



**KIRK N. ELLIS & ASSOCIATES  
STRUCTURAL & CIVIL ENGINEERING, LTD.**

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**TO:** Mr. Tim O'Fallon

Reno Housing Authority

1525 East Ninth Street

Reno, NV 89512

<b>DATE:</b> 01/29/2010	<b>JOB #:</b> 0410
<b>PROJECT:</b> RHA Residential Inspection	
<b>LOCATION:</b> 9200 Running Dog Circle	
<b>CONTRACTOR:</b> N/A	
<b>OWNER:</b> Reno Housing Authority	
<b>WEATHER:</b> Overcast	
<b>TEMP:</b> 34°F	<b>TIME:</b> 10:00AM
<b>PRESENT AT SITE:</b>	
Brian Wilcox – Kirk N. Ellis & Associates	
Kirk N. Ellis – Kirk N. Ellis & Associates	

**Report Date: 02/09/2010**

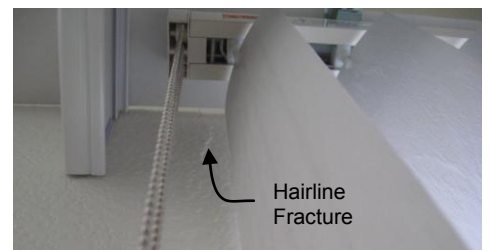
At the request of Tim O'Fallon of the Reno Housing Authority, this office went to conduct an Initial Structural Engineering Visual Inspection Site Visit for the residence located at 9200 Running Dog Circle. This residence is identified by the Washoe County Assessor as APN: 550-552-01, and listed as a Two Story, Single Family Townhouse End Style Residence built about 2005.

The following was noted:

1. The exterior is composed of horizontal lap siding. See Figure 1. The exterior finish shows no sign of movement.
2. The interior of the residence appeared to have a relatively new or undamaged coat of interior paint. Reviewing the assessment data, it is highly probable that this residence has not had an occupant. A private party purchased this residence for only a month. If this paint is the original paint, any cracks and buckles would be highly visible. The rear sliding glass door had a minor diagonal hairline crack. The wall adjacent to the the door also had a hairline minor crack. See Figure 2 and Figure 3.
3. All interior and exterior doors and exterior windows were opened. The sliding glass door is not exactly perpendicular to the wall. Even though the door is not square, it does not pinch or rack. All other openings were freely operated and showed no signs of racked openings.
4. All interior surfaces (gypsum board walls, gypsum board ceilings, finish floors) appeared nominally true to a reasonably flat plane. No objectionable or noticeable bulges, cracks, etc. were seen.



**FIG 1: EXTERIOR**



**FIG 2: MINOR GYP. BOARD FRACTURE AT CORNER OF SLIDING GLASS DOOR.**



**FIG 3: MINOR HAIRLINE FRACTURE AT CORNER OF STRUCTURE.**

5. This structure is constructed directly on the surface of a concrete slab-on-grade. No cracks or elevation differentials were felt or observed. Exterior inspection of concrete revealed no failure cracks at the foundation plane. Normal concrete shrinkage cracks were observed at nominal distances.
6. All areas accessible from the attic access point and above the insulation were inspected and appeared to be free from defect. The roof truss chords and webs did not have any visible stress fractures and no water damage was observed. There were no observed continuous lateral bracing. The exterior gable end walls did not appear to have sheathing. See Figure 4.
7. The garage slab exhibited no buckling or excessive cracking. Most of the slab cracking was controlled through crack control joints installed in the slab. The minor cracks in the garage are typical and of no structural concern.
8. The mechanical equipment, in both the garage and the attic, appear to be seismically braced. See Figure 5 and Figure 6.



FIG 4: STRUCTURAL GABLE END.



FIG 5: WATER HEATER, STRAPS NOT SHOWN.

## KNE Discussion

Based on what was visually seen at the time of inspection, the current as-built/existing structural systems for this residence appears to be absent of major defects or omissions. Please note that this was a visual inspection only. No destructive testing or structural calculations were done, no thermal insulation or finish work was removed.

There are several indicators that we look for as a marker of structural failure or movement. As a structure bends and flexes under the strain of lateral forces (wind or seismic) there tends to be a racking or twisting movement. This can be seen in the frames of doors and windows. The racking or twisting changes the shape of the opening from a rectangle to a parallelogram. The shape shifting causes doors to not fit correctly in the frames and windows become difficult to operate. The sheet rock also shows these stresses at the corners in the form of compression bulges or diagonal tension cracks. If excessive and repetitive movements have occurred, the finish exterior can show signs of stress as well.

The residence showed no evidence of stiff or racked door openings or stiff or racked window openings. There was a single interior door that did not close properly. This was not an indication of racked openings, due to the fact that the hinge fasteners were not fully engaged. This is a poorly hung door, not a racked opening. No compression bulges were visible and only one location



FIG 6: PLATFORM FOR THE ATTIC MECHANICAL EQUIPMENT.

# F I E L D R E P O R T

displayed diagonal tension cracks. If the current coat of paint is the original coat of paint (it appears to be), then this structure has not moved very much. The cracks are probably just due to normal lumber drying shrinkage. With no additional cracking and no other racked openings the signs of movement appear to be localized. The exterior horizontal lap siding showed no signs of buckling, and the edge and field nailing showed no signs of elongating. This type of siding is extremely forgiving and can conceal defects and movement. Though no signs of movement were seen, this is no guarantee that movements have not occurred.

Vertical/gravity load effects are typically not seen when adequately designed. Failures can usually be seen with flexural fractures and eccentricities in the structural members. Excessive deflection can also be an indication of poor construction or inadequately calculated structural members. None of this type of visual evidence was seen at this residence.

The residence appeared to have relatively straight and plumb interior surfaces, and the lower slab and upper floor systems appeared to be sturdy and did not excessively deflect. The lower slab showed no signs of elevation change or cracking. The finish flooring would probably hide most flaws. Inspection of the exterior area of the slabs revealed no excessive cracking. The second floor system was not open for inspection. All areas of the attic area that were accessible for inspection revealed no stress fractures or failures. The wall studs and columns were not available for inspection. No insulation or finishes were removed for inspection.

As a concrete slab or footing cures, it experiences many thermal and drying shrinkage variances. The expansion and contraction of the concrete slab normally causes hairline fractures in the concrete. The reinforcing in concrete slab and footings exists to preclude complete fracture of the footings and stem walls, so it can retain its structural strength. Typically, temperature cracks do not exceed 1/32" and occur approximately every six to eight feet. These cracks propagate perpendicular to the length of the stem wall (shortest distance). No unusual concrete cracks were seen.

On the other hand, differential settlement or foundation movement cracks typically radiate 45° from point of maximum load, or 45° perpendicular to the length of the footing or stem wall. None of this type of crack was seen.

The concrete footing and slab were not open for inspection. The exterior face of the footings was visible for the top 6-inches. No signs of failure were observed at the exterior of the structure. The concrete showed no signs of excessive weathering, efflorescence, spalling or failure cracks or fractures. Temperature cracks exist but are well within expected limits.

### **KNE Conclusions and Recommendations**

As stated above, the residence located at 9200 Running Dog Circle appears to be absent of major structural defects or omissions. Please note that this was a visual inspection only. No destructive testing or structural calculations were done, no thermal insulation or finish work was removed. See also the Structural Inspection Memorandum.

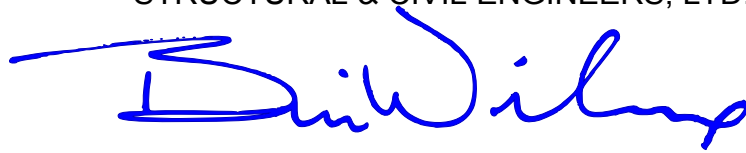
It is our understanding that a professional residential inspection will or has been performed for problems not related to structural members. If, upon inspection, the residential inspector has any structural concerns, do not hesitate to contact our firm for additional inspections and reports.

# F I E L D R E P O R T

If you have any questions or comments, please feel free to call.

Sincerely,

KIRK N. ELLIS & ASSOCIATES  
STRUCTURAL & CIVIL ENGINEERS, LTD.



Brian Wilcox  
Structural Inspector

**REVIEWED & APPROVED**



Kirk N. Ellis, S.E., P.E.  
President

02/09/2010

Enclosures:

Structural Inspection Memo  
Contact Sheets of all Images taken at the Site (4 Sheets Total)

F I E L D R E P O R T



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## M E M O R A N D U M

TO: Clients Desiring "Structural Inspection Services"

FROM: Kirk N. Ellis & Associates

DATE: February 5, 2010

RE: Discussion of some of the Limitations of the Visual Structural  
Inspection Site Visit

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When most clients request a "structural inspection", their intent is usually to be assured that their building structure, or one they are contemplating buying, is "structurally sound".

Usually, however, no matter how closely a structural engineer looks at a given building, he cannot really accomplish this desired end result.

In most cases, many of the actual structural framing systems are covered up by other finish materials. The structural engineer would then try to "read" any exposed cracking or movement patterns in the finish materials, that may indicate building structure movements, which underlie these finish materials. To be able to physically see all the framing systems, the finish materials would have to be removed and replaced later. This would obviously be impractical and expensive.

Even if all framing systems are in fact fully exposed, it cannot be guaranteed that the structure is "sound" by only a simple visual observation. Sometimes, structural members and their connections exhibit no visual signs of structural distress until they are loaded well beyond safe working design loads. Even well designed structures deflect, deform, move and shift somewhat. However, there is no sure way of knowing how much "apparent deformity" was built-in during construction. For example, if a given beam is highly cambered, and then heavily loaded, it may appear quite straight, and without sag or deflection. It may not appear overloaded, until it fractured, or cracked. This occurrence would be somewhat unusual, although not impossible.

Usually, but not always, overloaded structural members do exhibit some visual signs. Just as often, however, improperly designed members can look fine, because they have not yet been subjected to a full design load level condition.

## STRUCTURAL CALCULATIONS AND REVIEW OF BUILDING CONSTRUCTION PLANS

### THE NEXT STEP-

Obviously, there are many limitations to the "structural visual inspection". Some have been discussed above. If the client desires a higher level of comfort or assurance, I would recommend that a design review study be commissioned. This would require that structural analysis and design calculations be performed on the structural members and details which are shown on the "Construction Documents". Once check calculations have been performed, and key problem areas have been identified, a structural engineer will be much better informed. He will then be in a much better position to advise his client, the Owner.

However, there is always the nagging question of just how closely does the as-built construction match the drawings and plans? What materials stress grades were actually supplied? Was the workmanship substandard? Remember, a lot of this will be either visually concealed, or not subject to simple visual evaluation. If construction plans are not available for us to review, as-built drawings become necessary. These efforts provide the next higher level of assurance, but still there are no guarantees.

Unless otherwise stated, visual structural inspections do not include calculations, plan reviews, preparation of as-built drawings, material testing, etc.

Most often, the purpose for the inspection is quite specific. Therefore, unless otherwise stated, it should be understood by all parties that the "structural inspection" covers only the specific requested subject, and usually is not a general inspection of the entire structure.

### CONCLUSION

The structural engineer performing a "structural inspection" is simply looking for visual indications that the structural framing elements may have been subjected to a loading or deformation which has caused some kind of distress: cracking patterns, fractures in structural materials, sagging or deflecting, heaving or bulging, tearing, racked or deformed window and door openings, etc.

Given the complexities of modern building codes, and the limitations of a visual inspection, is not possible to state, "this structure is sound". It is only possible to report what is observed, and the possible structural implications of same. Nothing more, and nothing less.



9200 Running Dog Circle (1).JPG



9200 Running Dog Circle (2).JPG



9200 Running Dog Circle (3).JPG



9200 Running Dog Circle (4).JPG



9200 Running Dog Circle (5).JPG  
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9200 Running Dog Circle (6).JPG



9200 Running Dog Circle (7).JPG



9200 Running Dog Circle (8).JPG



9200 Running Dog Circle (9).JPG



9200 Running Dog Circle (10).JPG



9200 Running Dog Circle (11).JPG



9200 Running Dog Circle (12).JPG



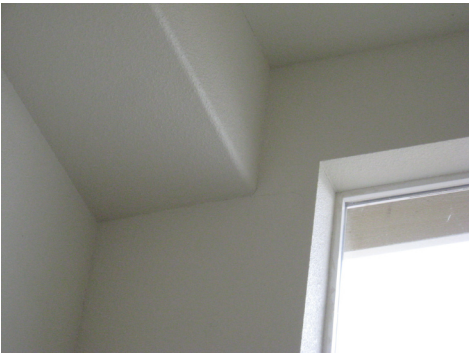
9200 Running Dog Circle (13).JPG



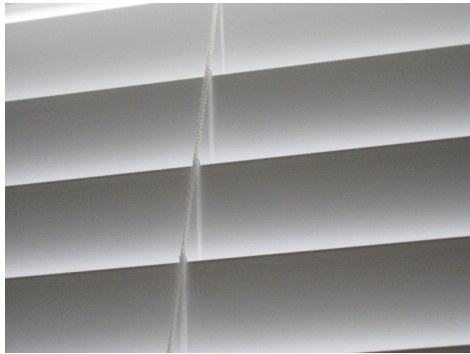
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9200 Running Dog Circle (15).JPG



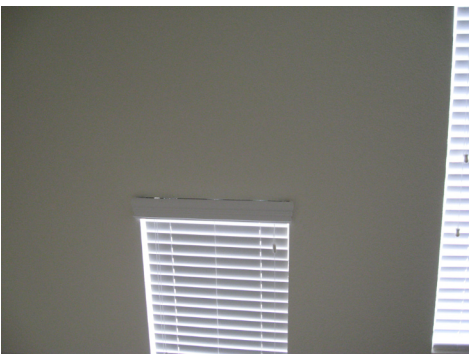
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9200 Running Dog Circle (18).JPG



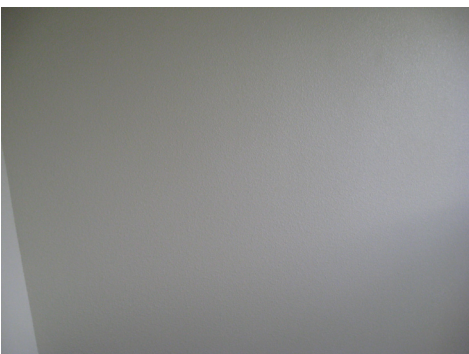
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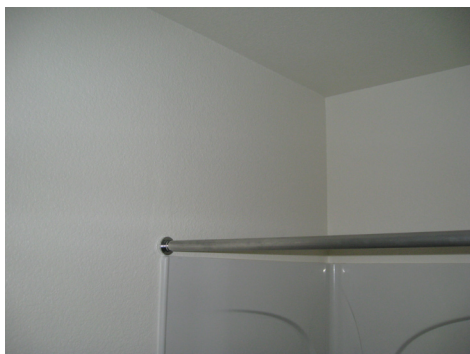
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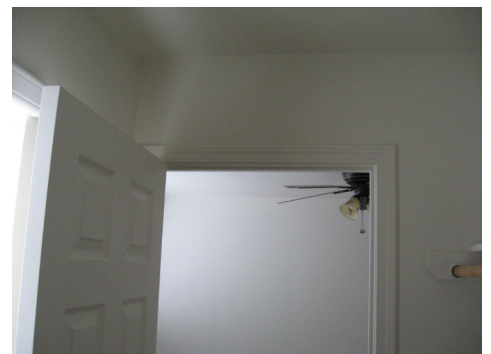
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