

# NELSON ENGINEERING

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August 15, 2007  
Job No. 07R46

Watt Law Firm  
Attn: Mr. Robert J. Bozelli  
141 East Mercer Street, Suite C  
Dripping Springs, Texas 78620

Re: Structural Condition Survey  
240 Canterbury Drive  
Dripping Springs, Texas 78737

Dear Mr. Bozelli,

Pursuant to your request, an investigation was performed on a residential structure at 240 Canterbury Drive, Dripping Springs, Texas on July 16, 2007. The scope of this investigation was primarily confined to a structural survey. This survey included an observation of the visible structural elements of the superstructure, foundation, and any non-structural elements that could have a direct or indirect bearing on the structural integrity of this building, any areas of notable distress and causes of the distress with recommendations for corrective work if necessary.

## **1.0 Property Description:**

The building is a two story residential structure that is situated on a lot with a gentle to moderate slope downwards from southwest to northeast. The building is approximately two years old per statement by the owner (Mr. Ron Hemphill). The exterior of the structure is clad in a combination of stone veneer, stucco and hardboard siding. The superstructure is conventionally wood framed and supported by a post-tensioned concrete slab-on-grade type of foundation. The roof of the structure is a gable/hip type covered with composition shingles. For the purposes of this report, the side of the structure facing Canterbury Drive will be considered south.

## **2.0 Observations/Comments:**

2.1 There is no observable distress on the exterior of the structure.

2.2 There is some distress (cracks in the walls, separation of wall joints, nail pop-outs and door frames misaligned) at various locations in the interior of the structure. The owners stated that the majority of this distress has appeared within the past year.

2.3 There is a noticeable protrusion in the ceiling at the north end of the entry hallway adjacent to the family room.

2.4 The homeowner (Carol Hemphill) pointed out a rippling of the ceiling of the family room that was noticeable when the lights are turned out. She also indicated that a bowing of the closet wall beneath the stairwell appeared to be more pronounced than when they moved into the structure. Observations of this bowing did not reveal any cracking in the wall board.

2.5 An elevation survey of the interior of the structure revealed that the lower level is relatively level with a maximum difference in measured elevation of approximately  $\frac{3}{4}$ ". This difference floor elevation does not include the garage, which typically has a built-in slope for drainage purposes. The upper level has a maximum difference in measured elevation of approximately one inch with a slight low spot near the entry door to the bathroom.

2.6 An observation of the attic space revealed what appeared to be mold on the sides of some of the roof trusses. This condition may have occurred from these trusses being wet prior to installation of the roof framing.

### 3.0 Conclusions:

3.1 Based on the results of the elevation survey and the absence of any noticeable distress in the stone veneer, there is no evidence that any of the observed distress and slight floor unlevelness (Items 2.2 thru 2.5), were caused by foundation movement.

At the present time, the amount and degree of observed distress and floor unlevelness does not appear to have significantly affected the structural integrity of the house. However, the observed distress is not typical for a house approximately two years old and possibilities for the causes of this distress are discussed in the following paragraphs.

3.2 The subtle rippling of the ceiling of the family room (Item 2.2) was created by an uneven surface of the gypboard as it extended over the bottom chord of the upper level floor trusses. This condition is not uncommon with older structures, since the longitudinal fibers of wood members will tend to stretch and weaken with age resulting in deflection of the member. The more load supported by the member, the more deflection, which would be seen as a rippling effect in the ceiling at the locations of the bottom of the ceiling or upper level floor members. However, due to the fact that this house is relatively new, this rippling effect may have resulted from slight warpage of the bottom chord of the floor trusses and/or slight deflection of the floor trusses, but does not affect the structural integrity of the building. The warpage and slight deflection of the floor trusses may be due to a phenomena known as "creep". Creep is affected by the moisture content of the wood. The dryer the member, the less deflection under sustained load. Consequently, if

the floor trusses had been rained on or exposed to the weather for a lengthy period of time prior to installation they could have absorbed a significant amount of moisture resulting in some warpage and slight deflection.

The appearance of what appeared to be mold on the side of some of the roof trusses may corroborate the hypothesis that several framing members were exposed to the weather prior to installation. If several of the framing members did get wet they could have created some of the observed distress after installation due to shrinkage as the house was dehumidified.

If some or several of the wood framing members were installed in a green condition (not kiln dried) or have a higher than 19% moisture content, shrinkage of these wood members could have caused some of the observed distress. Coring of several of the wood framing members and testing the cores for moisture content would be necessary to corroborate the hypothesis of excessive moisture content.

3.3 Other than shrinkage due to loss of moisture in the framing members as mentioned above, the other possibilities for the appearance of the observed distress are listed below:

- 3.3.1 Shrinkage of the texture coating across a wall or ceiling joint that was not properly sealed. This condition is fairly common at changes in direction of the framing members and at coffered or vaulted ceilings.
- 3.3.2 Vibration of the superstructure from wind forces. Any wracking of the superstructure could have caused distress manifested by nail pop-outs, and separation at the wall and ceiling joints.
- 3.3.3 Material defects (warped framing members) - At the conclusion of my site visit to this structure, I visited a nearby identical structure that was still in the framing stage on Harris Drive, across the street from the intersection of Harris Drive and St. Richie Lane. Observations of the framing elements on this structure revealed that at the same location of the bowed closet wall mentioned in Item 2.4, the wall studs at this house were straight and the wall was not supporting any significant load that would have caused it to bow. Consequently, the fact that there were no cracks in the finished wall that would have occurred if the wall had bowed outwards due to excessive load, reveals that this bowed wall was most likely caused by a warped wall stud.
- 3.3.4 Improper design - A previous engineering report by MLAW stated that based on their elevation surveys and observations of the sheetrock at the rear wall of bedroom 4, that the floor system is overloaded due to improper bearing from one of the roof truss girders (T5G). Based on the truss drawings and my observations of the house on Harris Dr., the ends of the Truss are supported by the west wall of the stairwell and the east wall of bedroom 4, which in turn is supported by a column from below. Although there is some distress in the north wall of bedroom 4, my elevations of the floor at the rear (north) wall of bedroom 4 show a maximum difference in measured elevation of

approximately 3/16 inch. This minor difference in elevation is not an indication of an overloaded floor. The maximum deflection in this bedroom occurs in the center with a measurement of 5/8 inch and this portion of the floor is not supporting any live load.

3.3.5 Improper installation - MLAW stated that the protrusion in the ceiling mentioned in Item 2.3 was caused by a floor truss hanger being installed slightly below the bottom of the support beam. This is a plausible explanation for this ceiling anomaly but would require destructive investigation to verify. Additionally, the problems associated with the T5G roof truss mentioned by MLAW are not apparent with the same truss on the house on Harris Drive.

3.4 MLAW's observations of distress and elevation measurements were for the most part, identical to my observations and elevation measurements. MLAW stated that the majority of the deflection of the center of the upper level floor occurred prior to installation of the sheetrock with a small amount of deflection (approximately 1/4") of the floor framing causing the majority of the distress noted throughout this structure. While it is possible that some of the distress in the vicinity of the maximum floor deflection occurred as a result of this floor deflection, it is doubtful that any substantial distress was caused by a 1/4" deflection and it certainly is not possible that all of the distress in the house was caused by this deflection due to the variation in framing direction and distance from the center of the upper floor.

#### **4.0 Recommendations:**

4.1 If there is evidence of ongoing soil movement, (appearance of new cracks opening and closing seasonally or existing cracks changing in size with corresponding changes in floor elevation), resulting in additional distress to the structure, such that the structural, functional and/or aesthetic integrity of the building is compromised, then consideration should be given at that time to some type of engineered foundation stabilization and/or repair.

Structural integrity relates to the ability of the various structural elements of the building to perform their intended functions of adequately supporting and resisting the imposed design loads. Functional integrity pertains to the proper functioning of doors, windows, mechanical, electrical, and/or plumbing systems. Aesthetic integrity pertains to cosmetic distress, in which frequent corrective work is necessary.

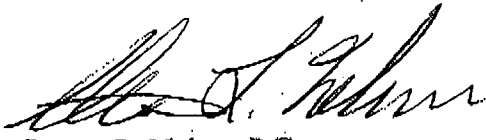
4.2 All interior distress should be repaired to enhance the aesthetic value of the structure and to prevent insect penetration and energy loss. Cracks in the walls and ceilings should be sealed with a reinforced tape prior to floating with joint compound and painting. MLAW has also recommended this course of action, in addition to making modifications to the T5G girder truss above the north wall of the bedroom 4 on the upper level. Although Nelson Engineering does not completely agree with the conclusions of MLAW pertaining to the causes of distress, we are both in agreement that the distress should be repaired and Nelson Engineering concurs with MLAW's recommendation to monitor the performance of the repairs during the next year for any signs of additional distress.

**5.0 Limitations:**

The basis of this report is a visual observation and a professional opinion as to the structural condition of the existing building. No guarantee, expressed or implied, is intended by this report and no examination was made to determine compliance with any governmental code or regulation.

Please call if you have any questions regarding this submittal or require further technical assistance.

Sincerely,



Steven L. Nelson P.E.  
NELSON ENGINEERING



08-15-07