

**Austin 6/15/17**

**To:** David Weibel

**Re: Existing Residential Foundation Assessment**

2614 Delwood Pl, Austin, TX 78703

**INTRODUCTION**

I have inspected the existing structure at the above referenced address on behalf of *David Weibel*. The inspection was part of a Level A investigation of the foundation structure. The investigation was triggered by concerns about ongoing foundation issues and to determine the extent of structural repairs needed to retrofit the structure to current building codes. According to the Texas Section of the American Society of Civil Engineers (Guidelines for the Evaluation and Repair of Residential Foundations, 2009), a Level A investigation consists of:

- Interview with homeowner/homeowner's representative to inquire about possible distress signs around the building and the history of the property;
- Visual inspections on the Interior and exterior of the property to search for any visible signs of excessive foundation movement.
- Request from the client and review the provided documents regarding the foundation, such as construction drawings, geotechnical reports, previous testing and inspection reports, and previous repair information.
- Make visual observations during a physical walk-through
- Observe factors influencing the performance of the foundation.

Per owner's comments, the structure was built in 1951. It consists of a two-story residential structure. The main house is supported partially by reinforced concrete basement walls supporting wood framed floor structure. Sections of the house appear to have been added later to the original footprint (e.g., *back portion of living room appears to have been extended over what appears to be the old back porch of the house, originally supported by "concrete flatwork" construction*). The carport area is on a slab on grade foundation. At the time of preparation of this report, there are no engineering or architectural plans available for review. Additionally, there is no known history of foundation stabilization or retrofitting (e.g. pier stabilization) for this house.

#### **GEOTECHNICAL DATA**

Per geotechnical investigation by Capital Geotechnical PLLC (Report # 170010, Feb 17, 2017) the site is located in the Del Rio Clay geological formation. The Del Rio clay is characterized by highly expansive CLAYS (CH). The Potential vertical rise (PVR) and Design Plasticity Index for the underlying Clays are 5 inches and 50, respectively. These values indicate a VERY HIGH potential for soil induced movement of foundations.

#### **INSPECTION FINDINGS**

During my visual assessment, the following items were observed. Photographic evidence is presented at the end of the report.

##### **Exterior Inspection:**

- Several stair-stepped cracks in stone masonry. These cracks are common indicators of excessive foundation movement.
- Wide cracks noted in the foundation walls. Cracks appear to be structural in nature due to the width (i.e., crack opening).
- Noticeable deflection of roof elements, possible due to roof low pitch and drainage system (pea gravel used typically to protect the layers of waterproofing).
- Large separations noticed between slab on grade and column/wall footings in the carport area.
- Surface drainage appears inadequate in some sections around the property. Proper surface drainage (typically 5% or 6 inches per 10ft of positive drainage) will prevent water accumulation against the foundation structure, aggravating swelling of clays and consequent heaving.
- Proximity of the house to large trees. The presence of trees near the foundation will change moisture content of the clay soils underneath the foundation and may cause damage to the structure.

##### **Interior Inspection:**

###### **Main House:**

- Multiple diagonal and vertical cracks noticed on drywall at corner of windows/doors. Extensive cracking indicates foundation shifting/settlement.
- Several cosmetic repairs still visible throughout the house. These repairs were necessary to cover sheetrock cracking on interior walls.
- Visible (wide) gaps between walls and floor system at sill plate. These gaps are normally result of some sort of foundation movement. Per homeowner comments, the gaps provide access to critters into the house.
- Different foundation types: "basement walls", "slab on grade" and flatwork. The multiple foundation types are not a good construction practice and most likely contribute to the extensive

signs of distress observed. Flatwork construction is not an engineered slab and has no structural value to support residential structures. This portion of the house may have been an exterior porch later enclosed by walls contiguous to the house.

- Several cosmetic repairs still visible throughout the house. Per owner comments, these repairs were necessary to cover extensive drywall cracking.

#### **Basement**

- Exposed rebar reinforcement in wall footings. Exposed rebar is visibly corroded.
- Several (mostly diagonal) cracks of varying widths indicating foundation shifting.
- It appears that the number of vents in the basement level is not adequate. Vents will allow air circulation that prevents moisture buildup and consequent decay of wood floor system.

#### **CONCLUSIONS AND RECOMMENDATIONS**

Based on my visual observation, the numerous signs of structural distress throughout the building are evidence of underlying serious structural problems related to deficient design (or lack thereof) and construction. The extent and nature of the distress will not allow for the strengthening/retrofitting without extensive damage to and/or demolition of portions of the current construction (i.e., flatwork portions).

The extent of needed repairs to the house must include foundation (concrete piers and walls, wooden floor joists and connections) and superstructure (walls, structural sheathing, joists and rafters). It is my opinion that this will render the retrofitting/strengthening project financially challenging. Further engineer's inspections will be required to evaluate the *flatness* of the foundation as well as the condition of framing elements (after cladding is removed). The repairs will apply to all portions supported by either foundation walls and slab on grade. A *typical* retrofitting procedure will encompass the following steps:

1. Install drilled concrete piers (+/- 20ft) in the interior and perimeter walls as well as under grade beams (slab on grade portion). The piers shall consist of 12" diameter straight shaft and approximately 24" bell diameter, reinforced with a minimum of 6#4 vertical bars and #3 ties at 12" o.c. (**Figure 1**). The piers shall be spaced at a maximum of 9ft on centers, with a pier on every corner of the foundation. Precise location of interior piers shall be determined by foundation engineer in the design phase and will be, typically, in 9ft x 9ft grids. Piers are not allowed directly underneath slabs for punching shear concerns. *Extensive tunneling/excavation will be required to accomplish complete pier installation.*
2. Foundation can be "leveled" to an acceptable tolerance. It is important to point out that excessive jacking of the slab may cause cracking on sheetrock and other distress cracks/separations around the house. Relative elevations must be recorded and analyzed by a registered professional engineer to determine the exact amount of lifting (if required).

3. Cracks in the concrete can be sealed with a high strength, epoxy based, filler or, for wider cracks, doweling of rebar connecting both sides of the crack.
4. Preventive measures may be adopted to minimize the amount of shrink/swell of underlying clays, such as: positive drainage (away from the foundation) which will prevent water accumulation (ponding) against the house; adequate watering around the perimeter of the house. The sole purpose of these is to keep the moisture content in the clays constant.

### Limitations

This is exclusively a visual inspection. This report is not intended to offer any warranty on the future performance of this foundation or framing structure. If you have any questions, please contact us at (512) 215-4364 or by e-mail: [marcos@sectexas.com](mailto:marcos@sectexas.com).

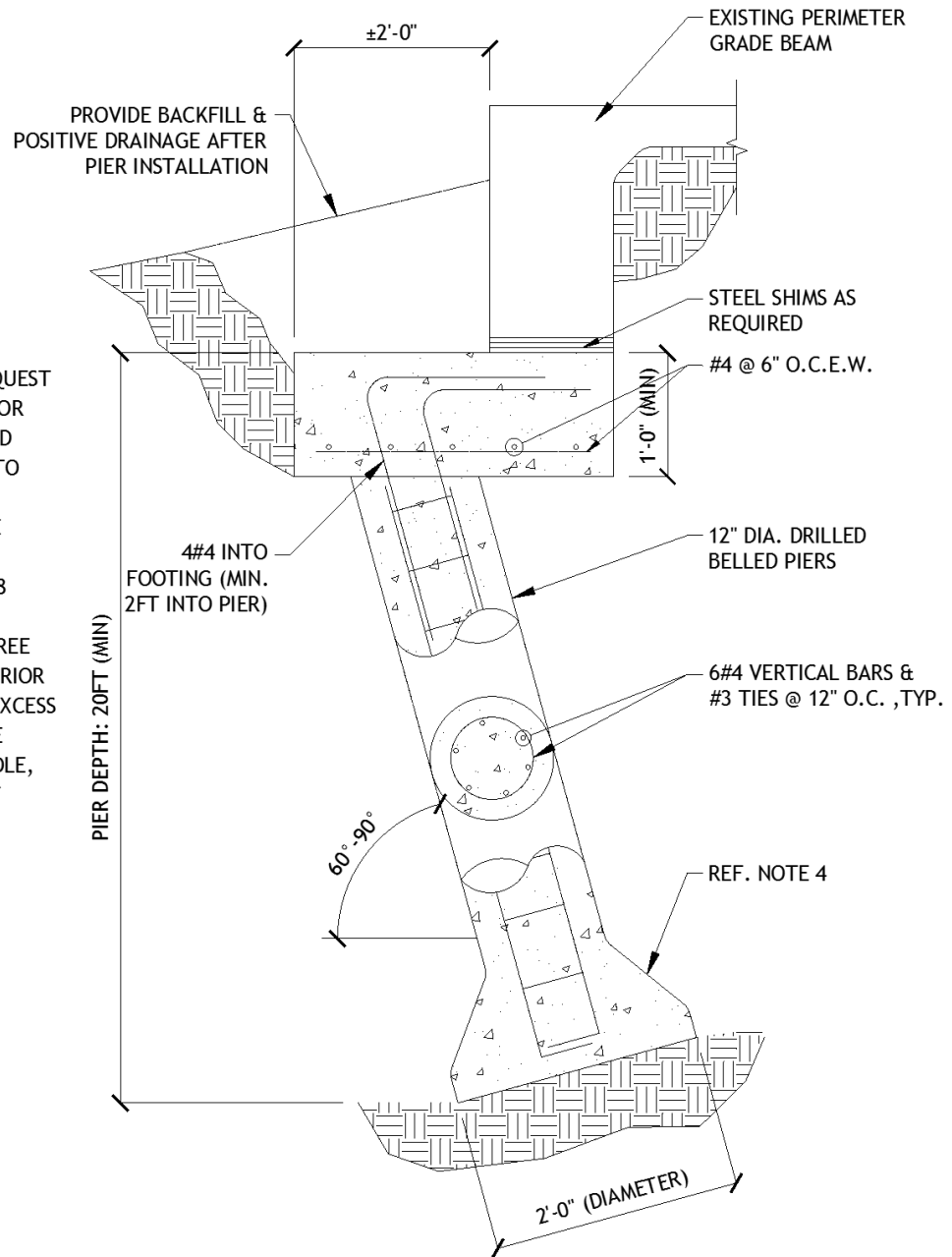
Sincerely,



Marcos V. Dequeiroga, PE  
Principal  
SEC Solutions LLC

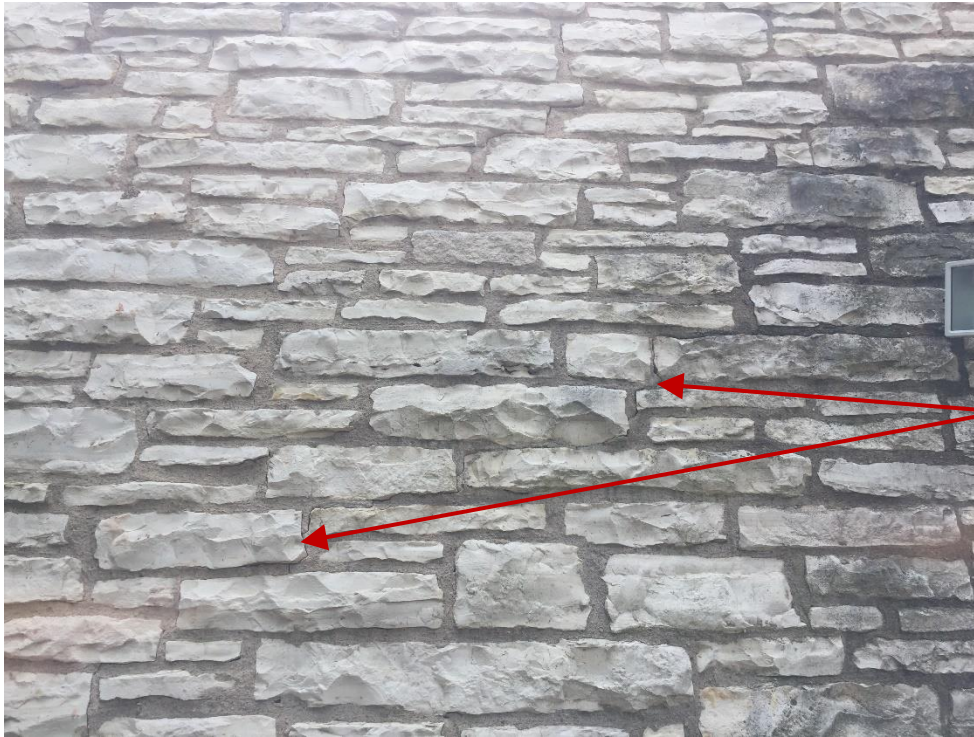
**DETAIL NOTES**

1. CONTRACTOR SHALL REQUEST PRE-POUR INSPECTION FOR APPROVAL OF DEPTH AND REINFORCEMENT PRIOR TO POUR
2. CONCRETE COMPRESSIVE STRENGTH SHALL BE A MINIMUM OF 3,000PSI (28 DAYS)
3. ALL PIER HOLES TO BE FREE OF WATER AND DEBRIS PRIOR TO POUR. IF WATER IN EXCESS OF 1" IS PRESENT AT THE BOTTOM OF THE PIER HOLE, IT MUST BE PUMPED OUT PRIOR TO CONCRETE.

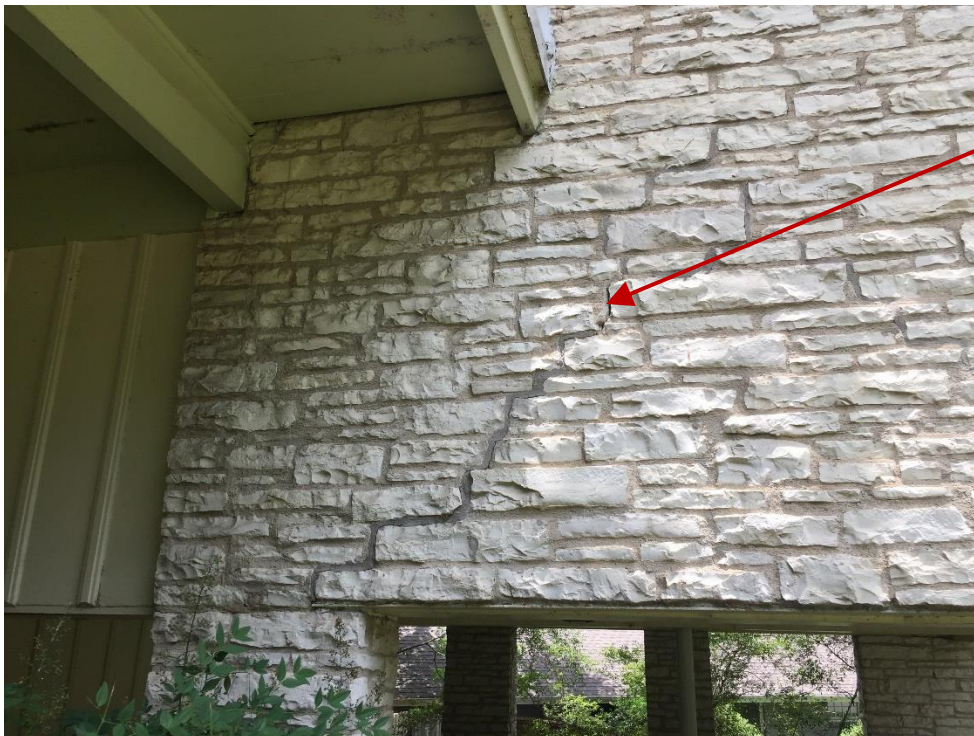


**Figure 1: Drilled Pier Detail.**

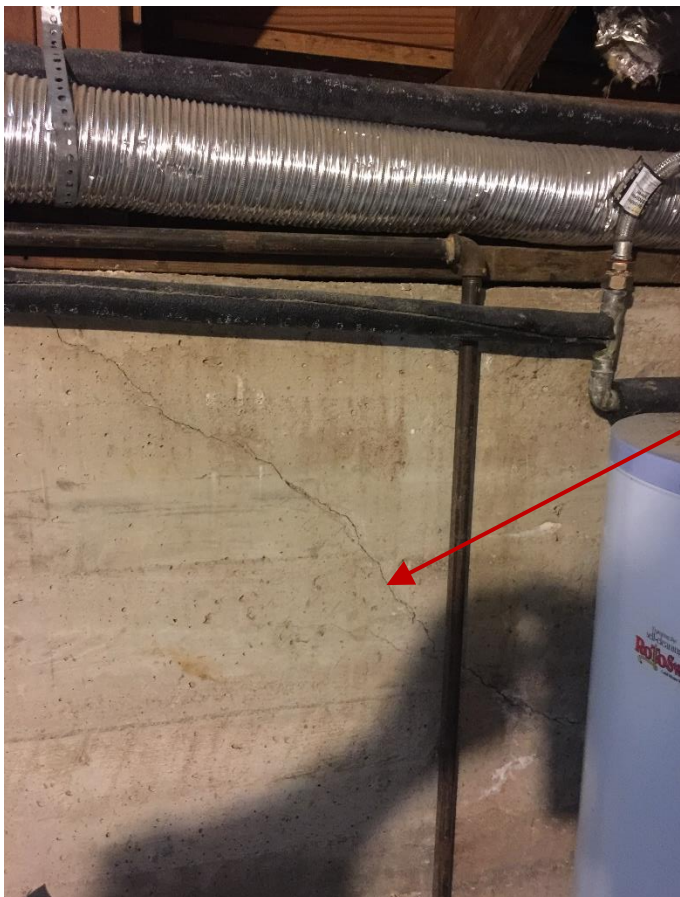




Stair-stepped cracks in rock masonry. These types of cracks are indicators of foundation (excessive) movement.



Stair-stepped cracks in rock masonry.



Cracks in concrete basement walls





Wide cracks in (what appears to be) basement walls.





Large separations noticed  
between slab on grade and  
column/wall footings in the  
carport area





Lack of positive  
drainage around  
the house.



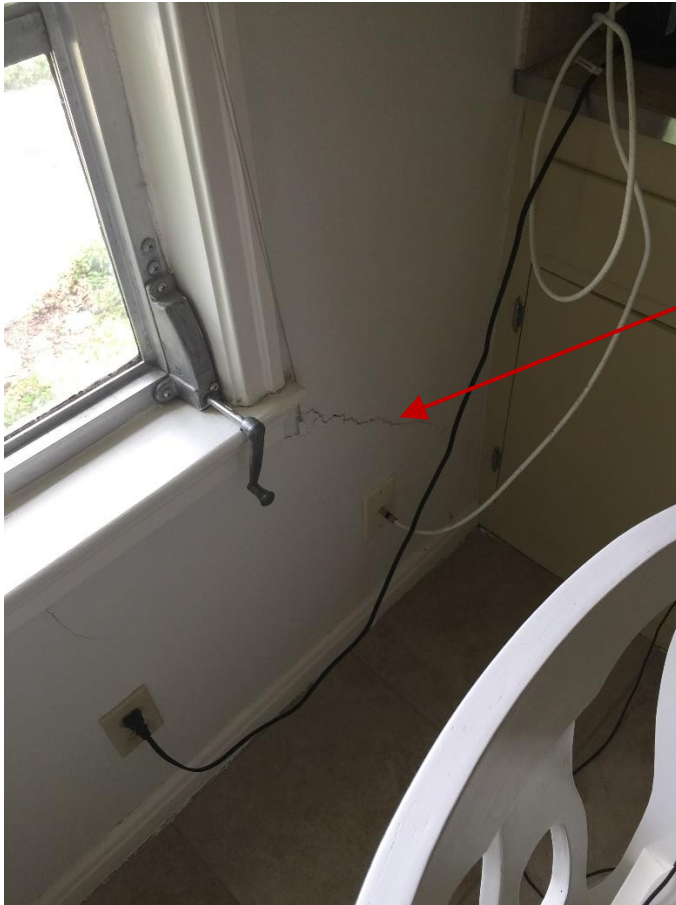
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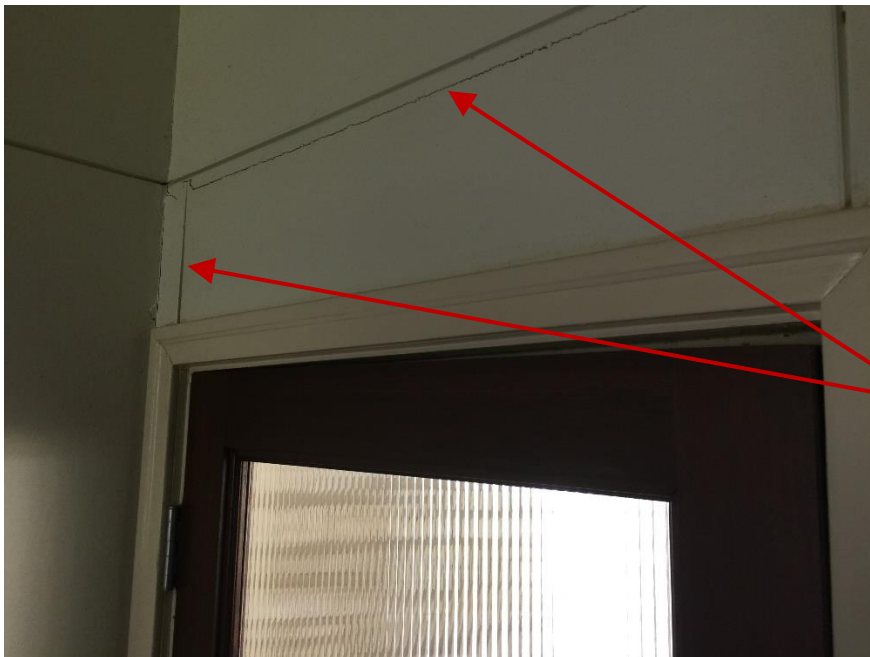
Multiple diagonal and vertical cracks noticed on drywall at corner of windows/doors.







Multiple diagonal and vertical cracks noticed on drywall at corner of windows/doors.



Several cosmetic repairs needed to cover sheetrock cracking on interior walls





Line of separation between flatwork (right) and wood floor framing on basement walls (left).



Proximity of the house to large trees



Visible (wide) gaps between walls and floor system at sill plate