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June 3, 2022

Steven Brewer  
Email: [brewersteven019@gmail.com](mailto:brewersteven019@gmail.com)

Re: Foundation design  
863 Robin Meadow Court  
Desoto, Texas

Dear Steven:

Pursuant to your requests, I inspected the lot for the proposed home and have designed the attached foundation design. In any case where there is a conflict between Architectural Plans and this foundation plan the Architectural plan will override.

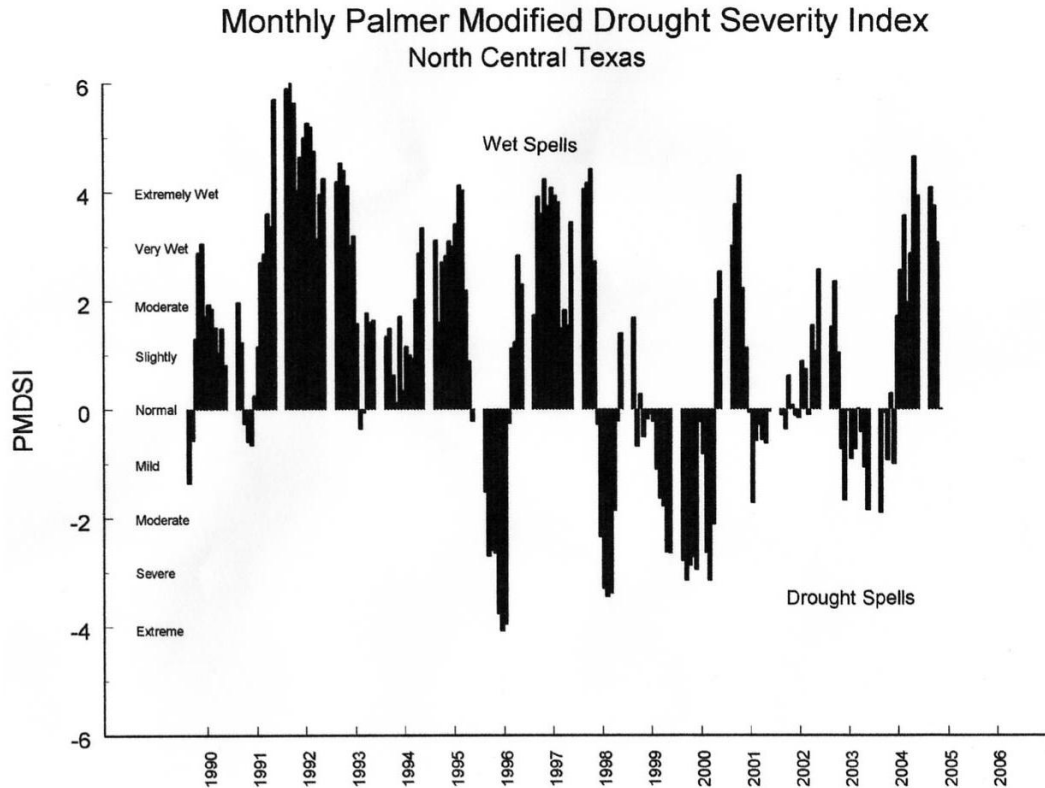
#### **FOUNDATION DESIGN SCHEME**

This foundation will be a slab-on-grade foundation with drilled pier support. In accordance with the architectural plans provided by Steven Brewer, I have prepared the attached foundation design for the above referenced dwellings. No Geotechnical study was provided but this inspection indicated there is what appears to be Austin Chalk Limestone in the creek.

This foundation is designed with drilled concrete piers that should be terminated 4' into the gray shale that appears some 12' to 15' below the surface to prevent upheaval and provide the necessary axial support.

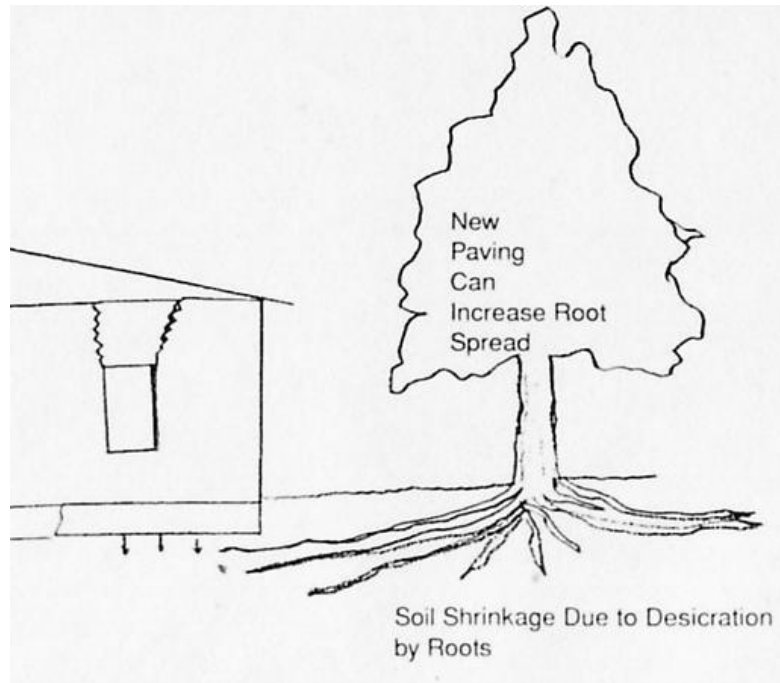
The homeowner should understand that the piers, if properly installed, will prevent settlement of the house but there is nothing to prevent upheaval. Therefore, positive drainage is critical to good foundation performance.

This house is situated in a region that is considered a semi-arid climate where there are very wet springs followed many times by extreme drought. The following chart shows just how dramatic these fluctuations can be from year to year.



Therefore, it is important drainage be positive away from the foundation and watering replenish moisture lost through evaporation during periods of drought. Per the International Residential Code it is important that soil start at a point 8" below the finish floor elevation, slope outward at a 5% slope for the first 10' and then off property at a minimum 2% slope.

A potential problem is a tree that is much too close to the foundation and can be a contributor, if not the cause of settlement at the perimeter. Trees will extract moisture from under a foundation by a process called evapotranspiration through their root system, which is especially problematic during times of drought since there is more moisture under a foundation than in the yard.



It is important that trees not be allowed to grow close enough to adversely affect a foundation. Therefore, the owner has two choices, remove the trees or install a root barrier between trees and house to lessen moisture fluctuation caused by the trees. No trees were observed near the proposed foundation but it is important that no trees be planted near the foundation or a root barrier must be installed. Note\* removed trees may cause upheaval for up to 2 years after removal.

## **TREATMENT OF SUB GRADE BY CHEMICAL INJECTION**

The timing of foundation installation will dictate if chemical injection is necessary. If this house construction is delayed until the very dry time of year then chemical injection may be required to lessen the chance of upheaval. The following injection procedure is provided here with to address this very active underlying soil. This procedure provides a proven solution to make an ion exchange with the clay platelets to reduce clay swelling by using a potassium injection as discussed below.

### **Back ground**

The intent of chemical treatment of an expansive clay sub grade is to reduce swell potential. The only chemical that has been found to be effective in this process is a solution containing Potassium Chloride. While Lime has been used successfully in many locations it's particle size is too large to fully penetrate the clay lattice with a liquid injection fluid. Therefore,

it must be mixed in with the clay and then compacted to achieve a cementation of the expansive clay, which does reduce swell potential when thoroughly mixed. The Potassium molecule is much smaller, which allows it to be injected with good penetration in most situations. The intent is to make an ion exchange with the clay, which will reduce its affinity for water and thereby lower swell potential.

### Chemical Composition

The chemical solution used for injection of the expansive sub grade should consist of a mixture of at least 1 gallon of dry Potassium Chloride per 200 gallons of water. The batch should be thoroughly mixed so that all granules of Potassium Chloride are completely dissolved in water prior to beginning each batch of injection.

### Injection Procedure

For a slab-on-grade foundation that sits upon expansive clay, the process involves injecting the foundation pad at a spacing of 3' o.c.e.w. and then injecting to a depth of 10' under pressure (500 psi to 1,500 psi) with a five point spray nozzle (a 40 degree spray at each 90 degrees horizontally and a 40 degree spray nozzle at the tip for vertical penetration). The procedure is to push down the nozzle at the end of a wand and stop at each 1' vertical interval and stay at that level until returns are realized and then go the next lower 1' level. For a material such as depicted on the soil borings for this site, it will be important to inject each hole twice but on different days so that maximum penetration can be achieved at each layer of soil.

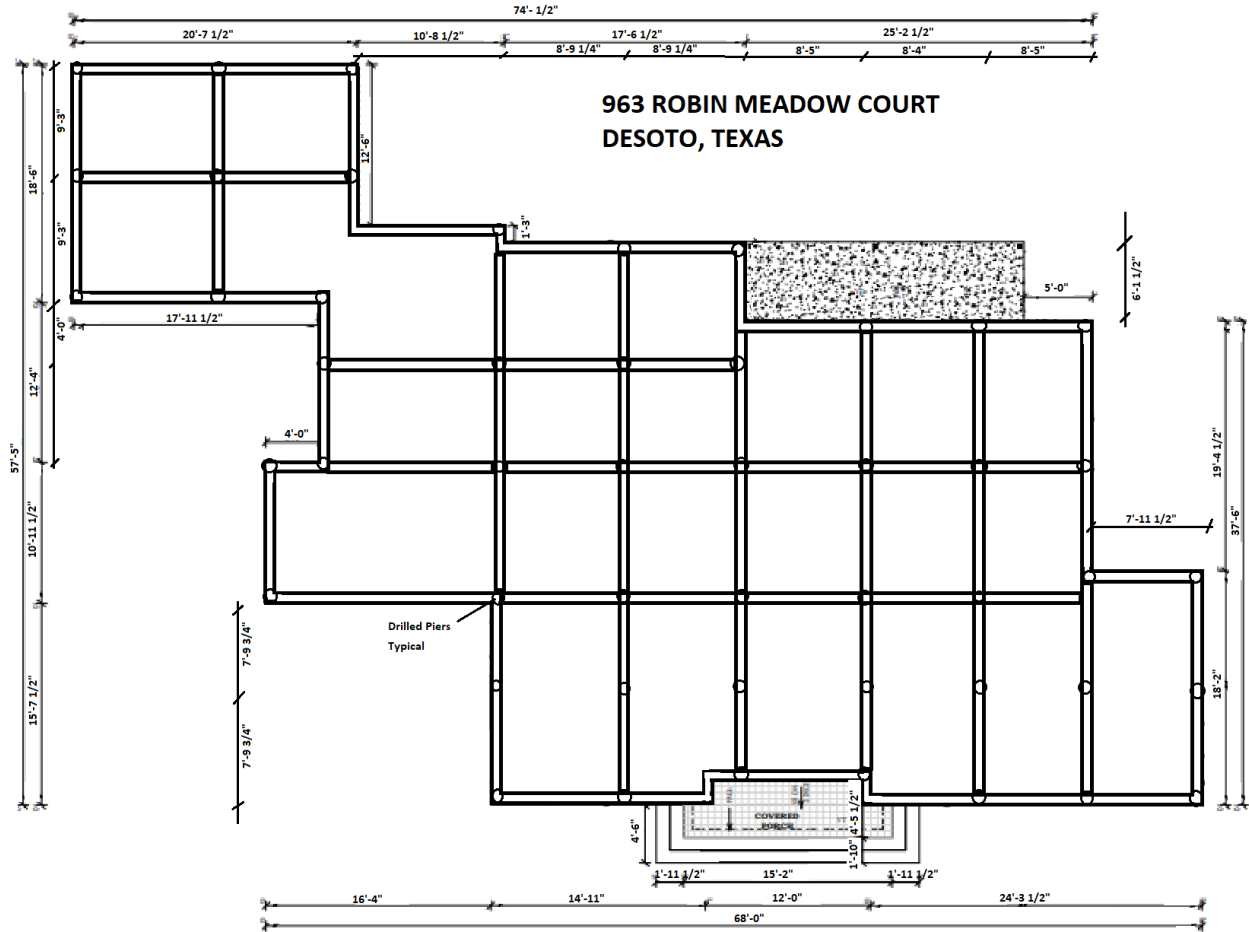
The area of injection will include not only inside the driveway footprint but around the perimeter with a spacing of 3' o.c.e.w.

### Testing Procedure

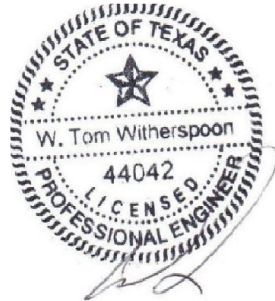
An independent testing laboratory should take samples at 3', 6' and 9' and test them to determine the free swell potential. This test should be completed for each 5,000 s.f. section of foundation pad injected to determine swell potential and confirm success with injection. Each sample hole should have a swell potential that does not exceed 0.5%. Should any test section fail to meet the swell threshold, that section must be re-injected and then tested again to make sure all sections have no greater swell potential than 0.5%.

## **SPECIAL PROVISIONS**

The garage will slope at a minimum 1 ½" from back to front to allow wash-out. The thickness of slab in the garage will, however, remain 6" thick.



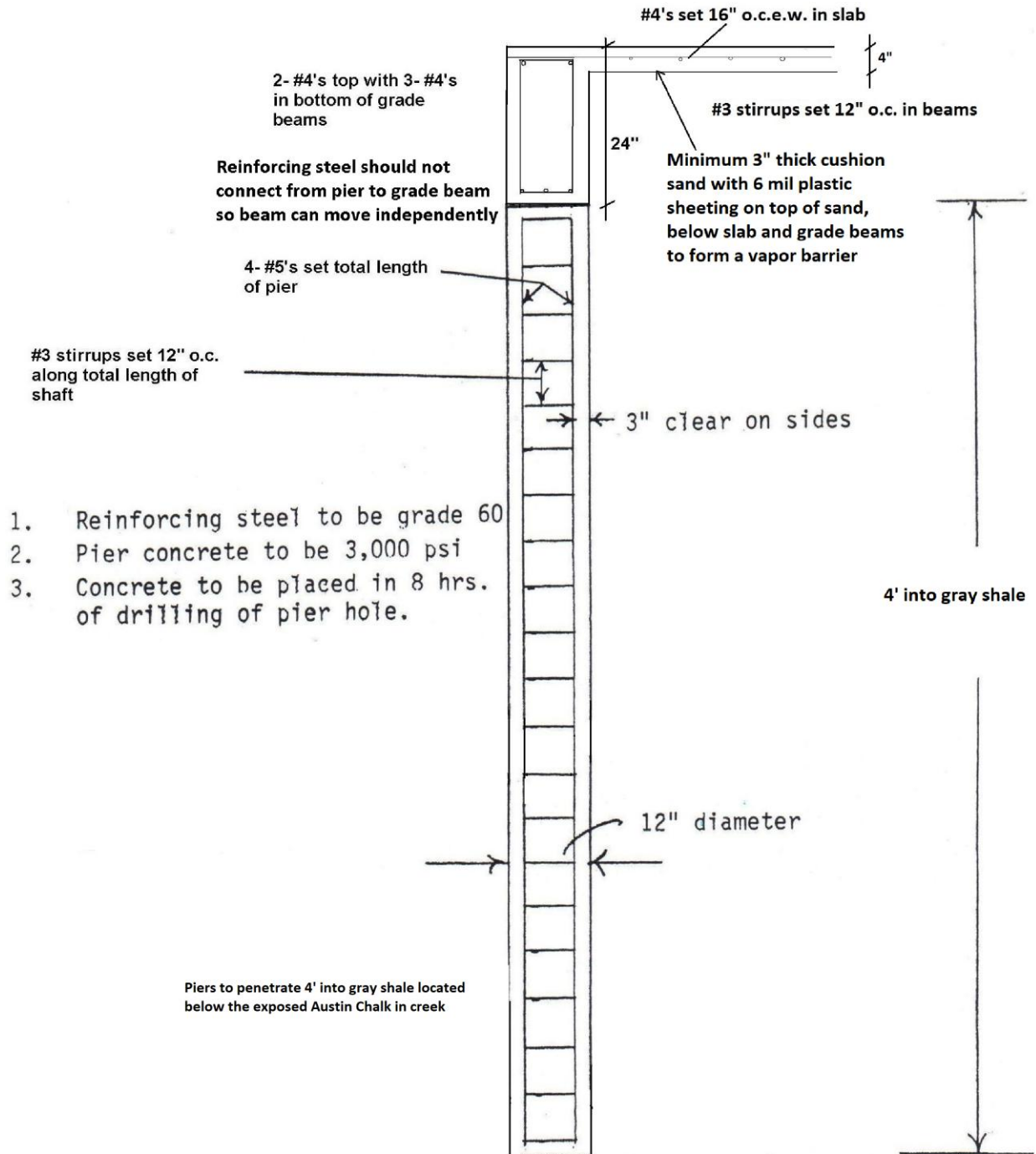
1 FOUNDATION PLAN



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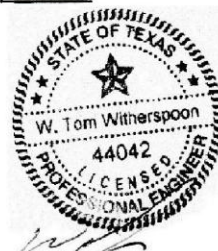
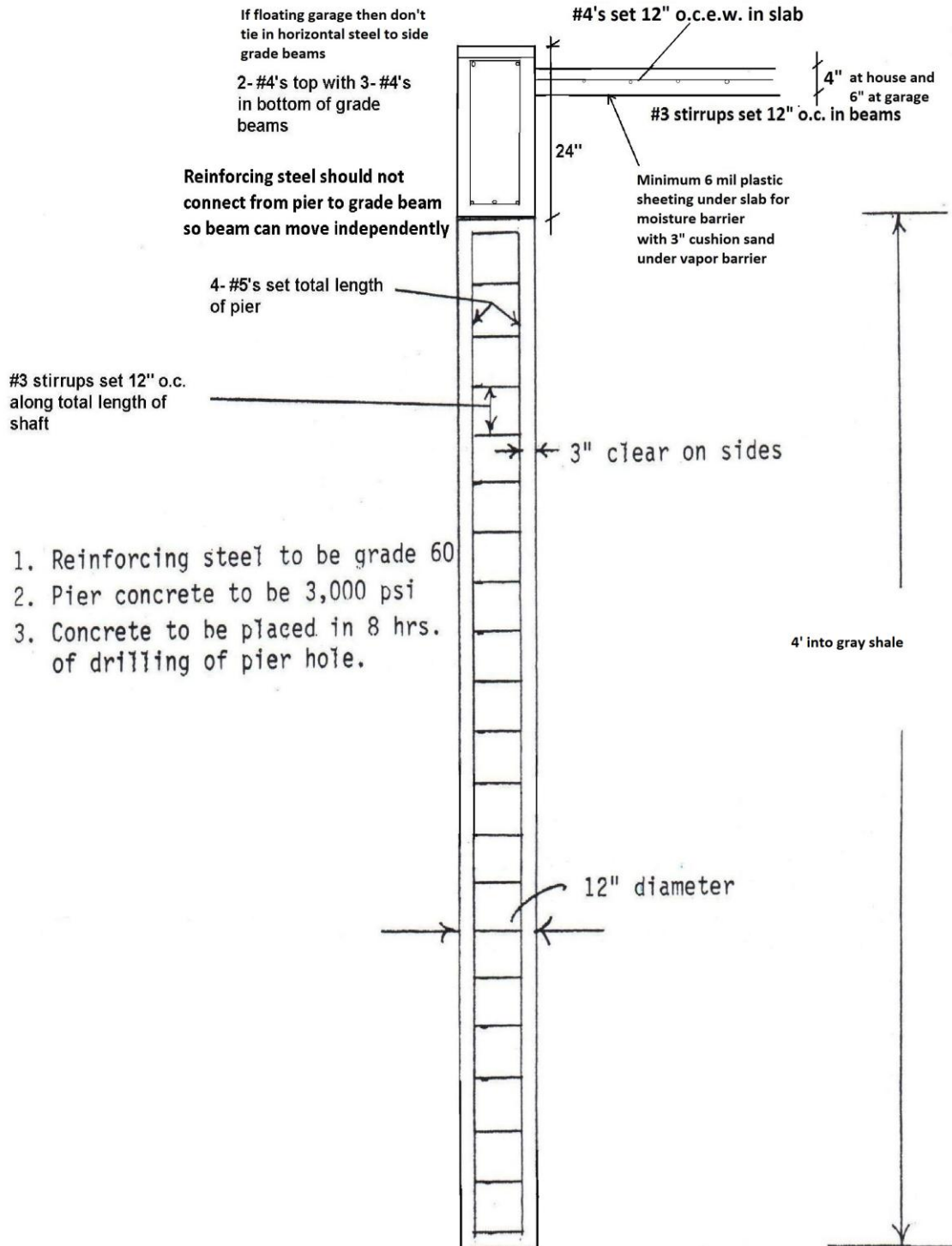
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June 4, 2022



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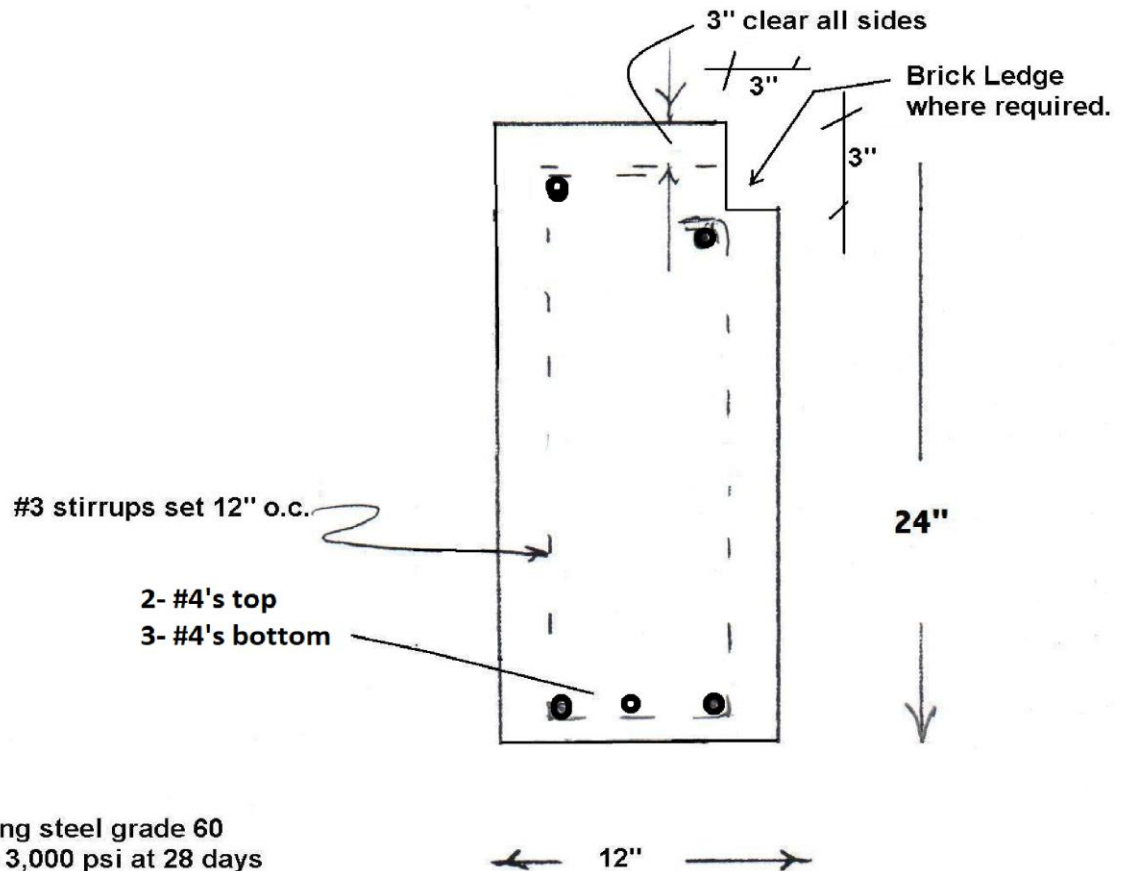
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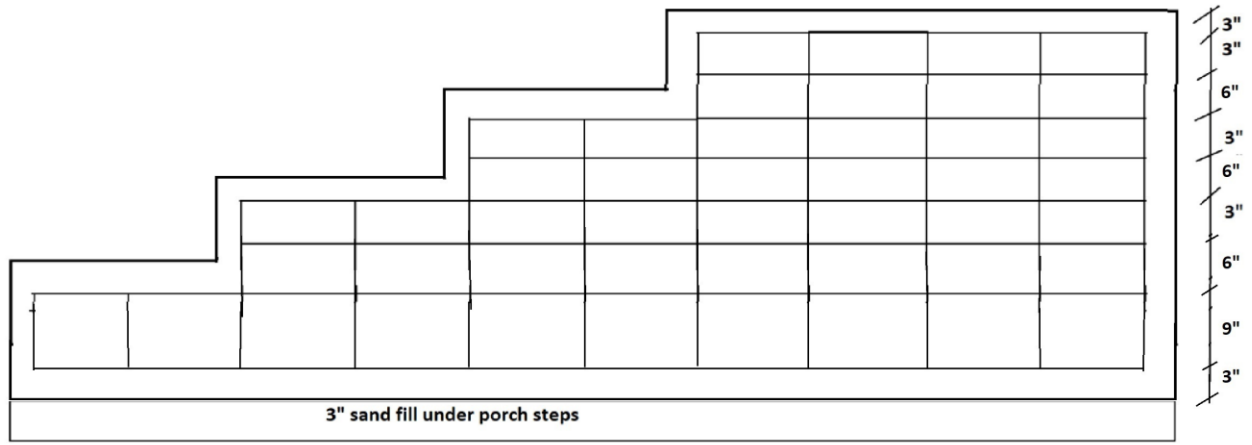




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PORCH STEP DETAIL



All rebar #4 spaced with #3 stirrups set 12" o.c.



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# AGREEMENTS AND LIMITATIONS

The opinions expressed in this report are based on information supplied by the Steven Brewer and/or an evaluation of current conditions observed at the time of this inspection.

Any prescribed design plan detailed by this report is based on architectural drawings provided by Steven Brewer. Compliance with any code or specification other than as expressly noted is specifically excluded.

Unless otherwise indicated, this report was prepared expressly for the client involved and expressly for purposes indicated by the client. Permission for use by any other persons for any purpose, or by client for a different purpose is denied unless otherwise stated in writing by this letter.

This writer shall have no liability for acts or omissions by the contractor or his subcontractors performing work on this project, or the failure of the contractor to perform the work in accordance with repair documents. This writer is not responsible for the construction means, methods, techniques, sequence, or procedures or the precautions incidental there in.

Whereas it is known to knowledgeable Professional Engineers that soils in this area are conducive to movement, expansion and/or contraction. This soil movement could possibly cause the foundation to move, even after the work has been completed as outlined in the recommendations. Although no warranty is expressed or implied as to the performance of this foundation, proper maintenance of consistent soil conditions along the perimeter of this structure should reduce further problems after the recommendations listed herein have been completed. The owner should be aware, however, that if water leaks occur stability of the foundation would be damaged.

WTW/tw



Sincerely,

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