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STRUCTURAL CALCULATIONS

PREPARED FOR

TARHEEL BASEMENT SYSTEMS

FOR

GLOVER RESIDENCE

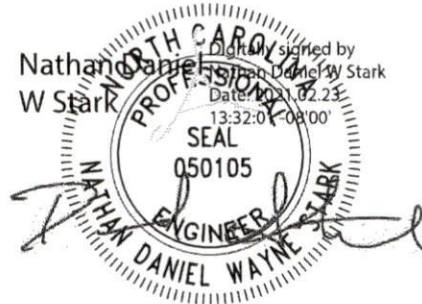
FOUNDATION REPAIR

955 BUNNLEVEL ERWIN ROAD
 BUNNLEVEL, NORTH CAROLINA

PROJECT NUMBER: 21.056.TBS

DATE: February 23, 2021

PROJECT MANAGER: DANIEL STARK, P.E.





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February 23, 2021

Project No.: 21.056.TBS

Tonya Gunn
Tarheel Basement Systems
2910 Griffith Road
Winston-Salem, North Carolina 27103

RE: Foundation repair - 955 Bunnlevel Erwin Road, Bunnlevel, North Carolina

PROJECT BACKGROUND

We understand that the structure is a single-family residence and has experienced settlement at the chimney. It is our understanding that (2) 2 7/8 inch diameter push piers have been proposed to provide additional foundation support.



Image 1: Front Elevation

GEOLOGIC SETTING

The existing structure is located in Bunnlevel, North Carolina. The geologic structure in the area is comprised of sandy loam and the site is relatively flat. It is our opinion that the localized settlement is a result of improper foundation drainage and/or undersized footings. We believe that suitable support can be achieved by installing helical and/or push piers.

SUMMARY

The ultimate load requirement for the push piers is 20000 lbs, and based on the geologic setting, we expect the piers to achieve adequate capacity at approximately 8 – 25 feet. We recommend that the piers with a 2 7/8 inch shaft and be installed to a minimum depth of 8 feet and a minimum installation pressure of 2100 psi, or refusal, using a 9.62 square inch hydraulic ram.

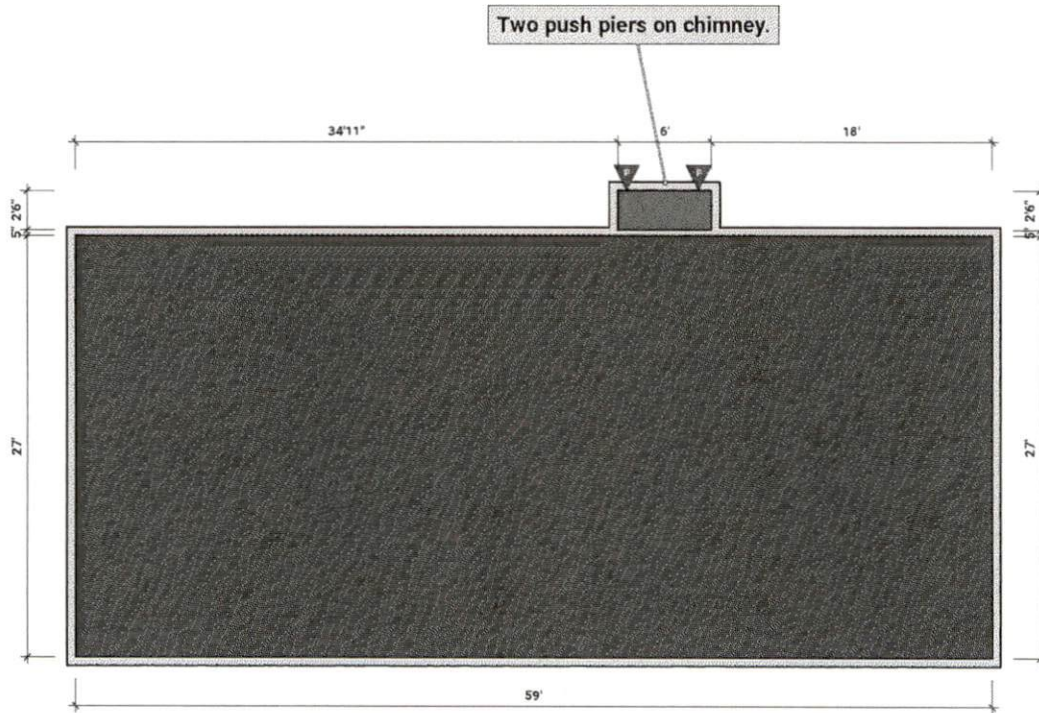
Regards,



Daniel Stark, P.E.
Stark Foundations



FLOOR LEVEL SURVEY



Front



PROJECT

Foundation Underpinning
955 Bunnlevel Erwin Road
Bunnlevel, North Carolina

Date: 23-Feb-21

Designed by: NDS

Project No.: 21.056.TBS

Design Criteria

Code(s):

International Building Code (IBC) 2015/2018
ASCE 7-10

Design Loads:

Dead:

Roof = 15 psf
Chimney = 45 psf
Third Floor = 15 psf
Second Floor = 15 psf
First Floor = 15 psf
Walls = 8 psf
8" Foundation Wall = 100 psf
Soil = 110 psf

Soil:

Allow Lateral Bearing Pressure = 200 psf/ft
Active Pressure = 60 psf/ft

Live:

Roof (snow) = 25 psf
Third Floor = 40 psf
Second Floor = 40 psf
First Floor = 40 psf

Wind: (not applicable)

Exposure = C
Wind Speed, V = 120 mph
Gust Effect Factor, G = 0.85
Internal Pressure Coefficient, GC_{pi} = -0.18
External Pressure Coefficient, C_p = 0.8

Risk Category = II

K_{zt} = 1.0
 K_d = 0.85
 K_z = 0.98
Height, h_z = 30 ft

Design Wind Pressure:

where: $p_w = q_z (GC_p - GC_{pi})$
 $q_z = 0.00256 K_z K_{zt} K_d V^2$

Design Load Combo = $D + 0.6W$
 $\omega = 0.6$

Therefore:

$q_z = 30.7$ psf
 $p_w = 26.4$ psf
Factored Wind Pressure, $p'_w = 15.8$ psf (say 16 psf)



PROJECT

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Push Pier Design - Worst Case

Vertical Design Loads:

Tributary Widths:

Roof =	0	ft	----->	0	plf
Chimney Area =	275	ft ²	----->	12375	lbs
Third Floor =	0	ft	----->	0	plf
Second Floor =	0	ft	----->	0	plf
First Floor =	0	ft	----->	0	plf
Walls =	0	ft	----->	0	plf
Chimney Footing Area (assume 24") =	21	ft ²	----->	6300	lbs
Soil (height) =	0	ft	----->	0	plf
				Σ DL =	18675

Live:

Roof (snow) =	0	ft	----->	0	plf
Third Floor =	0	ft	----->	0	plf
Second Floor =	0	ft	----->	0	plf
First Floor =	0	ft	----->	0	plf
				Σ LL =	0

No. Piers = 2

Pier Working Loads:

P_{DL} =	9338	lbs
$0.75 \cdot P_{LL}$ =	0	lbs
Working Load, P_{TL} =	10000	lbs
Ultimate Load, P_{ULT} =	20000	lbs

Pier Design:

Pier Type: Push Pier

Bracket: PP21617-34 Bracket Cap = 29340 lbs Therefore ok Reference ICC report (attached)

Shaft Diameter: 2.875"

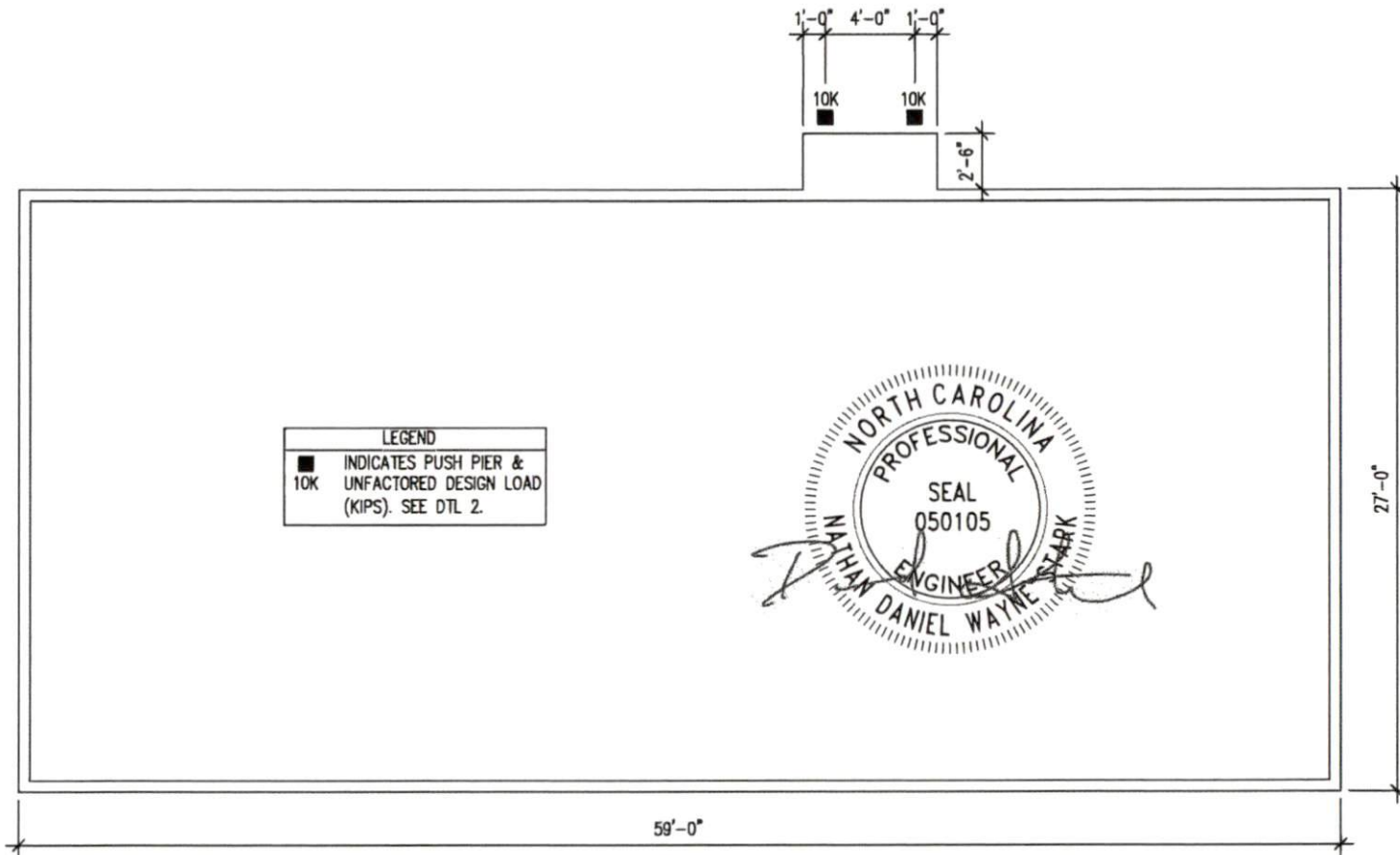
Installation Pressure, P:

$$Q_{ult} = 2 (P_{TL}) \quad Q_{ult} = A_{cyl} (P) \quad \text{where } A_{cyl} = \text{working area of the dual bore installation cylinder}$$

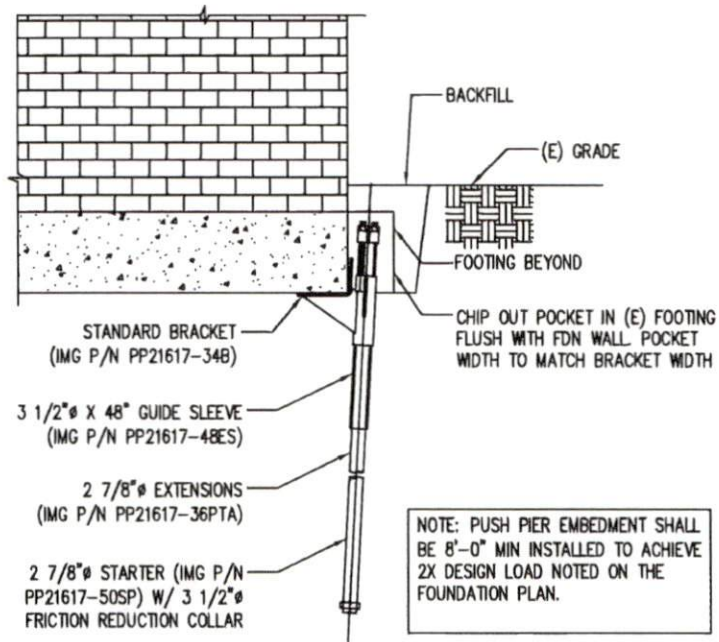
$$20000 \text{ lbs} \quad A_{cyl} = 9.62 \text{ in}^2$$

$$\text{Therefore, } P_{REQ} = Q_{ult} / A_{cyl}$$

$$2100 \text{ psi}$$



1 FOUNDATION REPAIR PLAN
SCALE 1/8"=1'-0"



2 PUSH PIER DETAIL - CHIMNEY
SCALE: 3/8"=1'-0"

