

DON ILLINGWORTH & Assoc. Inc. firm #4308 Consulting Structural Engineers
2401 Ave. J Suite 206 Arlington, TX 76006 817-649-1544 fax. 817-649-1545

March 13, 2013

Ms. Laurie Willis
7319 Wellcrest Dr.
Dallas, Texas 75230

RE: 7345 CO Road 283
Terrell, Texas

Dear Ms. Willis:

I conducted a visual foundation inspection of the RE: residence on March 7, 2013. The purpose of the inspection was to evaluate the condition of the residence. I looked for doors that did not fit squarely in their openings; cracks in the sheet rock, brick veneer, and foundation slab; and any other signs of distress or movement. No materials were removed and no testing was done. Site drainage was observed and floor elevation measurements were taken with a compu-level. Compensation for varying heights of floor coverings was made in determining floor elevations. For reference purposes the house faces north.

The floor elevations show the floor is relatively level and well within normal tolerances. The high point of the foundation is the front bedroom and the low area is uniformly along the back. The differences in elevation are due to original construction and/or normal foundation movement. Most likely, it is a combination of both, however, it is not a problem because the foundation is doing an excellent job of supporting the structure above. There are several brick and mortar cracks on the east side. These appear to be cracks from normal seasonal foundation movement. There are no corresponding cracks on the interior which shows there is not noteworthy foundation movement. In my opinion, the residence is in very good condition, and there are no cracks, material separations, or out-of-square doors that indicate foundation problems.

The first step in evaluating residential slab-on-grade foundation performance is understanding the function of a residential foundation and what should be expected. Residential foundations serve two primary functions. One is to provide a reasonably level, hard surface between the soil and living space and the second function is to support the structure above.

Slab-on-grade foundations are designed as floating slabs, much the same as a boat floats on water. Foundations do not resist or control soil movement. Rather, they are subject to the effects of soil movement. A properly performing foundation will act as a rigid element that will float on the soil with minimum distress to the structure above.

One of the most common tools for evaluating foundation performance is a floor levelness or elevation survey. This can be used to evaluate the foundation levelness, deflection and tilt at the time of survey, however, engineering judgement needs to be used to determine if any diselevation is due to original construction, foundation movement, or a combination of both. The only absolute way to measure foundation movement is to compare changes between two surveys.

The two primary criteria used to measure foundation performance are slope (or tilt) and deflection. The figures below give examples and descriptions of tilt and deflection. The most common allowables are a slope of 1 % and a deflection of $1/360$. In other terms, a slope of up to 1 inch in 100 inches and a deflection of 1 inch in a length of 360 inches are acceptable.

Foundations are not constructed perfectly level and normal construction tolerances for levelness are plus or minus $3/4$ inch which means there may be $1 \frac{1}{2}$ inch difference in elevation due to original construction and the original construction is within acceptable tolerance. When there is a difference in floor elevation and there is no accompanying distress, such as sheetrock and brick cracks, out-of-square doors or material separations, then, the out-of-level condition is most likely due to original construction and not foundation movement. When the above mentioned allowables for slope and deflection are exceeded there needs to be noteworthy distress that accompanies the out-of-tolerance conditions, otherwise the situation would not qualify as a foundation defect.

The Texas Residential Construction Commission (TRCC) and the Texas Section of the American Society of Civil Engineers (ASCE) have published criterial and guidelines for evaluating foundation performance and they both use the 1 % and $1/360$ tolerances. Once again, it is important to note that associated distress must accompany the out-of-tolerance conditions. It is not unusual to have minor sheetrock and brick cracking and material separations in a residence supported by a slab-on-grade founded on expansive clay soils.

The International Building Code states that a foundation "shall be designed to resist differential volume changes and to prevent structural damage to the supported structure. Deflection and racking of the supported structure shall be limited to that which will not interfere with the usability and serviceability of the structure." It is obvious from this statement that some minor to even moderate cracking and distress will not create a foundation failure.

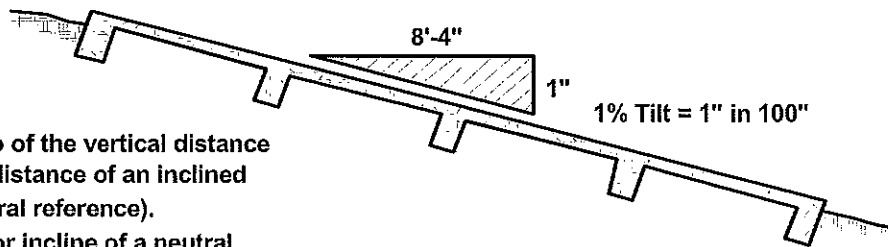
The attached sheet shows floor elevations at the RE: residence. None of the allowables for deflection or tilt have been exceeded as shown in the floor elevations. It is my opinion the foundation is serving its intended function, which is to support the structure above, even though there is very minor cosmetic distress which can be repaired.

SLOPE & TILT

DEFINITIONS:

SLOPE is the ratio of the vertical distance to the horizontal distance of an inclined straight line (neutral reference).

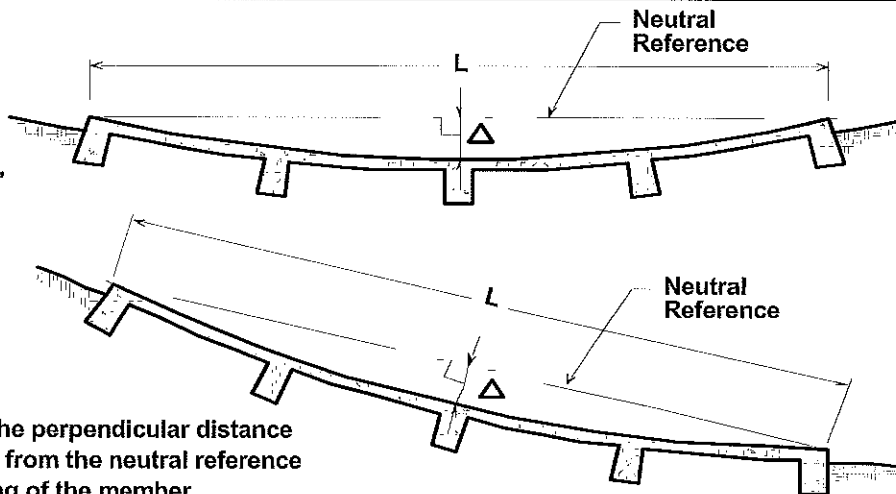
TILT is the slope or incline of a neutral reference without bending



DEFLECTION

Noted as Δ

$$\frac{L}{360} = 1'' \text{ in } 360''$$
$$\frac{L}{360} = 1'' \text{ in } 30'$$



DEFINITION:

DEFLECTION is the perpendicular distance moved by a point from the neutral reference during the bending of the member.

The structure is built on a slab-on-grade foundation which may move or "float" as a result of the swelling of the soil due to seasonal moisture changes. Minor cracks in the sheetrock and brick are normal and may require repair as a typical maintenance item. Proper yard and house maintenance are extremely important and will help reduce foundation movement and associated problems. It is very important to water the yard during the dry season and to have good drainage so water will drain away from the house during the wet season. Trees, also, draw a significant amount of moisture from the soil, and additional watering may be required in the area of the trees. Gutters and downspouts would help improve drainage along the east side.

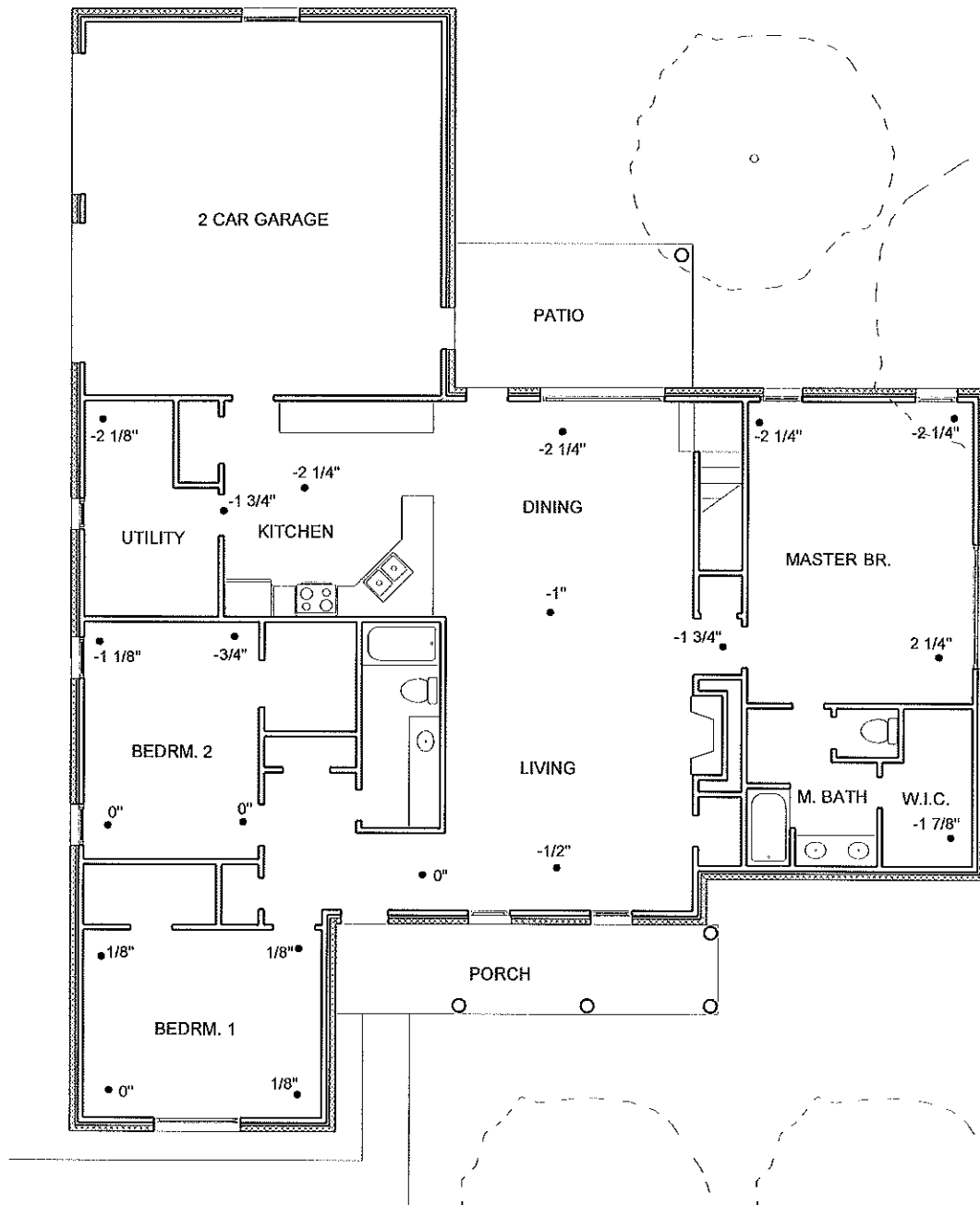
THIS REPORT IS INTENDED FOR THE SOLE USE OF THE CLIENT
(ADDRESSEE) AND IS NOT TO BE USED BY ANY THIRD PARTY.

If you have any questions, please do not hesitate to call.

Very truly yours,

Don Illingworth, P.E.
President





Note: Interior walls, doors, windows, cabinets, appliances, fixtures, exterior flatwork, fencing and landscaping are shown for conceptual purpose only and may not reflect actual site conditions.

• ELEVATIONS TAKEN: 3-07-13

ELEVATION SURVEY

SCALE: 3/32" = 1'-0"



DON ILLINGWORTH & ASSOC., INC.
CONSULTING STRUCTURAL ENGINEERS
PH. 817-649-1544 FAX 817-649-1545

7345 COUNTRY ROAD 283
TERRELL, TEXAS

DATE:

DRAWN BY:

3-13-2013

J.L.