30 December 2003

REDACTED NAME
REDACTED ADDRESS

Ref: Structural Conditions at 6038 Redacted Drive, Austin 78730.

Mr. & Mrs. Redacted:

At your request we visited the subject property on 30 December 2003 to observe the structure.

PURPOSE AND SCOPE

The purpose of this report is to observe readily accessible areas of the foundation and superstructure, document and enumerate apparent deficiencies in performance or installation, and provide subjective recommendations regarding any indicated repairs.

The scope of this service is limited to superficial facilities inspection using routine means, in accordance with our provided Evaluation Proposal. This report is not exhaustive and is explicitly limited to structural performance. No mechanical or utility systems are evaluated. Environmental or air-quality issues are not addressed. No design documents have been reviewed and no calculations performed. Concealed discrepancies and latent defects cannot be reported.

SITE DESCRIPTION

The scrubby, corner suburban lot is characterized by a local ridge (front, near corner) progressively sloping toward the right and rear.[1] The building pad is roughly at-grade along the left, with the surrounding slope dropping to 6-8' below floor level at the right side. The steep side slopes are in a natural (erosive) condition. The rear house foundation wall acts to retain a massive amount of backfill and a very large concrete pool installed above-grade at the right also acts to somewhat stabilize or protect the slope. The right margin of the property (well downslope of the house) is a steep drop-off into an urban drainage feature.

The subject property is a large, two-story residence with an integral (attached) three-bay garage. The foundation is a monolithically poured concrete slab on grade of unknown configuration, bearing depth, reinforcement[2] installed over unknown fill.

The walls are conventional light wood (stud) framing, with cement brick masonry veneer at the front and much of the sides. Upper headwalls, porch kick-outs, the rear and a chimney chase are clad with hardboard plank siding. The hipped attics are prefabricated wooden (2x4) trusses with stick framing at the connecting attics. The roofing is composition shingles installed over composition wood panel (OSB) decking.

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1 Descriptive orientations are from the street, facing the front entry (looking roughly north).

2 Typical residential slabs are 4" thick with grade beams (rib stiffeners) placed at 10-15' centers. Large, custom slabs and split-level slabs are often conventionally (rebar) reinforced, although post-tensioning is also used in this construction grade.

The house has covered (integral slab) porches at the front and right entries. There are post-supported, raised balconies (accessible from the upper bedrooms) at the right elevation. Left of the front entry is an attached horizontal trellis or lanai.

Front and Right Elevations (from corner at Redacted Lane)

Right Elevation (from lower slope)

This is urbanized (heavily modified) land in west Austin (Bell Mountain / Long Canyon) and no site-specific geotechnical data are available. This is a geologically remarkable area, right in the Mt. Bonnell fault zone, where Bull Creek has eroded through the upthrown side of the fault, just south of the Jollyville Plateau. Most of the material here is Glen Rose, but the upper caps are Walnut formation and there are exposures of Edwards formation. Recharge features and seeps at cut slopes are common.

Natural soils here are characterized as very shallow, gravelly or stony clays with extremely hard layers of limestone bedrock alternating with dolomite or permeable shales. Although the upper soils are low strength, the base rock is very hard and stable.[3]

Visual indications are that this site is difficult to characterize and likely to contain differing soil conditions, due to proximity to drainage features and huge amounts of imported backfill materials. Visible soils varied from gray gravelly clays to lighter, yellowish clay loams and caliche to bare rock outcrop. Ground cover was in generally poor condition (naturally erosive, bare soil and juniper trees).

3 Seismically, the Glen Rose formation is one of the most stable geological formations in North America.

BACKGROUND

The site visit was conducted from 8:30am to 11:30am. The weather was fair, cool and very dry, with no recent rains.

The house was heavily furnished (occupied), including areas used for storage. Many interior finishes appeared recent (esp. paint). Floor coverings were installed, including area rugs.

No tax or construction records were available but the house appears to be about 10 years old. Commode fire dates were 1994.

Mr. Redacted (client) and Ms. Agent (buyer's agent) were present during the survey.

SPECIFIC LIMITATIONS (INCLUDE BUT ARE NOT LIMITED TO)

Much of the upper attic spaces were not observed due to limited access provisions.

EXTERIOR OBSERVATIONS

1. Grading at the left, front and rear upslope areas of the house (basically around the driveway approaches to the house) appears negative, with minimal freeboard at the foundation. The front driveway appears to slope toward the front entry. The rear driveway is swaled, but the swale discharges at an upslope (left-facing) foundation wall.
2. There is saturated soil and standing water all around the left-facing wall of the rear (behind the house, to the right of the driveway, near the air-conditioning condensers). The source of this water was not determined.
3. There are minor flexural cracks around the house in the masonry veneer. The most visible is at the front elevation, near a round window to the left of the entry. This is stair-stepped diagonally toward the window, open about 1/8" around the window casing. Other minor cracks were noted at the garage door opening, around post corbels at the balconies and adjacent an upper balcony at the right side.
4. The base of the masonry veneer columns (at the raised right balconies) have vertical splits, open about 3/16" and extending a couple of feet up from the bottoms.
5. The roof headwalls roll flashings do not extend to drip edges and there are no kick-outs, leading to cosmetic masonry stains and progressive rot in the visible roof-edge fascia. Some of these areas have been caulked or partially re-flashed.
6. The roof covering appears to be nearing the end of its expected useful life.
7. The house siding and trim needs a good exterior prep, caulk and paint job.
8. At the rear decking (installed around the raised pool edge) the installed ledgers are missing washers at some of the anchor studs. Skewed joist connections do not have hangers. Some of the metal hangers are under-sized and installed on undersized ledgers (hanging from a couple of nails).
9. There appears to be some seepage through the pool enclosure, visible beneath the deck on the house side (near the spa).

EXTERIOR PHOTOGRAPHS

Standing Water Upslope of Foundation (rear, to right of driveway)

No apparent source was located. The tenant has not been operating the air conditioner, there is no hose bibb nearby, septic equipment is 12-15' away and slightly lower, etc. Client reports anecdotally that a condition inspector noted the water meter turning even with all the interior stop valves off.

Under-Sized Joist Hangers, Inadequate Lags (beneath deck)

Seepage at Pool Enclosure (beneath deck, near spa)

The deck ledgers and hangers can be addressed by any competent carpenter. The pool leakage should be referred to a specialist. In my opinion this leakage is unlikely to foreseeably affect the house (at least at the current rate).

Flexural Crack at Front Elevation (left of entry)

This crack appears to have a flexural component (causing diagonal propagation) but the absence of contraction joints and proximity to the window suggest that material shrinkage has also contributed.

Example of Inadequate Roll Flashing with No Kick-Out (one of several)

The roll flashings should be addressed as part of a routine re-shingling, which is due in a couple of years. Any progressive fascia rot should be addressed before re-painting the trim.

INTERIOR OBSERVATIONS

1. Shrinkage cracks are evident at the exposed slab surface in the garage and at the exterior porches. The majority of these are tight (1/16" or less across), but slightly more open in the transverse direction (i.e., front to rear).
2. Transient moisture ingress (finish patching) is evident at the living room ceiling toward the front right. The cause of this was not located, although it is proximate interior sources.[4]
3. Transient moisture ingress (floor board cupping) is evident at the hall bathroom just left of the front entry. The cause of this was not determined, although potential interior sources are obvious.[5]
4. Cursory floor elevation measurements (using an instrumented fluid level) indicate that the house is very slightly tilted from left to right (toward the slope). The garage drops about 0.4", with a similar trend from the front entry to the right wall. There is also some evidence of concave settlement, with rises from 0.3" to 0.5" to the exterior walls.
5. A few minor drywall separations and buckles appear to have been patched.

INTERIOR PHOTOGRAPH

Shrinkage Cracks at Garage Floor

These cracks are not affecting structural performance. They should be superficially sealed in traffic areas.

4 The patched area is directly beneath the master tub and shower.

5 The closet flange, commode supply, commode, lavatory supply, lavatory drain and lavatory sink are all potential sources.

DISCUSSION

As regards the site conditions:

- Because of the natural slope here, the interior slab areas are placed on fill (artificially placed material), notably much deeper at the right and rear. These fill materials are prone to consolidation (compaction) and/or erosion if water percolates through them. For this reason it is imperative to avoid ponding water at the upslope perimeter of the foundation or introducing excessive moisture (from any source) directly into the fill bench. The standing water at the rear, upslope of a deep fill bench, is a source of *immediate* concern.
- Similarly, the storm drainage off the roof and driveways appears to convey water to ponding areas on the upslope (left-facing) sides. Gutters are obviously indicated (especially absent any tree canopy), but the conveyance provisions will have to be substantial.

As regards the stability of the slab foundation:

- The apparent rotation toward the right may be attributable to slight undermining of the right foundation walls and/or fill consolidation. At this point the slope is very gradual and progressive, well clear of most applied functional limits.[6] No repair, leveling or stabilization is currently indicated.
- The concave settlement is consistent with fill problems. Large voids may form with very little interior indications. Again, this emphasizes the need to identify and eliminate the rear water source, along with drainage improvements upslope of the house.

As regards the integrity of the slab foundation:

- The cracks at the exposed garage surface probably initiated due to concrete shrinkage. However, slight movement (probably imposed by subsidence at the right) appears to be progressively widening some of these cracks. At this point they are not structurally significant.
- These types of cracks are also likely to be present at interior areas. Even when such cracks are not structurally significant (i.e., tight), they can affect other slab functions, notably flooring. Ceramic tile installed without a crack barrier membrane may reflect cosmetic cracks and this appears to be the case within the house. Carpet, wood and laminate flooring all perform acceptably on cracked substrates, but this can be termite conducive.

As regards the cracks at the masonry veneer:

- Most of these are basically attributable to a combination of cure shrinkage (there are no original contraction joints) and flexure as the right margin of the house subsides. The cracks at the bases of the balcony posts are probably due to moisture penetration at the overlying (corbeled-in) decking. Repeated shrink-swell in the underlying wooden post is splitting the veneer. At this point (assuming the interior posts are pressure-treated material) this is not structural defect. Absent some incremental improvements in sealing the upper deck connections, this damage may continue to worsen.

As regards the roofing:

- The roof covering (and notably the flashings) were not well-installed at original construction. Although there is some useful life left in the roof covering, the need for replacement appears imminent. This would be nicely coordinated with re-flashing, guttering, refinishing the fascia, etc.

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6 Functional slope for evaluation purposes is arbitrarily defined as 1:120. Slopes here are around 1:360, barely remarkable for analogous deflection in ten years.

RECOMMENDATIONS

The source of the ponding water at the rear should be immediately identified and eliminated. At this point a licensed master plumber should be retained to functionally test the supply plumbing and isolate any suspected branch leaks.[7] Absent any identified plumbing leaks, then evaluation of the septic disposal system should be undertaken. Absent any septic problems, then site-specific geotechnical evaluation (exploratory boring for groundwater) might be indicated.

The observed settlement morphology can be reduced (but probably not completely eliminated) by incremental improvements to drainage, notably at upslope areas. Indicated improvements include:

1. Full guttering of all roof drip edges.
2. Extended conveyance of downspouts and grade drains to discharge well downslope (i.e., right) of the house foundation.
3. Backfilling eroded areas causing low spots near the foundation.

Because of the poor site grading (basically a hydrologic divide runs across the middle of the lot), the drainage conveyance will need buried culverts or hard piping around both sides of the house. This will require some flatwork demolition and heavy rock-sawing. Special care should be exercised around the utility entrances (left elevation) and the septic equipment (rear lawn area).[8]

In the event any flooring is removed and slab cracks revealed to be open more than 1/16", then these should be evaluated by a licensed Professional Engineer prior to installing the flooring. We recommend that even tight interior shrinkage cracks on traffic surfaces be superficially sealed using a suitable polymeric material (e.g., paint the garage floor with tractable polyurethane or epoxy paint).

Cracks in the masonry veneer may be cosmetically re-pointed as desired. Some sealing (caulking) of the decking penetration into the right columns should be attempted, but the cracks at the lower columns may continue to worsen with time.

The owner should plan a roofing replacement in the next couple of years, to include flashing details. Some coordination should be attempted between the repainting (addressing fascia rot), re-flashing and gutter installation, to avoid redundant work. Ideally the order would be paint, flashing, roofing, then guttering.

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7 In the event any plumbing leaks are detected, have the plumber briefly document his findings and contact our office *immediately* for further recommendations.

8 This does not need to be an 'engineered' system, but we recommend that any installation proposals be reviewed by an experienced engineer or site hydrologist.

RECOMMENDATIONS FOR FOUNDATION MAINTENANCE (STANDARD)

The supporting soils at this residence may include components which shrink and swell with changing moisture content. For this reason, a maintenance program should be followed to include keeping the moisture content of soil around the foundation perimeter constant and uniform. We generally recommend guttering roof drip edges over lawn areas. Exterior stormwater and condensate drains should be extended 36-48" from the foundation perimeter, preferably downslope. Any low areas adjacent to the foundation should be filled. Do not operate sprinkler systems in wet weather (most systems do not have rain sensors). During dry weather periods, routine watering to keep healthy grass green (about 1" per week) is ordinarily sufficient to keep the soil uniformly moist.

ADDITIONAL COMMENT

Items which may be described in findings but not addressed in recommendations are judged to be minor and no repair for structural integrity is indicated. Some flaws, such as occasional (tight) cracks in concrete or misshapen wood members are typical in residential construction.

CERTIFICATIONS

I hereby certify that I am a Professional Engineer licensed in the State of Texas, that I have no personal interest in the inspected property nor anyone involved with the property, and that this inspection was performed in a diligent manner to accurately represent conditions on the date of survey.

Stone Creek Engineering Services, Inc. is a registered engineering service provider in Texas.

GENERAL LIMITATIONS

The facilities inspected are not new. Various wall, floor, ceiling coverages and/or household goods prevent observation of many surfaces. Concealed discrepancies and/or latent defects necessarily limit the accuracy and scope of this report. There was no geotechnical soil data available for review.

Stone Creek Engineering Services, Inc. and its associates have no control regarding conditions in which these facilities were built and do not accept responsibility for future structural damage as a result of selections made by the builder and/or designer. Stone Creek Engineering Services, Inc. disclaims any control regarding site work practices and does not accept responsibility for future damage or injury as a result of actions taken by other parties. Any recommendations herein are made to improve conditions.

This report makes no determinations or representations regarding the presence or absence of any environmental pathogens. Findings regarding apparent moisture ingress and/or fungal growth are strictly limited to considerations of termite conducivity and/or structural rot.

This report does not represent any warranty, express or implied, and this company is not licensed to

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Please contact us if additional information becomes available for analysis, or if you have any questions.

Witness my signature & seal:

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cc: chrono