STRUCTURAL CALCULATIONS
PREPARED FOR
TARHEEL BASEMENT SYSTEMS
FOR
FERRY RESIDENCE
FOUNDATION REPAIR
15 WESTER CIR
FUQUAY-VARINA, NORTH CAROLINA

PROJECT NUMBER: 25.027.TBR

DATE: March 6, 2025

PROJECT MANAGER: Shane Adams, P.E.

COA: C-4876

NORTH CAROLINA
PROFESSIONAL
SEAL
054665
SHANE C. ADAMS

Digitally signed by Shane Adams
03/06/2025 18:47:38 AM

March 6, 2025

Project No.:25.027.TBR

Tarheel Basement Systems
3333 Air Park Road
Fuquay-Varina, North Carolina 27526

RE: Foundation Repair - 15 Wester Cir, Fuquay-Varina, North Carolina

PROJECT BACKGROUND

We understand the structure is a single-family residence and the owner wishes to provide additional framing support. It is our understanding (2) S4x7.7 supplemental beams and (5) Intellijack systems have been recommended by the contractor. A recent field sketch (attached) indicates the proposed locations of repair.

Image 1: Front Elevation

GEOLOGIC SETTING

The existing structure is located in Fuquay-Varina, North Carolina. Based on the information provided by the USDA Web Soil Survey, the general site condition in the area is comprised of sandy loam and the site is relatively flat.

SUMMARY

Based on our scope of work, determing the design load, the design load requirement for the Intellijacks is 4000 lbs, and based on the technical manual for the Intellijack system, this is acceptable as the allowable load is 24100 lbs.

Regards,

Shane Adams, P.E.
Stark Foundations

CONTRACTOR-PROVIDED FIELD SKETCH

REAR

Water lines in way

30' 4 1/2"

8' 9"

-0.5

10'

5'

28' 1 1/2"

11' 3"

38' 7 1/2"

-0.25

-0.25

18' 7"

11' 4"

5' 2 1/2"

2' 5"

10' 2"

FRONT

Matt ferry

15 wester cir fuquay varina nc 27526

C# 232723

207-699-7057

CFI Jimmy Meloy

984-332-1142

Key

Cmu pier ☐

Sunk pier ☐

Intelijack ⊗

S4

STARK FOUNDATIONS

PROJECT

Foundation Repair
15 Wester Cir
Fuquay-Varina, North Carolina

Date: 6-Mar-25
Designed by: ACS

Project No.: 25.027.TBR

Design Criteria

Code(s):

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

Design Loads:

Dead:

			Soil:		
Roof =	15	psf	Allow Lateral Bearing Pressure =	100	psf/ft
Chimney =	45	psf	Active Pressure =	60	psf/ft
Third Floor =	15	psf			
Second Floor =	15	psf			
First Floor =	15	psf			
Walls =	8	psf			
8" Foundation Wall =	100	psf			
Soil =	110	psf			

Live:

Roof (Snow) =	15	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 =	116	mph	K_{zt} =	1	
Gust Factor, G =	0.85		K_d =	0.85	
Int. Pressure Coefficient, GC_{pi} =	-0.18		K_z =	1	
Ext. Pressure Coefficient, Cp =	0.8		Height, h_z =	30	ft

Design Wind Pressure:

Design Load Combo = D + 0.6W

where: $p_w = q_z (GCp - GC_{pi})$ $\qquad \omega = 0.6$

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

Therefore:

q_z =	29.3	psf
p_w =	25.2	psf
Factored Wind Pressure, p'_w =	15.1	psf (say 16 psf)

STARK FOUNDATIONS

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Intellijack Design - Worst Case

Vertical Design Loads:

  Tributary Widths:

   Dead:

Roof =	0	ft	------> 0	plf
Third Floor =	0	ft	------> 0	plf
Second Floor =	0	ft	------> 0	plf
First Floor =	22	ft	------> 330	plf
Walls =	0	ft	------> 0	plf
Foundation Wall (height) =	0	ft	------> 0	plf
Soil (height) =	0	ft	------> 0	plf

ΣDL = 330 plf

   Live:

Roof (live) =	0	ft	------> 0	plf
Third Floor =	0	ft	------> 0	plf
Second Floor =	0	ft	------> 0	plf
First Floor =	22	ft	------> 880	plf

ΣLL = 880 plf

  Max Pier Spacing or Trib = 3 ft

  Pier Working Loads:

   P_{DL} = 990 lbs
   P_{LL} = 2640 lbs
   Working Load, P_{TL} = 4000 lbs   (ASCE 7-16 Load Combo 2 Governs)

Pier Type: Intellijack

  Intellijack Column: Allowable Compression for system heights up to 9ft = 24.1 kips

Footing Check: Allowable Bearing Pressure =   1500   psf

Footing Type	Length (in)	Width (in)	Depth (in)	A_{FTG} (ft²)	Soil Pressure (psf)	
CIP Concrete	24	24	12	4	1000	<1500 psf OK
Gravel	24	24	12	4	1000	<1500 psf OK
Endurocrete IJ-IC	24	24	12	4	1000	<1500 psf OK
-	-	-	-	-	-	

PROJECT

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Loads for Beam Design

Vertical Design Loads:

Tributary Widths:

Dead:

Roof =	0	ft	------>	0	plf
Third Floor =	0	ft	------>	0	plf
Second Floor =	0	ft	------>	0	plf
First Floor =	4.5	ft	------>	67.5	plf
Walls =	0	ft	------>	0	plf
Foundation Wall (height) =	0	ft	------>	0	plf
Soil (height) =	0	ft	------>	0	plf
			ΣDL =	67.5	plf

Live:

Roof (live) =	0	ft	------>	0	plf
Third Floor =	0	ft	------>	0	plf
Second Floor =	0	ft	------>	0	plf
First Floor =	4.5	ft	------>	180	plf
			ΣLL =	180	plf

Max Pier Spacing or Trib = 6 ft

Pier Working Loads:

P_{DL} = 405 lbs
P_{LL} = 1080 lbs
Working Load, P_{TL} = 2000 lbs   (ASCE 7-16 Load Combo 2 Governs)

Pier Type: Intellijack

Intellijack Column: Allowable Compression for system heights up to 9ft = 24.1 kips

Footing Check: Allowable Bearing Pressure = 1500 psf

Footing Type	Length (in)	Width (in)	Depth (in)	A_{FTG} (ft²)	Soil Pressure (psf)	
CIP Concrete	18	18	10	2.25	889	<1500 psf OK
Gravel	24	24	12	4	500	<1500 psf OK
Endurocrete IJ-IC	24	24	12	4	500	<1500 psf OK
-	-	-	-	-	-	

Beam :   **S4x7.7**

Analysis of Section: Max. Span = 6 ft   Allowable Dist. Load = 1200 plf
DL + LL = 247.5 plf   **ok**
Max. Cantilever = 2 ft   Span / 2 = 3 ft   **ok**

STARK
FOUNDATIONS
861-E N DEAN ROAD
AUBURN, AL 36830
P: 360.566.7343
www.starkfoundations.com

31'±

5'± 4'±

2'±
6'±
2'±

4K
4K

(N) S4X7.7

(E) BEAM, TYP.

(E) CRAWL SPACE

2'-6"±

19'-6"±

32'-6"±

44'±

4K
2'± 2'±
4'±
2'±

(N) S4X7.7

10'-6"±

1'-6"± 1'-6"±
1'-6"±
2'±

4K 4K

11'-6"±

4'-6"±MAX
(FIELD VERIFY)

FRONT OF HOME

LEGEND	
○ 10K	INDICATES INTELLIJACK & UNFACTORED DESIGN LOAD (KIPS) SEE DETAIL 1/S2.0
▨	INDICATES (E) CMU PIER
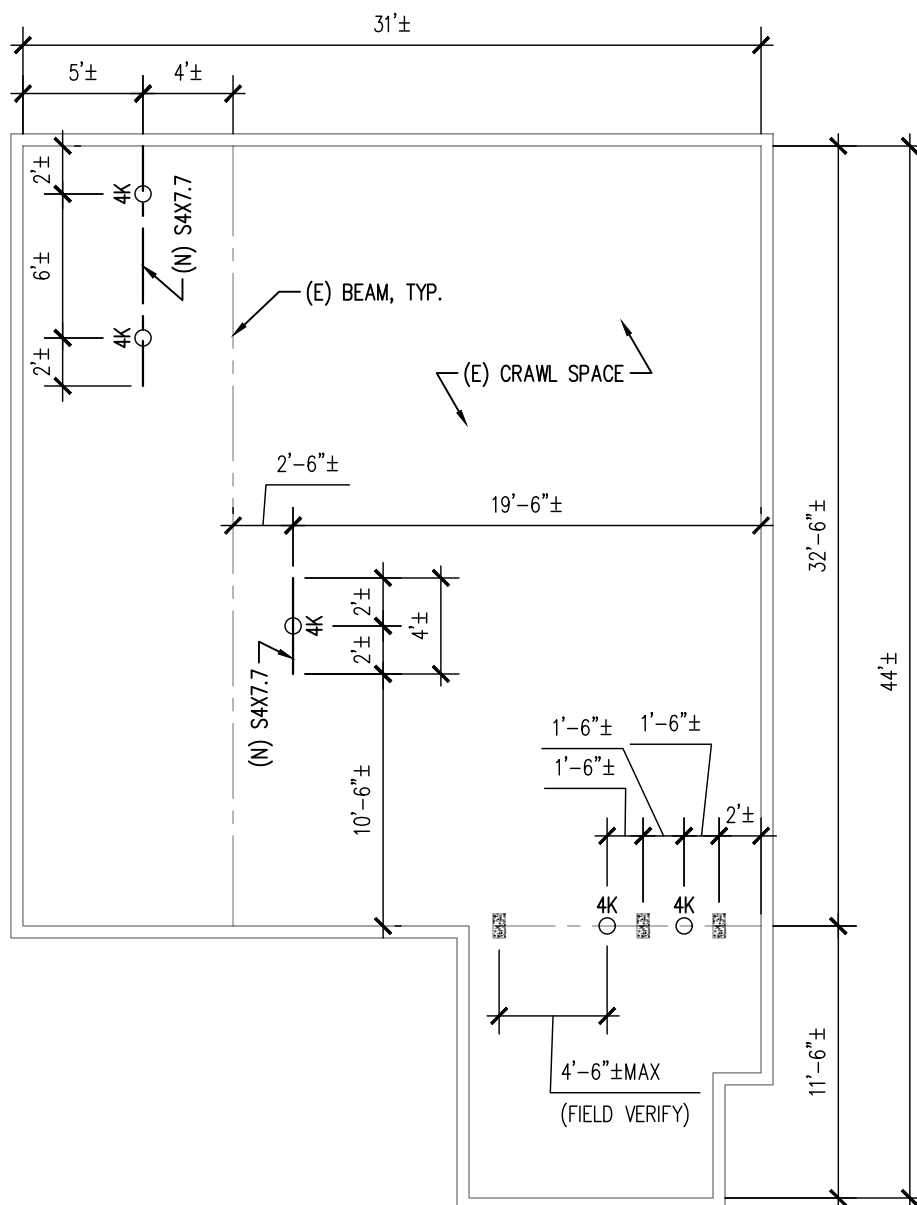
1 FOUNDATION REPAIR PLAN
SCALE: 1/8"=1'-0"

PLAN NOTES:

1. FIELD VERIFY ALL DIMENSIONS PRIOR TO STARTING CONSTRUCTION. NOTIFY STARK FOUNDATIONS OF ANY DISCREPANCIES.

STAMP

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PROJECT
FOUNDATION REPAIR
FERRY RESIDENCE
15 WESTER CIR
FUQUAY-VARINA, NC

CLIENT
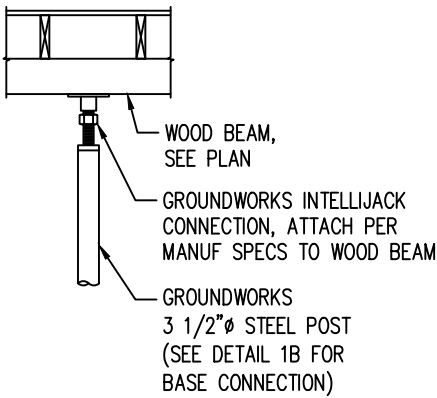TAR HEEL
BASEMENT SYSTEMS
3333 AIR PARK ROAD
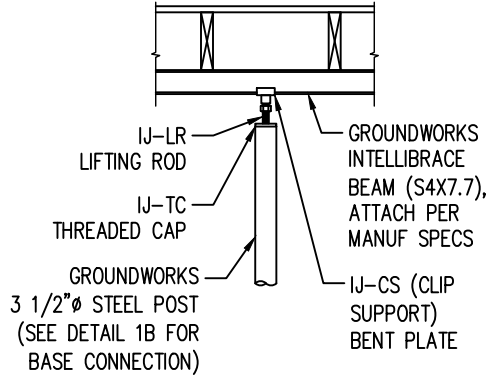FUQUAY-VARINA, NC

FRONT ELEVATION

NO	REVISIONS	BY	DATE
ISSUED:	03.05.25	PROJ NO.:	25.027.TBR
DRAWN BY:	SHA	CHECKED BY:	SA

SHEET TITLE
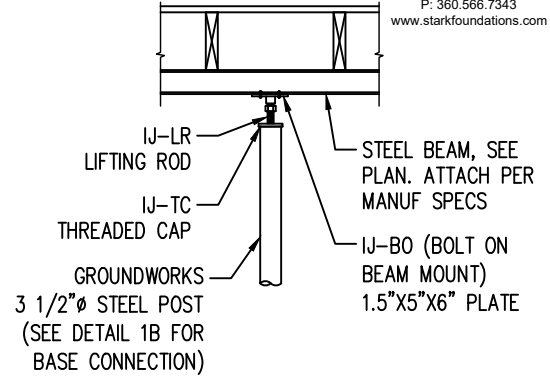FDN REPAIR PLAN

SHEET NUMBER
S1.0

NOTES:
1. HOUSE TO REMAIN UNOCCUPIED DURING THE REPLACEMENT OF EXISTING POSTS W/ NEW INTELLIJACK POSTS.
2. SUPPLEMENTAL/REPLACEMENT WOOD TO BE SOUTHERN PINE/DOUGLAS FIR, NO.2.
3. CAPACITY ASSUMES AN ALLOWABLE SOIL BEARING PRESSURE OF 1500 PSF.
4. CONCRETE COMPRESSIVE STRENGTH, F_c' = 2,500 PSI.
5. BOTTOM OF FOOTING SHALL NOT BE LESS THAN THE FROST DEPTH.

WOOD BEAM, SEE PLAN
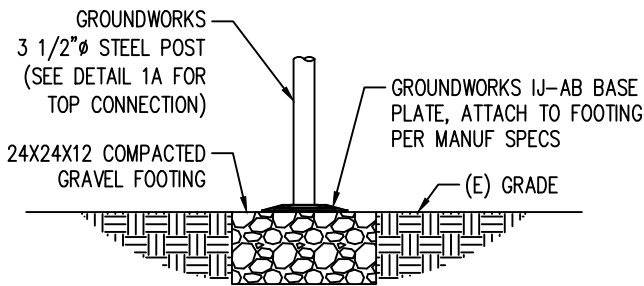GROUNDWORKS INTELLIJACK CONNECTION, ATTACH PER MANUF SPECS TO WOOD BEAM
GROUNDWORKS 3 1/2"⌀ STEEL POST (SEE DETAIL 1B FOR BASE CONNECTION)

1A.A: FLAT PLATE W/ WOOD BEAM

IJ-LR LIFTING ROD
IJ-TC THREADED CAP
GROUNDWORKS 3 1/2"⌀ STEEL POST (SEE DETAIL 1B FOR BASE CONNECTION)
GROUNDWORKS INTELLIBRACE BEAM (S4X7.7), ATTACH PER MANUF SPECS
IJ-CS (CLIP SUPPORT) BENT PLATE

1A.B: BENT PLATE W/ STEEL BEAM

IJ-LR LIFTING ROD
IJ-TC THREADED CAP
GROUNDWORKS 3 1/2"⌀ STEEL POST (SEE DETAIL 1B FOR BASE CONNECTION)
STEEL BEAM, SEE PLAN. ATTACH PER MANUF SPECS
IJ-BO (BOLT ON BEAM MOUNT) 1.5"X5"X6" PLATE

1A.C: FLAT PLATE W/ STEEL BEAM

1A: INTELLIJACK TOP CONNECTIONS

CONCRETE FOOTING SCHEDULE	
DESIGN LOAD	SIZE
1K-3K	18"X18"X10" THK
4K-6K	24"X24"X12" THK
7K-9K	30"X30"X15" THK

GROUNDWORKS 3 1/2"⌀ STEEL POST (SEE DETAIL 1A FOR TOP CONNECTION)
24X24X12 COMPACTED GRAVEL FOOTING
GROUNDWORKS IJ-AB BASE PLATE, ATTACH TO FOOTING PER MANUF SPECS
(E) GRADE

1B.A: BASE PLATE W/ GRAVEL FOOTING

GROUNDWORKS 3 1/2"⌀ STEEL POST (SEE DETAIL 1A FOR TOP CONNECTION)
GROUNDWORKS IJ-AB BASE PLATE, ATTACH TO FOOTING PER MANUF SPECS
CONCRETE FOOTING PER FOOTING SCHEDULE
(E) GRADE
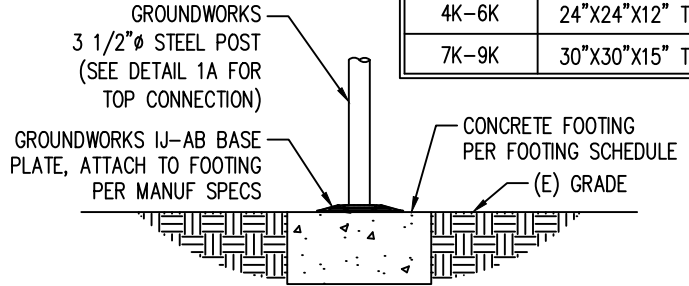
1B.B: IJ-AB BASE PLATE W/ CONCRETE FOOTING

GROUNDWORKS IJ-BP BASE PLATE, ATTACH TO FOOTING PER MANUF SPECS
14"⌀ X 6" ENDUROCRETE PRECAST FOOTING
GROUNDWORKS 3 1/2"⌀ STEEL POST (SEE DETAIL 1A FOR TOP CONNECTION)
24X24X12 COMPACTED GRAVEL FOOTING
(E) GRADE
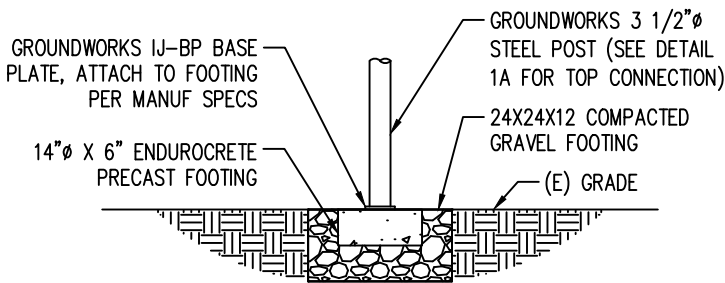
1B.C: ENDURO WHEEL W/ GRAVEL FOOTING

GROUNDWORKS IJ-BP BASE PLATE, ATTACH TO FOOTING PER MANUF SPECS
(E) GRADE
GROUNDWORKS 3 1/2"⌀ STEEL POST (SEE DETAIL 1A FOR TOP CONNECTION)
CONCRETE FOOTING PER FOOTING SCHEDULE
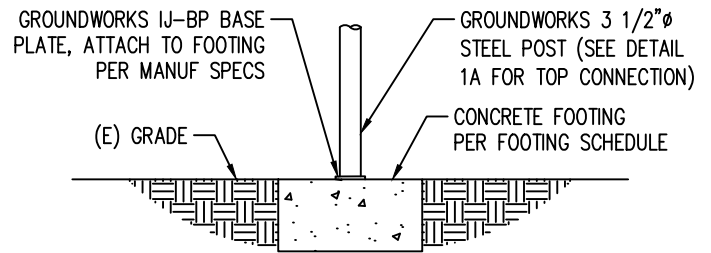
1B.D: IJ-BP BASE PLATE W/ CONCRETE FOOTING

1B: INTELLIJACK BASE CONNECTIONS

1 INTELLIJACK DETAIL
SCALE: 3/8"=1'-0"

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ENGINEER
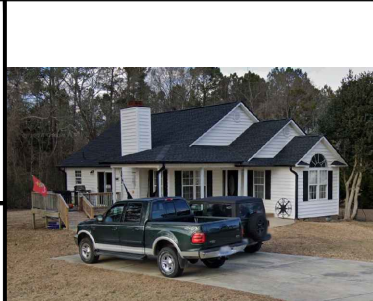SHANE C. ADAMS
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FERRY RESIDENCE
15 WESTER CIR
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NO	REVISIONS	BY	DATE

ISSUED:	03.05.25	PROJ NO.:	25.027.TBR
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SHEET TITLE
DETAILS

SHEET NUMBER
S2.0