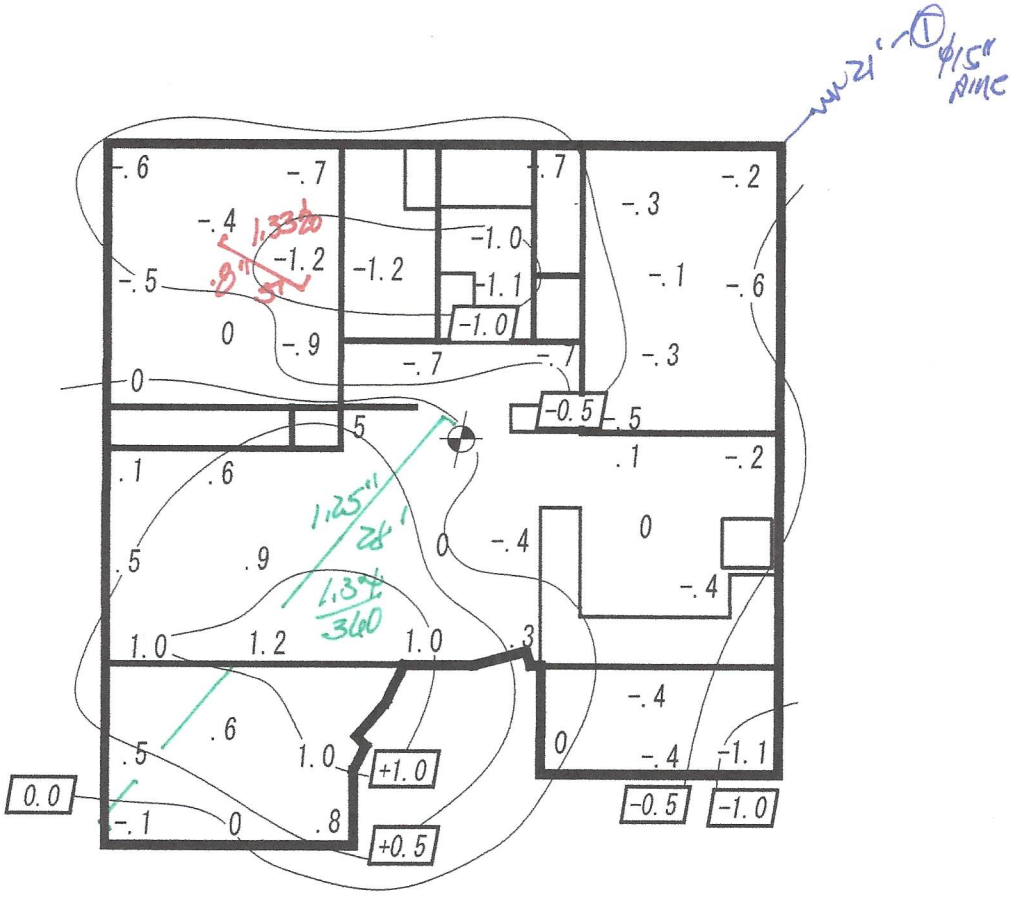
I am not licensed by the Texas Real Estate Commission (TREC) and do not perform inspections in the manner promulgated by the Commission. Property purchasers are urged to have properties inspected by a TREC inspector prior to commitment.

Attachments:
- Elevation survey
- Survey key
- Performance criteria
- Conditions at grade level

FLOOR SURFACE ELEVATIONS AND OBSERVATIONS

332 10th Street, Dickinson/San Leon, Texas, 77539

February 14, 2019



- ELEVATIONS IN INCHES
- CORRECTED FOR FLOORING
- CHARACTERISTIC DAMAGES ANNOTATED
- ISO-ELEVATION (CONTOUR) LINES AT .5 INCH INTERVALS

1" = 10'

Gerard J. Kuhn, P.E.

SURVEY KEY

EXTERIOR (X) [WALL OPENING] [CONSTANT WIDTH] Tr [TRIM] Br [BRICK]

[FENCE] Fn [NOT FOUNDATION RELATED] [NEIGHBOR'S TREE] [CRACK] FnJ [FOUNDATION JOINT]

[TRIM DISPLACEMENT, BRICKS MOVED IN DIRECTION SHOWN, NORMALLY GOOD INDICATOR FOR DROP OF FOUNDATION AT THIS CORNER]

rp+.1/7 [CRACK, OPENED AT TOP, AT WINDOW, REPAIRED, THEN OPENED UP .1" ACROSS 7'] C/O [DRAINAGE CLEANOUT]

rp [REPAIRS AT WINDOW] [RECOVERED MOVEMENT] rec [RECOMMENDED REPAIR PILE OR PIER LOCATION]

[DAMAGES AT DOOR] rem [REMOVED] [INSTALLED PILE OR PIER LOCATION] [ROOT BARRIER]

.4/17 [VERT CRACK, OPENED AT TOP, NOT @ WINDOW OR DOOR, OPENED .4" IN 17'] .3 [CONSTANT WIDTH CRACK, .3" WIDE, WINDOW]

20' 18" PECAN [TREE, 20' FROM FOUNDATION, IN DIRECTION SHOWN, AN 18" DIAMETER PECAN TREE] [COLUMN]

[TRIM DISPLACEMENT, SEVERE] pilings [PILINGS, FOUNDATION REPAIR, START AND END] pilings rp [TRIM DISPLACEMENT, REPAIRED]

[AT FRONT ENTRANCE, BRICKS MOVE IN DIRECTION SHOWN, NORMALLY INDICATING DROP OF FOUNDATION TOWARDS HEAD OF ARROW]

siding [SIDING START AND FINISH, PRESUMABLY BRICK OTHERWISE] siding XJ [EXPANSION JOINT NOT MOVED]

+x [FOUNDATION EXPOSURE IN EXCESS OF 6"] N/A [NOT ACCESSIBLE] WW [WING WALL] Fn [CRACK AT FOUNDATION EXPOSURE]

RL [RUSTY LINTEL] MA [MONTHS AGO] [TRANSFER POINT] rp [REPAIR OF BRICK]

NP [NAIL POP] [PIER OR PILE NOT FOUND] ++x [PRESENCE OF PIER/PILE VERIFIED]

[DOUBLE CHECKED] [HORIZONTAL BRICK MORTAR [FOUNDATION EXPOSURE 12"+] OR SIDING LINE UP IN MIDDLE OF WALL]

DRAINAGE (Dn) pits [GROUND DEPRESSIONS AT FOUNDATION PERIMETER] OTD [OBSTRUCTION TO DRAINAGE]

. . . . . [ROOF DRIP LINE] [ROOF VALLEY] -Dn [SURFACE DRAINAGE TOWARDS FOUNDATION] d/s [GUTTER DOWNSPOUT]

d/s+6 [DOWNSPOUT DISCHARGES 6" FROM Fn] Dn? [TRUE DRAINAGE OBSCURED] cond [AC CONDENSATE DRIPS NEXT TO FOUNDATION]

impound [WATER CAPTURED NEXT TO FOUNDATION] pond [WATER PONDS NEXT TO FOUNDATION] [DIRECTION OF DRAINAGE]

d/s+ [DOWNSPOUT DISCHARGING TO POSITIVE DRAINAGE]

INTERIOR (N) C C [CEILING CRACK] +var [POSITIVE SEASONAL VARIATION] var [VARIES}

[WALL TO WALL DISTRESS] 2C 2C [UPPER LEVEL CEILING CRACK] Wdm [WATER DAMAGE]

[WALL TO CEILING DISTRESS] F F [FLOOR CRACK] +xrp [EXCESSIVE FOUNDATION EXPOSURE DUE TO FOUNDATION REPAIR]

[REFERENCE ZERO] H [WATER HEATER] [REFRIGERATOR]

W$F [WALL TO FLOOR SEPARATION, GAP] W W [WALL CRACK] === [DOUBLE LINE AT WALL INDICATES SEPARATE Fn]

W$C [WALL TO CEILING SEPARATION, GAP] [SHOWER]

W C [WALL CRACK CONTINUES TO CEILING]

[SEVERE WALL TO WALL DISTRESS] [CONDITION DOUBLE CHECKED]

[AT DOORWAY, INDICATIONS OF DOWN AND UP, ARROWHEAD ALWAYS SHOWN AT DOWN SIDE, DAMAGES AT DOWN SIDE]

[AT DOORWAY, INDICATIONS OF DOWN AND UP, ARROWHEAD ALWAYS SHOWN AT DOWN SIDE, DAMAGES AT DOWN AND UP SIDES]

[AT WINDOW, INDICATIONS OF DOWN AND UP, ARROWHEAD ALWAYS SHOWN AT DOWN SIDE, DAMAGES AT DOWN SIDE]

fit [AT DOORWAY, INDICATIONS OF DOWN AND UP FROM FIT (NORMALLY A WIDE GAP WITH JAMB), ARROWHEAD ALWAYS SHOWN AT DOWN SIDE]

op [AT DOORWAY, INDICATIONS OF DOWN AND UP FROM OPERATION (NORMALLY WILL NOT CLOSE), ARROWHEAD ALWAYS SHOWN AT DOWN SIDE]

[DAMAGE AT WINDOW]

ALL DAMAGES NOTED ON SURVEY PRESUMED TO BE FROM FOUNDATION MOVEMENT
MOST COMMON NOTATIONS SHOWN, LESS COMMON NOTATIONS DERIVED OR WRITTEN OUT

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ENGINEERING OPINION
CRITERIA FOR FOUNDATION PERFORMANCE

The main generally accepted objective criteria for foundation performance is L/360, one inch of curvature/deflection/bending in 30 feet, accompanied by some damages in the area. A thorough discussion of the subject of foundation performance can be found in the Foundation Performance Association FPA-SC-13, Guidelines for the Evaluation of Foundation Movement for Residential and Other Low-Rise Buildings.

My criteria deviate somewhat from the FPA, but the findings regarding the adequacy of foundation performance are about the same.

The following are my main objective criteria for judgment of foundation performance.

- Deflection in excess of L/360 across 20+ feet of distance, in middle third of span.
- Tilt, across the entire foundation, in excess of 1%.
- Slope, across at least 5 feet, in excess of 2%.
- Doors and windows non-functional.

The deflection, tilt, slope, and functional criteria above are objective and useful for judging the performance of the foundation. Other criteria, both objective and subjective, are considered in making a determination of foundation failure. These other criteria include:

- Structural damages, including foundation, consider amount and type.
- Finish damages, consider amount and type.
- Proper fit of doors and windows, consider amount and type.
- Area and directions of floors in excess of deflection criteria.
- Area of floor exceeding tilt and slope criteria.
- Age of building.
- Stability of foundation.
- Identifiable causes of foundation distress.
- Residence or attached garage, consider type of area affected.
- Range of elevations.

Foundations performance is normally described as very well, well, adequate, and inadequate. There is some engineering judgement involved in choosing the classification.

The rule is that a foundation which is judged inadequate will have foundation repair recommended, and vice versa. In cases where the rule is not applied, the engineer should have valid reasoning and be well-explained.

Tilt between 1% and 1.5%, with low level of deflection and damages, may be considered inadequate with no recommendation for foundation repair, or may be considered adequate. Tilt in excess of 1.5% will be considered inadequate but only recommending repair if other problems exist. Tilt in excess of 2.0% will be considered inadequate and requiring repair.

The term sub-standard regarding foundation performance indicates adequate performance with no foundation repair recommended, but the conditions of the foundation and due to the foundation may diminish the market value of the house.

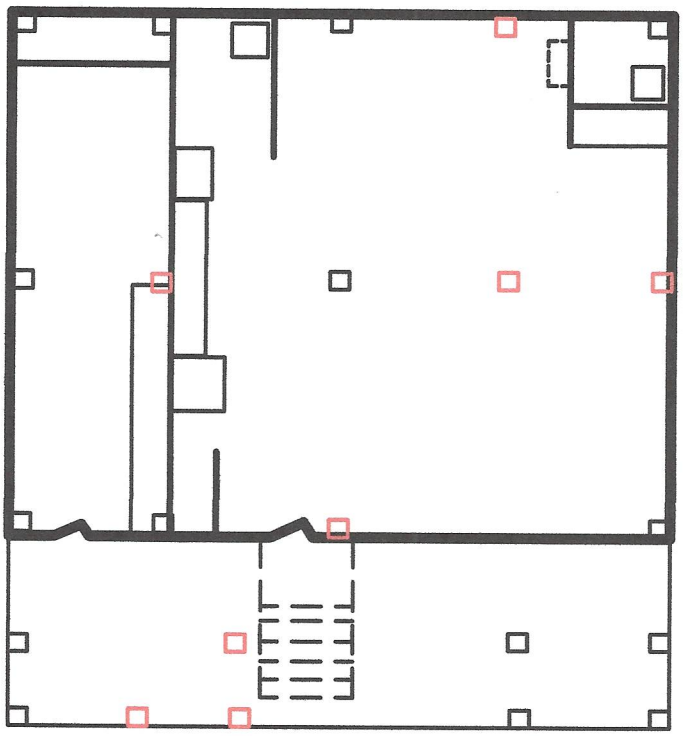
Engineered Foundation Solutions
F-12259

Gerard J. Duhon, P.E.

CONDITIONS AT GRADE LEVEL

332 10th Street, Dickinson/San Leon, Texas, 77539

January 24, 2019



□ Observed rot at base of wood posts

X——1″——X
10'

Gerard J. Nelson, P.E.