STARK FOUNDATIONS

3365 Skyway Drive
Auburn, AL 36830
P: 360.566.7343

STRUCTURAL CALCULATIONS

PREPARED FOR

TARHEEL BASEMENT SYSTEMS

FOR

LLOYD RESIDENCE

FOUNDATION REPAIR

821 HIGHGROVE RD

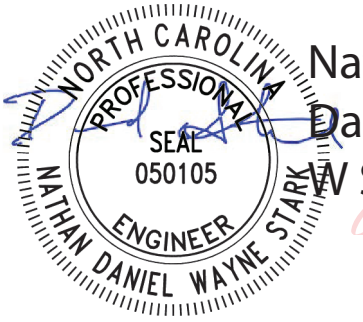
SPRING LAKE, NORTH CAROLINA

PROJECT NUMBER: 22.087.TBS

DATE: April 8, 2022

PROJECT MANAGER: Daniel Stark, P.E.

COA: C-4876



Nathan Daniel W Stark

Digitally signed by Nathan Daniel W Stark
Date: 2022.04.11 09:58:54 -05'00'

3365 Skyway Drive
Auburn, AL 36830
P: 360.566.7343

April 8, 2022

Project No.:22.087.TBS

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

RE: Foundation Repair - 821 Highgrove Rd, Spring Lake, North Carolina

PROJECT BACKGROUND

We understand the structure is a single-family residence and has experienced settlement at the left rear corner of the structure. A recent floor level survey (attached) indicates as much as ~1" of differential settlement may have occurred. It is our understanding (7) 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 Spring Lake, North Carolina. The geologic structure in the area is comprised of sandy loam and the site is relatively flat. It is our opinion the localized settlement is a result of improper foundation drainage and/or undersized footings. We believe suitable support can be achieved by installing push piers.

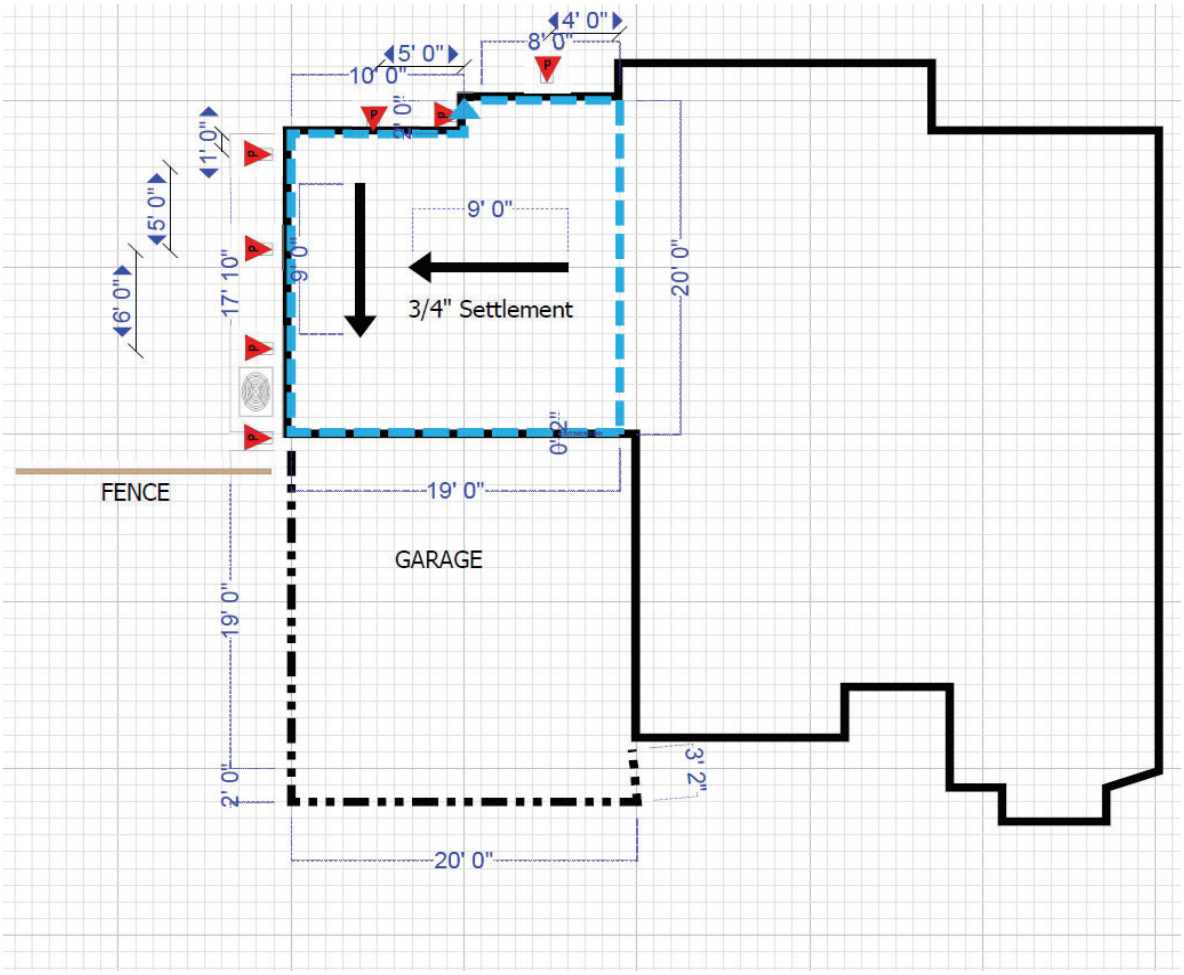
SUMMARY

The ultimate load requirement for the push piers is 14000 lbs, and based on the geologic setting, we expect the piers to achieve adequate capacity at approximately 8 – 25 feet. We recommend the piers with a 2 7/8 inch shaft be installed to a minimum depth of 8 feet and a minimum installation pressure of 1500 psi, or refusal, using a 9.62 square inch hydraulic ram.

Regards,

Daniel Stark, P.E.
Stark Foundations

FLOOR LEVEL SURVEY



STARK FOUNDATIONS

PROJECT

Foundation Repair
821 Highgrove Rd
Spring Lake, North Carolina

Date: 8-Apr-22
Designed by: ACS

Project No.: 22.087.TBS

Design Criteria

Code(s):

2018 North Carolina State Building Code
International Building Code (IBC) 2015
ASCE 7-10

Design Loads:

Dead:

Roof =	15	psf
Chimney =	45	psf
Third Floor =	15	psf
Second Floor =	15	psf
First Floor (4" Conc. Slab) =	50	psf
Walls =	8	psf
8" Foundation Wall =	100	psf
Soil =	110	psf

Soil:

Allow Lateral Bearing Pressure =	100	psf/ft
Active Pressure =	60	psf/ft

Live:

Roof (Snow) =	10	psf	
Roof Live Load =	20	psf	governs
Third Floor =	40	psf	
Second Floor =	40	psf	
First Floor =	40	psf	

Wind: (not applicable)

Exposure =	C		Risk Category =	II	
Wind Speed, V =	118	mph	K_{zt} =	1	
Gust Factor, G =	0.85		K_d =	0.85	
Int. Pressure Coefficient, GC_{pi} =	-0.18		K_z =	0.98	
Ext. Pressure Coefficient, Cp =	0.8		Height, h_z =	30	ft

Design Wind Pressure:

Design Load Combo = D + 0.6W

where: $p_w = q_z (GCp - GC_{pi})$ ω = 0.6

$q_z = 0.00256 K_z K_{zt} K_d V^2$

Therefore:

q_z = 29.7 psf

p_w = 25.5 psf

Factored Wind Pressure, p'_w = 15.3 psf (say 16 psf)

STARK FOUNDATIONS

PROJECT

Foundation Repair
821 Highgrove Rd
Spring Lake, North Carolina

Date: 8-Apr-22
Designed by: ACS

Project No.: 22.087.TBS

Push Pier Design - Worst Case

Vertical Design Loads:

Tributary Widths:

Dead:

Roof =	9	ft	------->	135	plf
Third Floor =	0	ft	------->	0	plf
Second Floor =	4	ft	------->	60	plf
First Floor =	4	ft	------->	200	plf
Walls =	16	ft	------->	128	plf
Foundation Wall (height) =	1	ft	------->	100	plf
Soil (height) =	1	ft	------->	55	plf
			ΣDL =	678	plf

Live:

Roof (live) =	9	ft	------->	180	plf
Third Floor =	0	ft	------->	0	plf
Second Floor =	4	ft	------->	160	plf
First Floor =	4	ft	------->	160	plf
			ΣLL =	500	plf

Max Pier Spacing or Trib = 6 ft

Pier Working Loads:

P_{DL} =	4068	lbs
0.75*P_{LL} =	2250	lbs
Working Load, P_{TL} =	7000	lbs
Ultimate Load, P_{ULT} =	14000	lbs

Pier Design:

Pier Type: Push Pier

Bracket: PP21617-34 Bracket Cap = 29340 lbs Therefore OK

Shaft Diameter: 2.875"

Installation Pressure, P:

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

14000 lbs

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

A_{cyl} = 9.62 in^2

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

1500 psi

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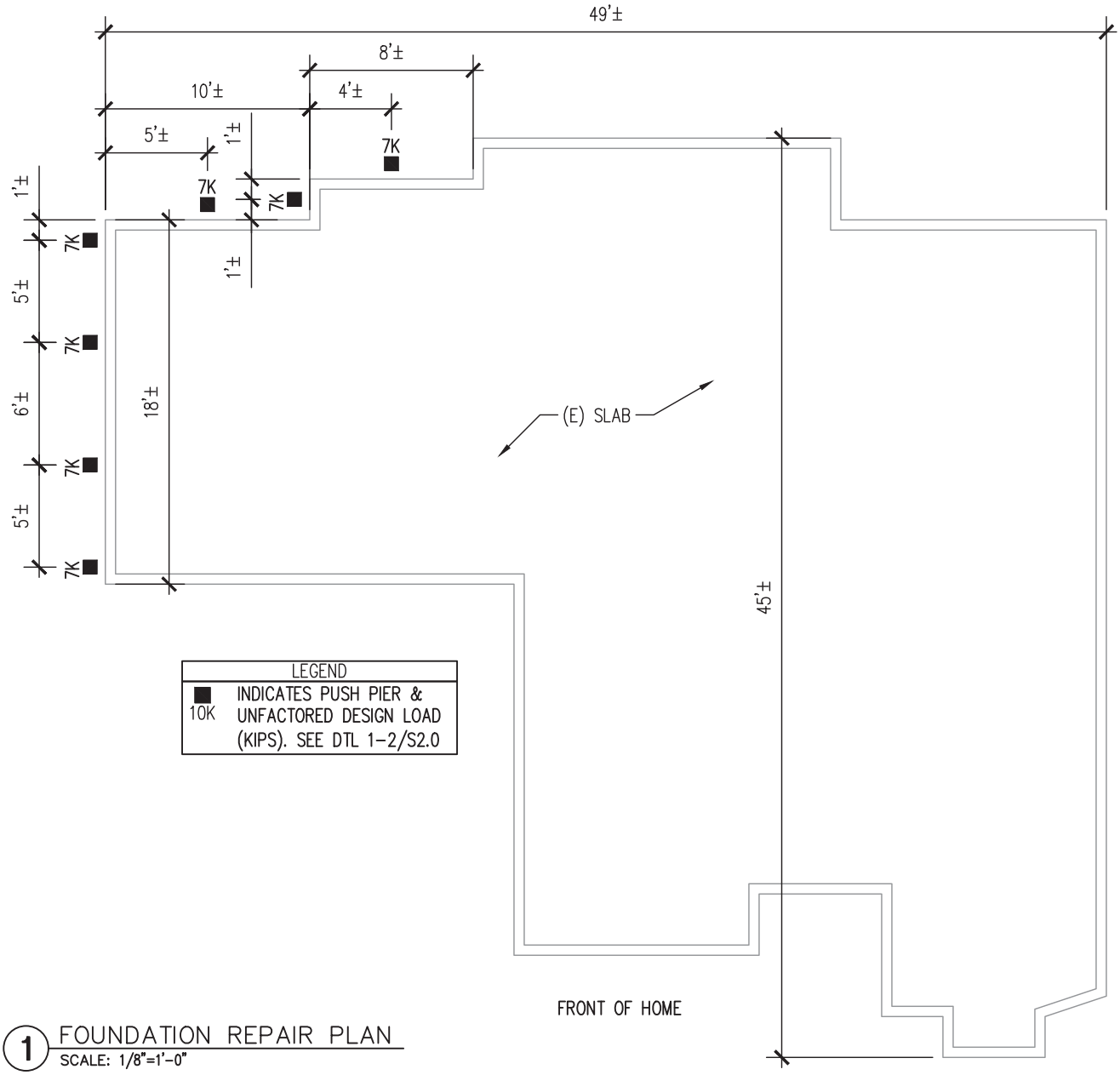

1 FOUNDATION REPAIR PLAN

SCALE: 1/8"=1'-0"

PLAN NOTES:

1. DO NOT INSTALL PIERS UNDER WINDOWS OR OPENINGS, UNLESS NOTED OTHERWISE.
2. PIERS CAN BE ADJUSTED A DISTANCE OF 1'-0"± AS LONG AS THE SPAN BETWEEN THE ADJUSTED PIER AND ADJACENT PIER DOES NOT EXCEED THE MAXIMUM RECOMMENDED SPACING. WHEN THE DISTANCE EXCEEDS THE MAXIMUM RECOMMENDED SPACING, CONSULT WITH THE ENGINEER OF RECORD FOR FURTHER DIRECTION.
3. PUSH PIERS SHALL BE INSTALLED TO A MINIMUM 2.0X THE DESIGN LOAD AS NOTED ON THE FOUNDATION REPAIR PLAN TO achieve AN ULTIMATE AXIAL LOAD OF 14,000 LBS MINIMUM. PIER EMBEDMENT SHALL BE 8'-0" MIN.

STAMP

NORTH CAROLINA PROFESSIONAL SEAL 050105 ENGINEER NATHAN DANIEL WAYNE STARK

PROJECT

FOUNDATION REPAIR
LLOYD RESIDENCE
821 HIGHGROVE RD.
SPRING LAKE, NC

CLIENT

TARHEEL
BASEMENT SYSTEMS
2910 GRIFFITH ROAD
WINSTON-SALEM, NC

FRONT ELEVATION

NO	REVISIONS	BY	DATE

ISSUED:	04.08.22	PROJ NO.:	22.087.TBS
DRAWN BY:	TLD	CHECKED BY:	DS

SHEET TITLE

FDN REPAIR PLAN

SHEET NUMBER

S1.0

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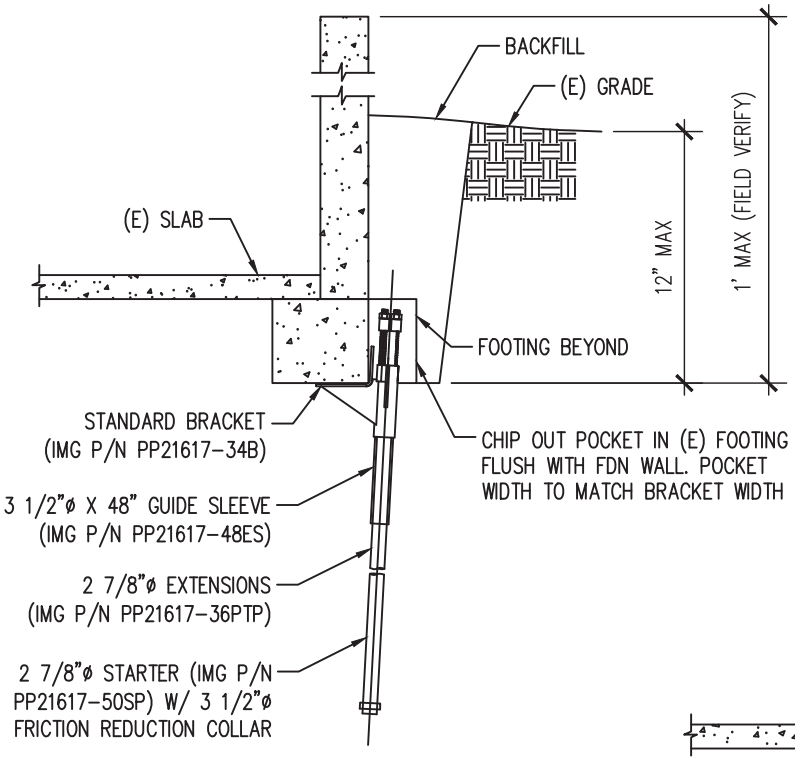
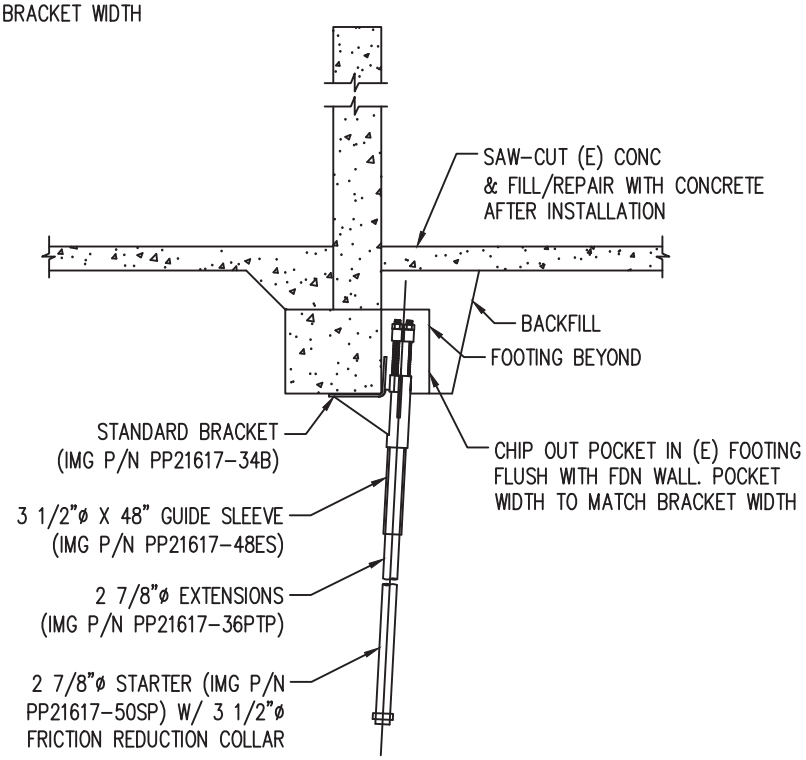


1 2 7/8"ø PUSH PIER DETAIL
SCALE: 3/8"=1'-0"



2 2 7/8"ø PUSH PIER DETAIL
SCALE: 3/8"=1'-0"

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NORTH CAROLINA PROFESSIONAL SEAL 050105 ENGINEER NATHAN DANIEL WAYNE STARK

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ISSUED:	04.08.22	PROJ NO.:	22.087.TBS
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SHEET TITLE

DETAILS

SHEET NUMBER

S2.0