

STRAND

Observations and Recommendations:

The following cosmetic distress was observed: brick veneer distress, sheetrock distress, uneven door frames and tile cracking. There was no notable functional or structural distress observed during the time of inspection.

Based on our observations, the lawn coverage appeared to be generally adequate with positive drainage away from the foundation (minimal slope away from the foundation was observed along the rear of the foundation). The inspection was completed during early spring and the watering program and moisture level in the soils were not visibly evident due to the time of the year. Positive readings ranging from 0.1-1.6" were observed throughout the slab. Lack of or excessive moisture in clayey soils can cause the soils to shrink or swell causing foundation movement. The key to limiting distress is to ensure the foundation moves as one unit and not differentially. It is likely the distress noted has resulted from moisture variation in the soils causing differential movement as observed. It is our recommendation to reduce the watering to a minimum for the next 3-4 months in order to reduce the moisture content while allowing the soils to dry causing the foundation to return close to its original state. Once the soils around the perimeter appear to be in equilibrium, the watering program around the home shall be consistent so that soils are not more or less wet/dry in one area versus another area. The same recommendations should be followed at the front planter beds, ensuring the planter beds are not receiving excess or lack of moisture and the watering is consistent with the perimeter. Adequate lawn coverage is typically a good indicator for consistent watering and moisture content in the soils. Drainage should be reviewed on all four sides to ensure swales are functioning properly and standing water is not observed as it may result in unequal moisture content in the soils (drainage along the front planters beds shall be reviewed as positive slope away from the foundation was not observed in the region).

The foundation is within tolerance for both deflection and tilt. Based on the current deflection, tilt and distress the foundation performance is acceptable. While within acceptable tolerance it is the opinion of this firm that some foundation movement has occurred. Watering program and drainage improvements are imperative to long term foundation performance. Please note as the recommendations above are implemented cosmetic distress may be observed as the underlying soils reach equilibrium.

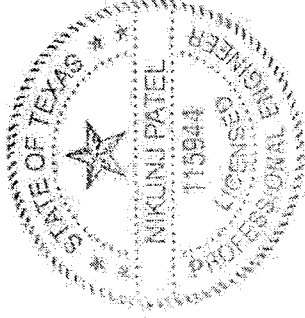
Please find attached a copy of our foundation maintenance guidelines for your use. This inspection was requested by your onsite representative, with the limited purpose of addressing only the specific items above. No other items were inspected or reviewed.

We trust that this is the information you require. Please contact this office if we may be of further assistance.

Respectfully,
Strand Systems Engineering, Inc.

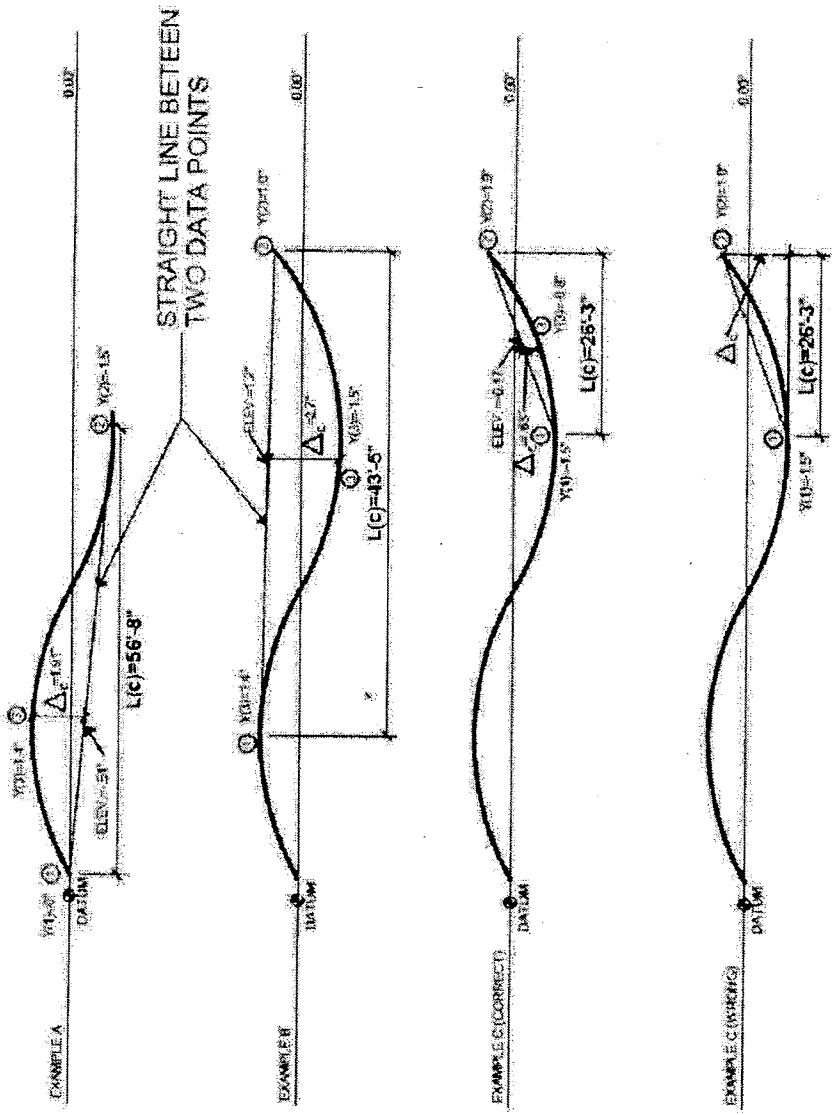


Nikunj NP Patel, P.E.
Registration No: F-1629



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Deflection:



Elevation readings evaluation:

A review of the elevation readings for this foundation shows a worst case deflection of 0.81" over an approximate 67 ft distance from the rear right to the front left of the foundation. The PTI tolerance for deflection, based on a L/360 deflection criteria, is 2.23" for this distance. The worst case tilt was found from the rear left to the front left of the foundation and measured at a 0.27% slope. The accepted tolerance for tilt according to the PTI is 1%. Based upon these performance guidelines set forth by the PTI performance document, the foundation is within tolerance for both deflection and tilt.

STRAND

March 19, 2019

SZE: 1516868

Express Homes Houston (North)
400 Carriage Hills Blvd
Conroe, TX 77384

REF: Breckenridge Forest Section 10
23434 Dukes Run Drive
Harris County, Texas
Lot: 3 Block: 2

Sir/Madam:

On March 18th, 2019 a representative of our firm conducted an inspection at the above address. Specifically, the inspection was requested to evaluate the current performance of the foundation. The inspection was non destructive and primarily visual in nature. Elevation readings showing the relative levelness of the foundation were also taken during the inspection. This inspection was conducted in accordance with the "Guide for Performance Evaluation of Slab-on-Ground Foundations PTI DC10.8-18" published by the Post-Tensioning Institute (PTI).

In most regions of Texas, highly expansive soils are common and the majority of foundations are designed utilizing a post tensioned slab on grade design. All foundations constructed on expansive soils are expected to move as a result of soil volume change. Slab on grade foundations are floating slabs. Per the PTI performance document, "*Slab-on-ground foundations are not designed to control soil movement. Rather, they respond to soil movement. They are not infinitely stiff or immovable, therefore they will experience out-of plane curvature (also known as deflection or bending) and planar tilt.*" Per the PTI 3rd edition, the design of the foundation must meet the following stress conditions: flexural stress, stiffness and shear stresses. In addition to the design requirements the PTI performance document evaluates distress, deflection and tilt/slope of as built foundations to ensure the ground supported slab is within tolerance. There are instances when all design stress limits are within guidelines but the distress, deflection or slope/tilt is out of tolerance. In this event, engineering judgment has to be used to evaluate anomalies in site preparations, soil remediation and or other factors that may be adversely affecting the foundation performance.

The International Building Code (IBC) provides guidance on foundation performance and 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.*" The PTI performance document has further advised that the foundation design is intended to result in foundations with sufficient strength and stiffness to allow some cosmetic distress, limit the amount of functional distress, and prevent structural distress. The PTI performance document has set guidelines on when the movement is considered excessive and when movement is considered within code tolerances. There are three criteria's used to measure the foundations performance, deflection (curvature), slope (tilt) and distress. Elevation readings obtained at the time of the inspection can be used to calculate the deflection and tilt. It is essential to also utilize engineering judgment to determine if as-placed construction tolerances may be contributing to the amount of deflection and tilt calculated. A more accurate analysis of the degree of foundation movement may