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Project No. 18723

April 20, 2020

Re: Foundation Evaluation



Dear



As requested, personnel of GreenWorks Engineering and Consulting have completed an observation of the foundation at the address referenced above on April 16, 2020. The purpose of the observation was to collect information necessary to assess the performance of the existing foundation. This evaluation was a Level B evaluation as described in the "Guidelines for the Evaluation and Repair of Residential Foundations" by the Texas Section of the American Society of Civil Engineers (ASCE). For the purpose of this report the house faces south.

Introduction:

The house is a single-story wood framed structure built in 1970. The foundation system of the house is a concrete slab on grade. All the information gathered was from the visual evaluation and no destructive or invasive testing was performed.

Observations:

The interior and exterior of the house showed typical signs of distress for a house that has incurred differential foundation movement.

The interior distress included:

- Cracks in the walls and ceiling drywall
- Separation of the corner bead from the drywall
- Cracks in the tile flooring

The exterior distress included:

- Separation of the frieze board joints
- Separation of the brick step and the foundation on the east side of the house

Note, the exposed areas of the foundation were covered with a parge which limited our ability to visually evaluate the foundation. Although not related to foundation movement, it should be noted

that wood rot was observed on the frieze board, fascia, and window trim around the perimeter of the house.

Interior Elevation Survey:

An interior floor elevation survey was performed on the living area of the house, with the elevations recorded to the nearest 10th of an inch (0.1"). Adjustments were made to account for the thickness of the floor coverings. A benchmark elevation of 0.0 inches was established near the center of the house as shown in Figure 1 of this report.

Drainage:

The drainage of water is an important issue that affects the shrink/swell properties of the expansive soil the house is built upon. The purpose of proper drainage is to remove excess water from around the house to keep the soil around and under the perimeter foundation at a stable moisture content and the soil under the slab dry. Gutters and down spouts are an effective method of draining rainwater away from the house but must be used correctly. Downspouts should discharge rainwater a minimum of 5 feet away from the foundation. In addition, the soil around the house should have a positive 5% slope, 3 inches in 5 feet, away from the house.

Foundation History:

The existing house has no known existing repairs that can be seen, and GreenWorks Engineering and Consulting have not received any existing foundation report. It is our belief that the current foundation evaluation is the only evaluation on record.

Conclusions:

Based on our observations of the interior and exterior cosmetic distress, the floor elevations, and calculations, it is our opinion that the house has undergone an excessive amount of movement. The maximum differential deflection is 0.8 inches and occurred over an approximate distance of 15.3 feet. This amount of deflection exceeds the standard allowable deflection of 0.5 inches for a distance of 15.3 feet. The standard allowable differential deflection is based on 1.0 inch of vertical movement, up or down, over a horizontal distance of 30 feet; expressed as Length (in inches)/ 360.

Furthermore, it is our opinion that the foundation is performing as designed and remedial measures are not required at this time. However, there are a few foundation maintenance recommendations that could be beneficial to the future performance of the foundation.

Recommendations:

- 1) To stabilize and lift the perimeter foundation wall, install (7) perimeter and (13) interior piles or drilled piers as shown on Figure 1 of this report. The piles can be concrete cylinders, steel pipe, or helical screws. Refer to Figures 2, 3, 4, and 5 of this report. Space

the piles or drilled piers along the perimeter foundation at a maximum of 7 feet on-center and within the interior at a maximum of 5 feet on-center. The number of interior piers may be reduced if the interior grade beams are located prior to the foundation underpinning. The interior piers shall be placed at the intersections of the grade beams and placed at a maximum of 8 feet on-center. Note, any foundation movement, even corrective movement, can cause additional cosmetic distress.

- 2) With the completion of the foundation repair, the interior cracks can be repaired, and the exterior separations can be sealed.
- 3) A leak detection test by a licensed plumber is recommended after the foundation has been repaired to verify the condition of the plumbing. If any discrepancies are determined they should be repaired immediately to preserve the foundation repair.
- 4) With the completion of the foundation underpinning, a final elevation survey must be performed to provide a final elevation baseline. It is recommended to review the performance of the foundation every 6 to 12 months. Compare all future foundation evaluations to this baseline.

Foundation Maintenance Recommendations:

- 1) To better control the rainwater, add gutters, downspouts and extensions to all the downsloped areas of the roof that do not currently have them. The downspouts should discharge the water a minimum of 5 feet from the foundation or into a drainage system.
- 2) To assist in the drainage of free water the soil around the house should be sloped away from the house. The slope should drop a minimum of 3 inches in 5 feet, a 5% slope. If this cannot be done a French Drain may be required.
- 3) Consider removing all trees or large bushes within 6 feet of the foundation. The large vegetation can consume vast amounts of water which can cause the expansive clay, the house is built on, to shrink causing damaging foundation movement. Tree roots can also extend below the foundation and cause damage. Tree roots can typically extend as far as the extent of the tree's canopy. If trees are not to be removed a root barrier should be used between the tree and the house.
- 4) Establish a watering program for the foundation soil to keep the soil moisture content constant during the dry months. The lawn should be kept healthy. This will help by reducing evaporation. Water the lawn and other vegetation consistently and evenly. If the soil is cracking at the surface this is a sign that the soil is drying out.

Limitations:

The opinions and recommendations contained in this report are based on the visual observation of the then current conditions of the house and the knowledge and experience of the engineer. The evaluation was limited to visual observations and areas not visible, accessible or hidden behind

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furniture and appliances were not included in the evaluation. There has been no structural inspection of the existing framing of the house and no verification of the framing has been done. The evaluation did not include any soil sampling or testing.

The evaluation did not include any assessment of the existing framing, plumbing or soil and no implication is made on the compliance or non-compliance of the house with old or current building codes. The evaluation does not constitute a design of the foundation. No verification was made of the existing concrete strength, thickness, reinforcement nor capacity to support any load.

Foundation movement is a prevalent phenomenon in the Houston metroplex area. Future foundation movement is likely to varying degrees due to the shrink/swell characteristics of the soil. The foundation is prone to movement due to the moisture variation in the existing soil and total prevention of future movement is unlikely.

No guarantee or warranty as to the future performance or need for repair of the foundation is intended or implied. Limits of liability for any claims with respect to this report is limited to the fees paid for services and anyone relying on the content of this report agrees to indemnify GreenWorks Service Company for all costs exceeding this fee.

Prepared by,



H. Wayne Leake III, P.E.
Professional Engineer



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Texas Registered Engineering Firm 20170

LEGEND	
	Bench Mark Elevation, 0.0"
	0.0" Top of Floor Elevation
	Push Pile or Drilled Pier
	Interior Slab Pier

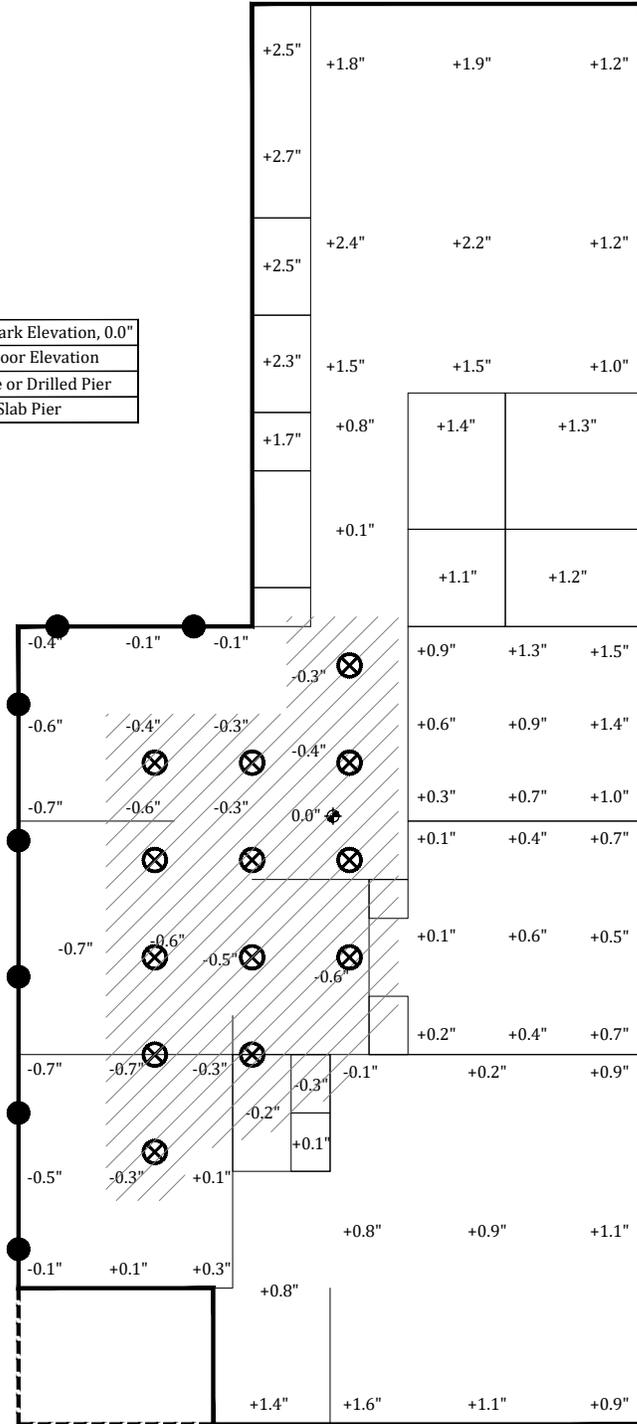


FIGURE 1

NOT TO SCALE

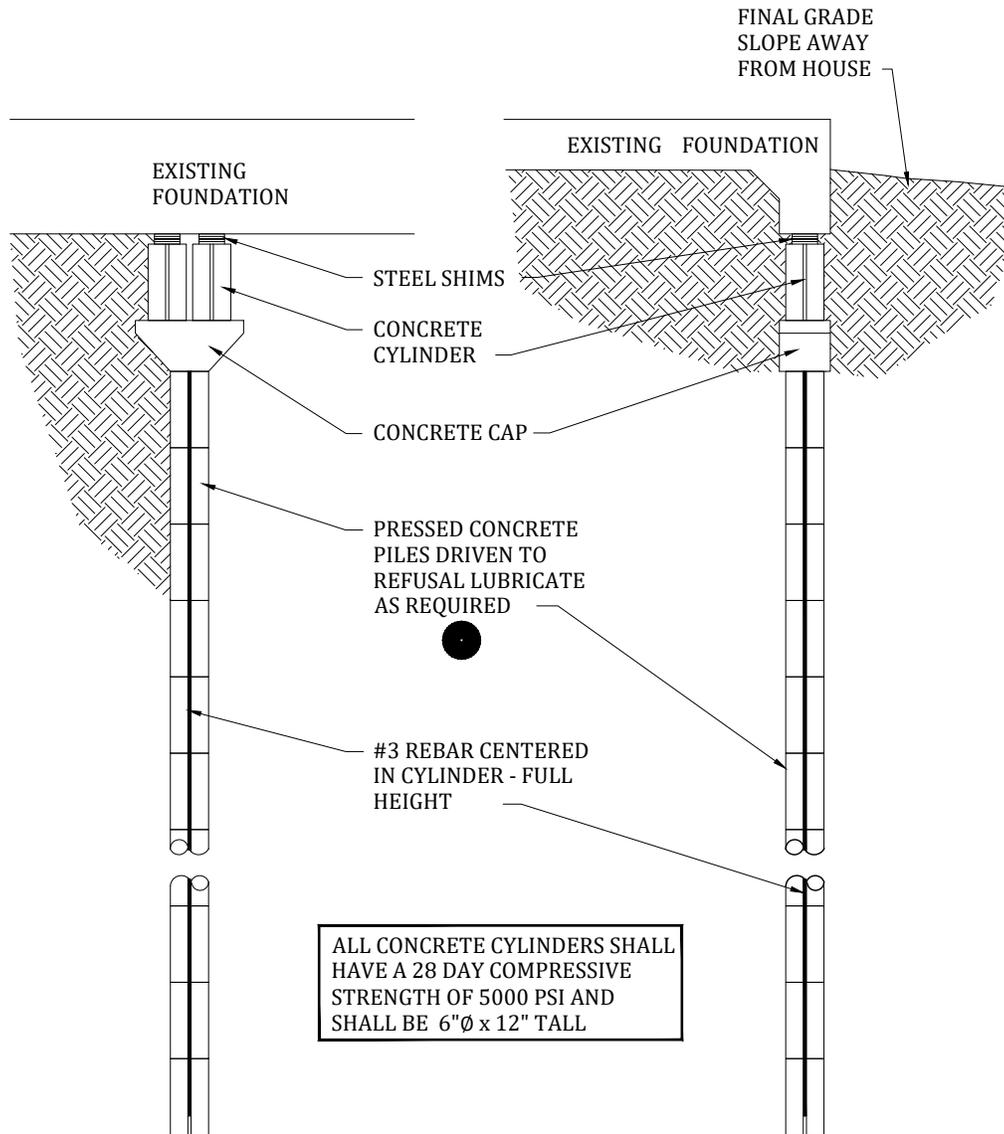


FIGURE 2

NTS

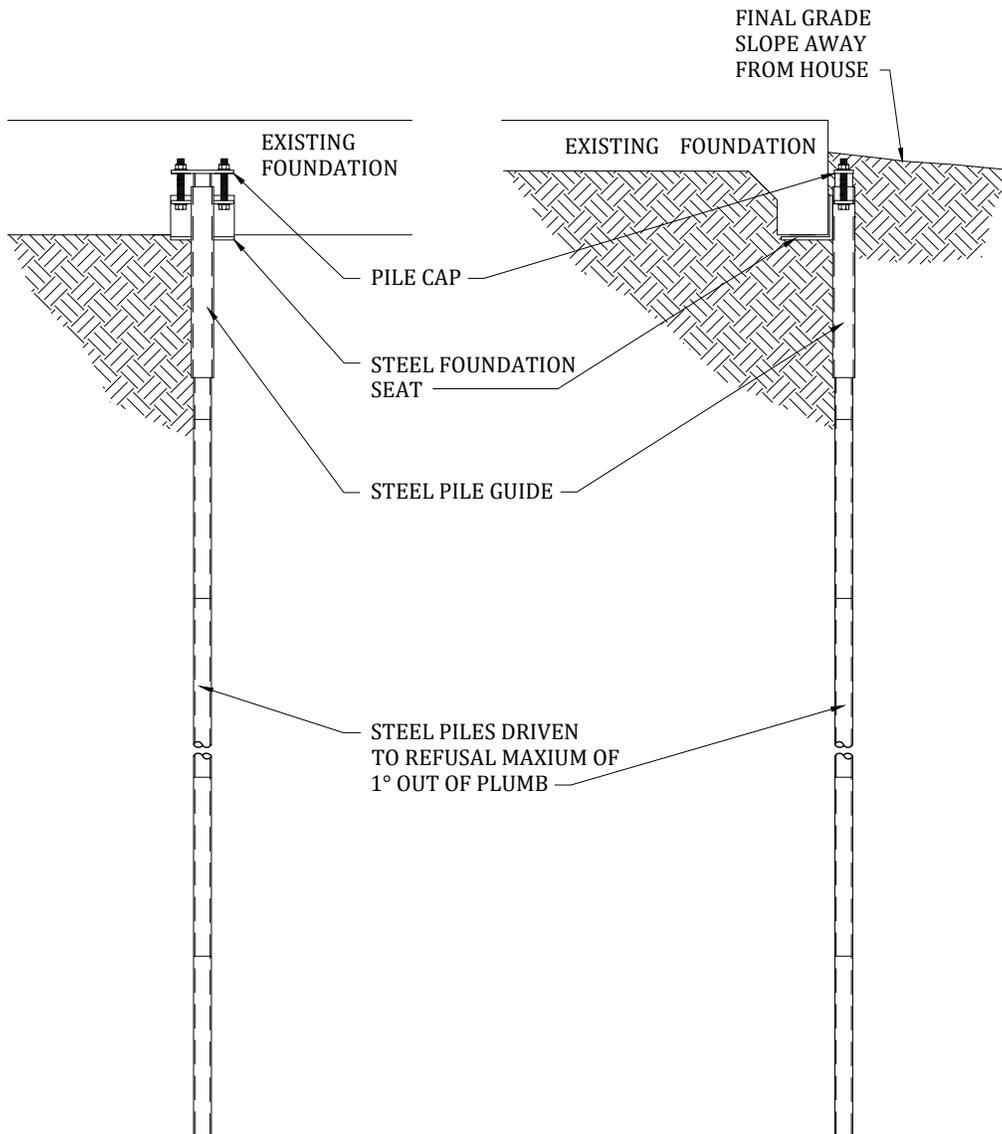


FIGURE 3

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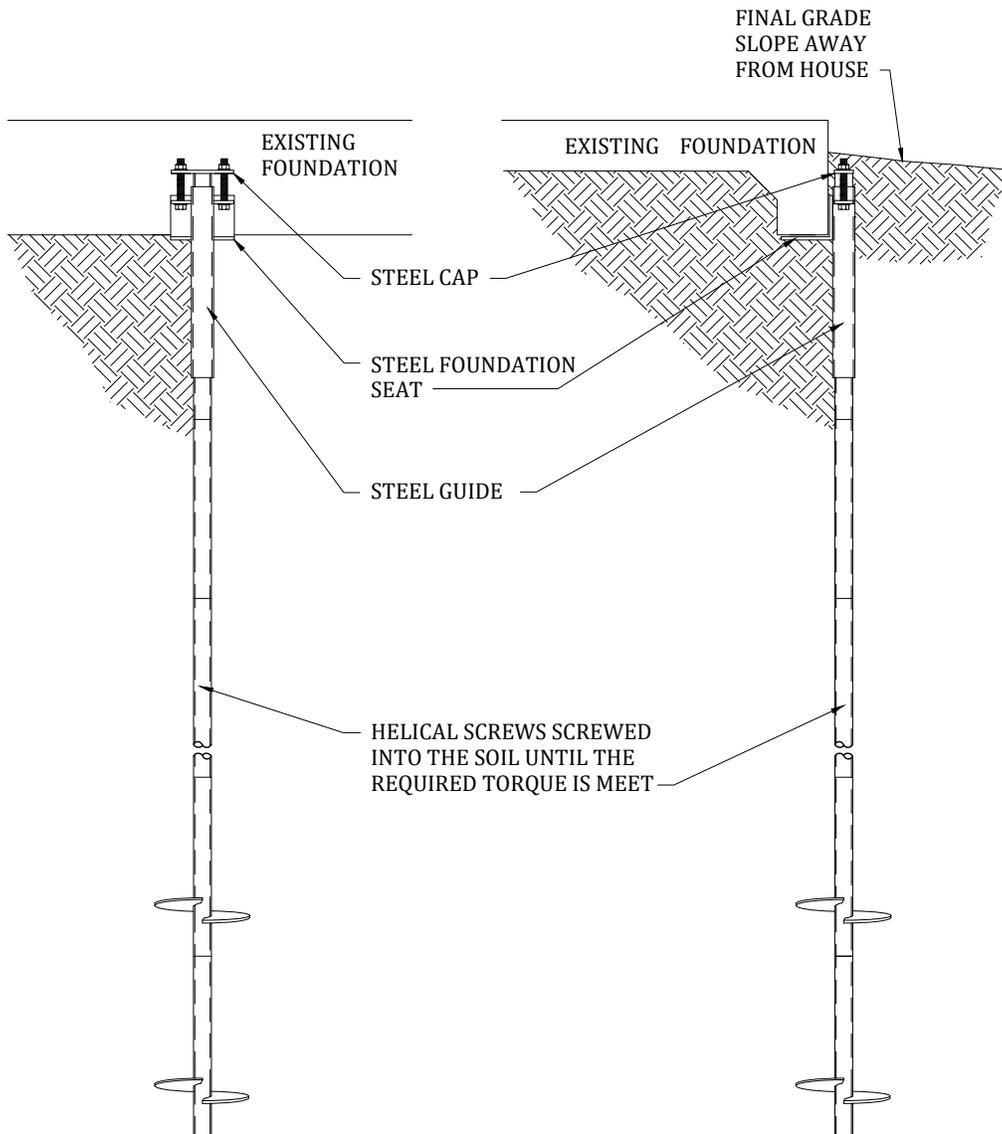
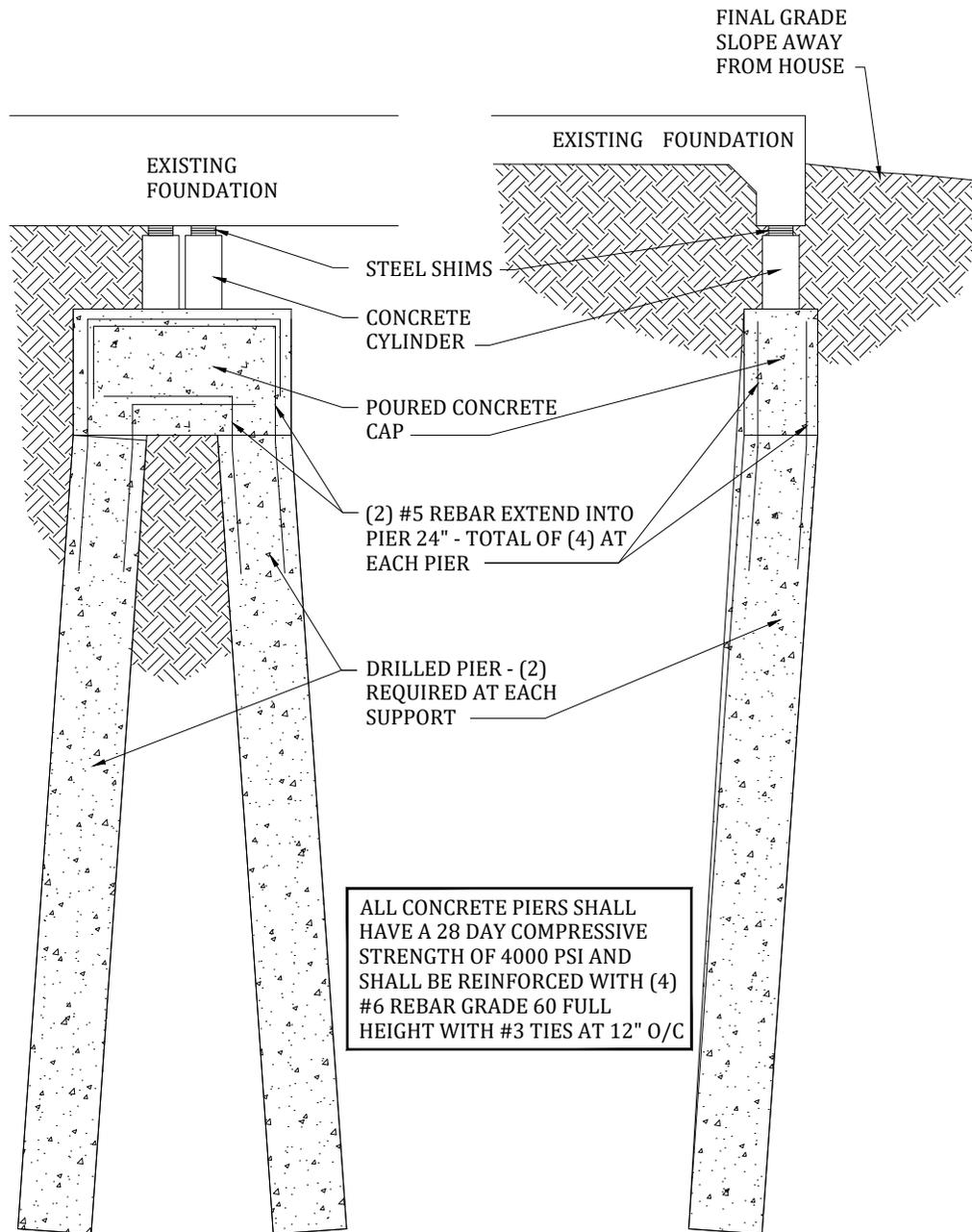


FIGURE 4

NTS

ALL CONCRETE CYLINDERS SHALL
HAVE A 28 DAY COMPRESSIVE
STRENGTH OF 5000 PSI AND
SHALL BE 6"Ø x 12" TALL



ALL CONCRETE PIERS SHALL
HAVE A 28 DAY COMPRESSIVE
STRENGTH OF 4000 PSI AND
SHALL BE REINFORCED WITH (4)
#6 REBAR GRADE 60 FULL
HEIGHT WITH #3 TIES AT 12" O/C

FIGURE 5

NTS