



NOTICE TO CONTRACTOR
All construction must comply with current NC Building Codes and is subject to field inspection and verification.

APPROVED
Limited building only review
Permit holder responsible for full compliance with the code

03/29/2021




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STRUCTURAL CALCULATIONS
PREPARED FOR
TARHEEL BASEMENT SYSTEMS
FOR
ADAMS RESIDENCE
FOUNDATION REPAIR
386 CAMELIA RD
ANGIER, NC

PROJECT NUMBER: 21.083.TBS

DATE: March 19, 2021

PROJECT MANAGER: DANIEL STARK, P.E.



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Nathan Daniel W
Stark
Date: 2021.03.22
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March 19, 2021

Project No.: 21.083.TBS

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

RE: Foundation repair - 386 Camelia Rd, Angier, NC

PROJECT BACKGROUND

We understand that the structure is a single-family residence and has experienced settlement at the front elevation of the structure . A recent floor level survey (attached) indicates as much as -1" of differential settlement may have occurred. 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 Angier, NC. The geologic structure in the area is comprised of silty 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





PROJECT

Foundation Underpinning
386 Camelia Rd
Angier, NC

Date: 19-Mar-21

Designed by: NDS

Project No.: 21.083.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 = 50 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

Foundation Underpinning
386 Camellia Rd
Angier, NC

Date: 19-Mar-21

Designed by: NDS

Project No.: 21.083.TBS

Push Pier Design - Worst Case

Vertical Design Loads:

Tributary Widths:

Roof =	11	ft	----->	165	plf
Third Floor =	0	ft	----->	0	plf
Second Floor =	4	ft	----->	60	plf
First Floor =	4	ft	----->	60	plf
Walls =	12	ft	----->	600	plf
Foundation Wall (height) =	2	ft	----->	200	plf
Soil (height) =	0.5	ft	----->	55	plf
				$\Sigma DL =$	1140 plf

Live:

Roof (snow) =	11	ft	----->	275	plf
Third Floor =	0	ft	----->	0	plf
Second Floor =	4	ft	----->	160	plf
First Floor =	4	ft	----->	160	plf
				$\Sigma LL =$	595 plf

Max Pier Spacing or Trib = 6 ft

Pier Working Loads:

$P_{DL} =$	6840	lbs
$0.75 \cdot P_{LL} =$	2678	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:

$$Q_{ult} = 2 (P_{TL})$$

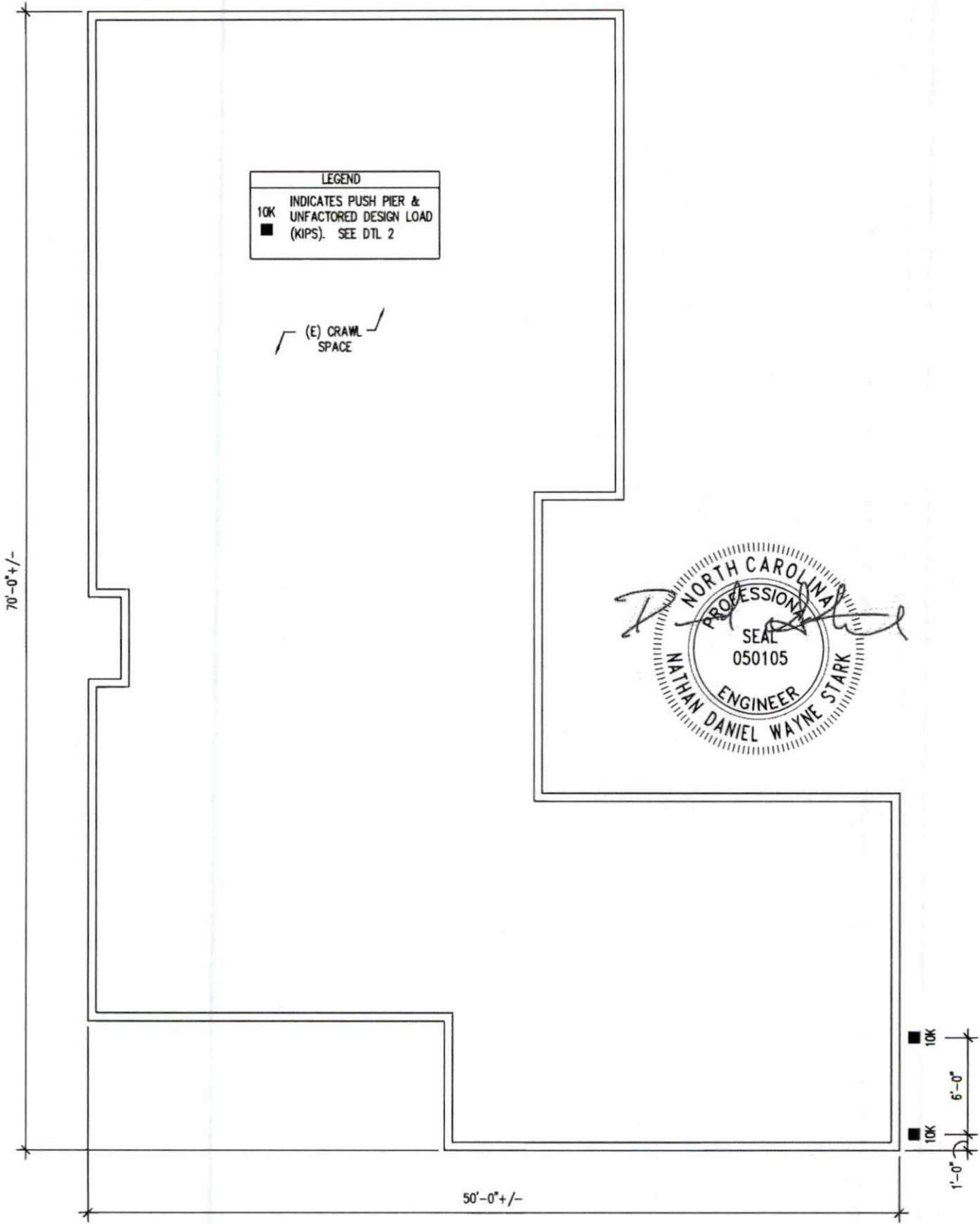
20000 lbs

$Q_{ult} = A_{cyl} (P)$ where A_{cyl} = working area of the dual bore installation cylinder

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

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

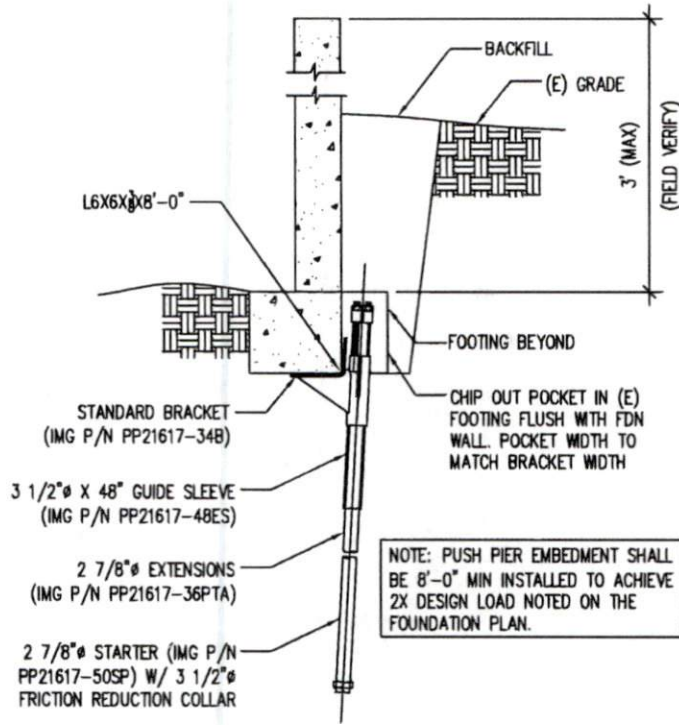
2100 psi



LEGEND	
10K	INDICATES PUSH PIER & UNFACTORED DESIGN LOAD
■	(KIPS). SEE DTL 2

∟ (E) CRAWL SPACE





2 2 7/8" ϕ PUSH PIER DETAIL
SCALE: 1/2" = 1'-0"