NORTHWEST
ENGINEERING GROUP

Ram Jack West
862 Bethel Drive
Eugene, OR 97402

August 9, 2023

Re: **Mr. Christopher Lee**
Site Inspection
3619 81st Ave SE
Mercer Island, WA

Dear Ram Jack West,

Per your request, a site inspection was performed at the above residence on August 3, 2023. The purpose of the site inspection was to provide a general assessment of the structural condition of the foundation at the residence. The inspection was strictly visual and limited to the exposed areas of the structure. Documents detailing the construction of the residence were not available for review. The residence is estimated to be approximately sixty-seven (67) years old and for orientation purposes is assumed to face east.

Image 1: Front Elevation

The residence is a two-story wood framed structure. The residence has wood siding covering the exterior walls. The house is supported by a conventional reinforced concrete slab-on-grade system. The roof consists of metal standing seam panels and has rain gutters on the north and south sides of the residence. The interior walls of the residence are wood framed and sheathed with sheetrock. The interior floor covering consists of carpet, tile, and wood. Removal of any floor or wall coverings to inspect for cracking was beyond the scope of this investigation.

GEOLOGICAL SETTING AND SOILS

Preliminary soil data was obtained from the Web Soil Survey from Natural Resources Conservation Service produced by the United States Department of Agriculture. This soils survey indicates that the primary soil at the residence is classified as Kitsap silt loam. This soil has a slow infiltration rate and a slow rate of water transmission. Kitsap silt loam has a low to moderate shrink-swell potential with a Plasticity Index ranging from 5-20.

The geologic setting in this area is comprised of deposits of sand, silt, clay, and peat defined as Pre-Fraser undifferentiated glacial deposits of the Plesitocene (USGS National Geologic Map Database). According to Washington Geologic Information Portal, the site is not considered a landslide hazard and is relatively sloped.

It is our opinion that the settlement is a result of improper foundation drainage, poor soils conditions, and/or undersized foundations. We believe that a suitable support can be achieved by installing helical piles. Based on the site conditions, a full geotechnical report is not necessary.

OBSERVATIONS

Vegetation around the residence consists primarily of grassy areas with some small to medium shrubs. The residence does not appear to have a sprinkler system. The surface grades on the north, east and west sides of the residence appear to be relatively flat. The surface grade on the south side of the residence appears to be negatively sloped toward the foundation. No areas of ponding water were observed on any sides of the residence.

Some evidence of foundation movement was observed during the inspection which is noted on the attached Foundation and Elevation Assessment Plan (SK-1). The evidence consisted primarily of grade beam cracks and sloping floors.

Relative floor elevations were provided by Ram Jack West and spot-checked by Northwest during this investigation. The floor elevations were reportedly taken on June 30, 2023 with a Ziplevel. The Ziplevel is a pressurized hydrostatic altimeter and works by measuring the difference in elevations between the base unit and the handheld unit. The basepoint was reportedly set to 0.0 inch and located near the southeast corner of the residence. Negative elevations referenced are below the basepoint, and positive elevations are higher than the basepoint. The lowest point was recorded near the northwest corner of the residence. The high point was recorded at the basepoint. The elevation differential between the low and high points of the residence was found to be about 3 ½ inches. These elevations are shown on the attached Foundation and Elevation Assessment Plan (SK-1).

RECOMMENDATIONS

We recommend a total of ten (10) helical steel piles and one (1) driven steel pile be installed at the residence. Pile locations are shown on the Foundation and Elevation Assessment Plan (SK-1). The steel piling system used should have an evaluation service report (ESR) recognized by ICC-ES showing compliance with the currently adopted International Building Code (IBC). The steel piling system for the helical piles should also have a minimum allowable working load of

15.0 kips and be capable of uniformly raising the foundation as applicable. The minimum installation torque is 4,200 ft-lbs. The steel piling system for the driven pile should have a minimum allowable working load of 26.0 kips and be capable of uniformly raising the foundation as applicable.

The purpose of underpinning the foundation is to support portions of the structure that have experienced some differential settlement. The underpinning piles are designed to support the structural loads in the immediate areas where they are placed and not to prevent uplift from soil heave.

Maintaining uniform moisture around the foundation is very important. The landscape grades around the residence should be maintained to slope away from the residence where required. The landscape grades should slope away from the foundation at a minimum of ½" per foot for six (6'-0) feet. The top soil should extend a minimum of one (1'-0) foot above the bottom of the grade beam and should not extend above four (4") inches below the bottom of the siding. All new fill soil should be clayey sand with a minimum Plasticity Index (PI) of twenty-five (25). Watering the soil around the foundation is also important during dry periods to help maintain uniform moisture in the soil.

This concludes this report. Observations made in this report pertain to the condition of the residence on the date of the inspection which is subject to change. No foundation warranty is expressed or implied by this report. If we can be of further assistance or should you have any questions about this report, please do not hesitate to contact us.

Sincerely,

8/9/2023

Andrew Van Meter

Andrew Van Meter, E.I.T.
Engineering Technician

Darin Willis, P.E.
Managing Principal

Attachment:
Site Plan (SK-0)
Foundation and Elevation Assessment Plan (SK-1)
Ram Jack Helical Pile Detail with 4038 Bracket at Exterior (SK-2)
Ram Jack Driven Pile Detail with 4021 Bracket at Exterior (SK-3)
Footing & Pile Calculations
Ram Jack 4038 Bracket Shop Drawing
Ram Jack 4021 Bracket Shop Drawing
Ram Jack 2 7/8" Helical Pile Specification
Ram Jack 2 7/8" Driven Pile Specification

Department of Local Services
Permitting Division

Residential Site Plan Template
11" x 17"

For Permitting Use

Received Date _____

Max. Impervious Surface Allowed _____
Max. Bldg. Height Allowed _____
Min. Bldg. setback from Street _____
Min. Garage setback from Street _____
Min. Bldg. setback from Interior _____

Signature _____
Date _____

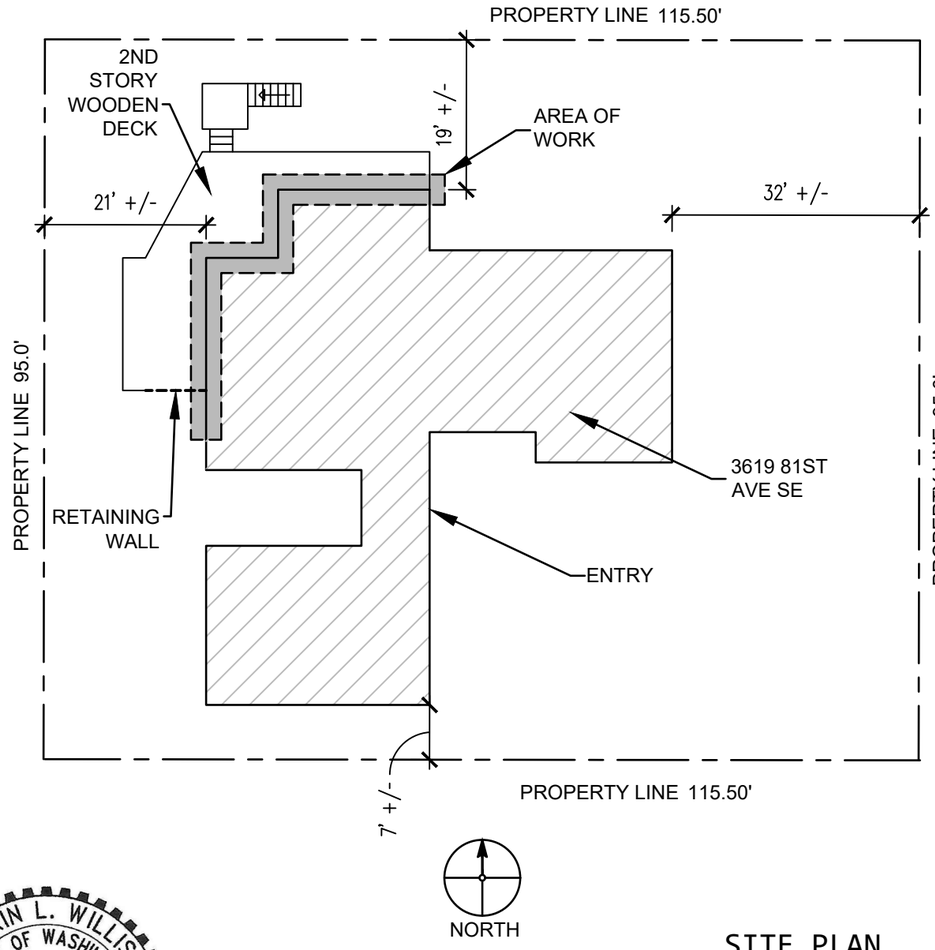
Building Approval
Signature _____
Date _____

Engineering / Drainage Approval
Signature _____
Date _____

Critical Areas Approval
Signature _____
Date _____

Clearing / Grading Approval
Signature _____
Date _____

Fire Approval
Signature _____
Date _____



SITE PLAN

DARIN L. WILLIS
STATE OF WASHINGTON
57483
REGISTERED
PROFESSIONAL ENGINEER
8/9/2023

PARCEL DETAILS

NUMBER: 445770-0110
OWNER: LEE CHRISTOPHER & JANICE
SITE ADDRESS: 3619 81ST AVE SE, MERCER ISLAND, WA 98040
LEGAL DESCRIPTION: LUCAS HILL ADD
PLAT BLOCK: 2
PLAT LOT: 4

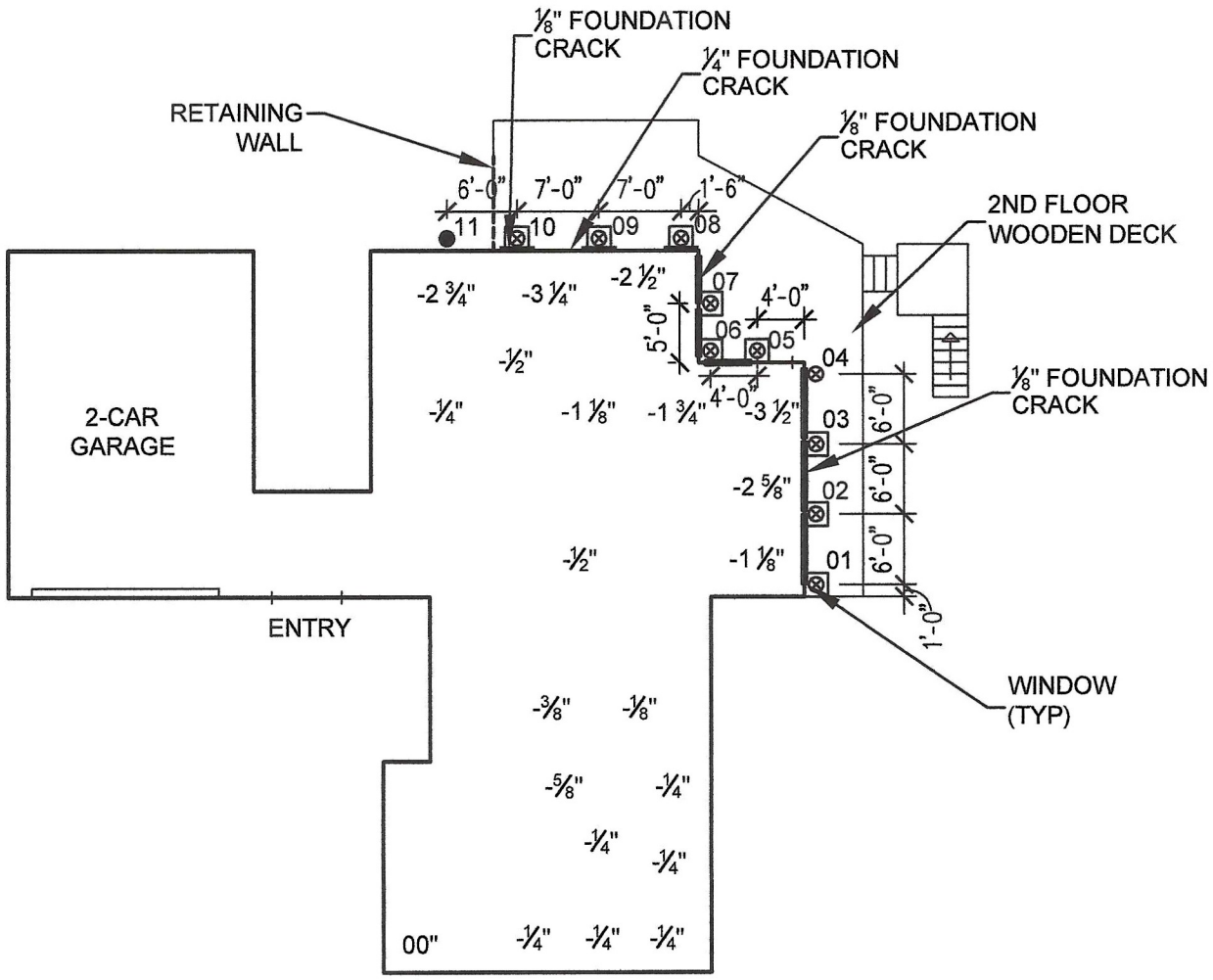
FOUNDATION NOTES

1. VERIFY ALL FOUNDATION DIMENSIONS ON SITE.
2. FOUNDATION DIMENSIONS ARE FROM OUTSIDE FACE OF CONCRETE STEM WALL
3. MINIMUM PILE DIAMETER TO BE 2 7/8".
4. PROPERTY LINE DIMENSIONING APPROXIMATED BY KING COUNTY MAPPING TOOLS. NOT INTENDED FOR LEGAL USE.
5. AREAS SEPARATE FROM PROJECT LOCATION TO REMAIN UNDISTURBED BY INSTALLATION.
6. TEMPORARY CUTS MADE TO INSTALL PILES SHALL NOT ENCROACH UPON THE NEIGHBORING PROPERTIES.

NOTES:

1. LOT AREA 10,973 SF. NO PROPOSED CHANGE IN LOT COVERAGE.
2. ALL HOLES ARE EXCAVATED NEXT TO THE STRUCTURE FOUNDATION.
3. THE TOTAL AREA OF EXCAVATED HOLES < 50 SQFT

Permit Number _____ Parcel Number 445770-0110 Applicant Name RAMJACK WEST Site Address 3619 81ST AVE SE, MERCER ISLAND, WA Engineering Scale: 1" = 20' Sheet SK-0 of _____



FOUNDATION & ELEVATION ASSESSMENT PLAN

NORTH

LEGEND

-¾" ---- FLOOR ELEVATIONS TAKEN BY RAM JACK ON 06/30/2023

⊗ ---- HELICAL STEEL PILES (15.0 KIP CAPACITY)

⊠ ---- HELICAL STEEL PILES THROUGH CONCRETE (15.0 KIP CAPACITY)

● ---- DRIVEN STEEL PILES (26.0 KIP CAPACITY)

— ---- L6"x6"x3/8" x 3'-0" STEEL ANGLE

DARIN L. WILLIS
STATE OF WASHINGTON
57483
REGISTERED
PROFESSIONAL ENGINEER
8/9/2023

NORTHWEST ENGINEERING GROUP
P.O. BOX 10393
EUGENE, OR 97440 (541) 393-7363

CHRISTOPHER LEE
3619 81ST AVE SE
MERCER ISLAND, WA

SHEET: SK-1

SCALE: 1/16" = 1'-0"

DATE: 08/09/2023

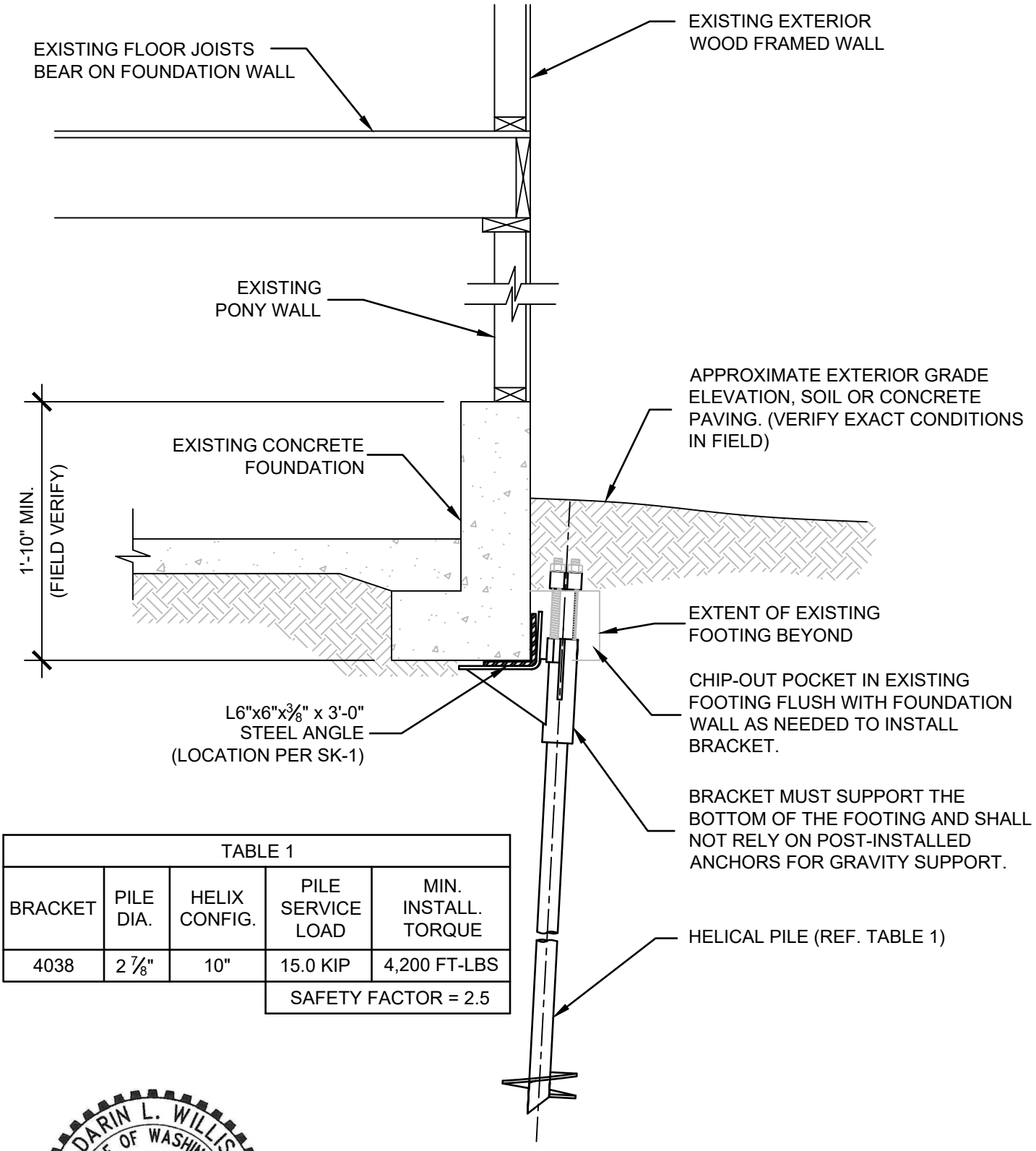
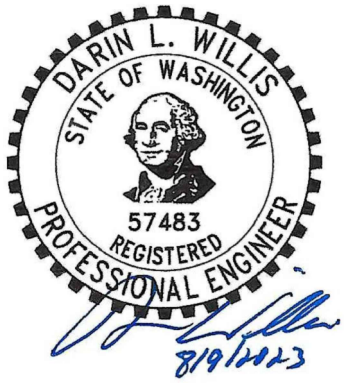


TABLE 1				
BRACKET	PILE DIA.	HELIX CONFIG.	PILE SERVICE LOAD	MIN. INSTALL. TORQUE
4038	2 7/8"	10"	15.0 KIP	4,200 FT-LBS
			SAFETY FACTOR = 2.5	



TYPICAL HELICAL PILE DETAIL @ EXTERIOR GRADE BEAM (PILE 01-10)

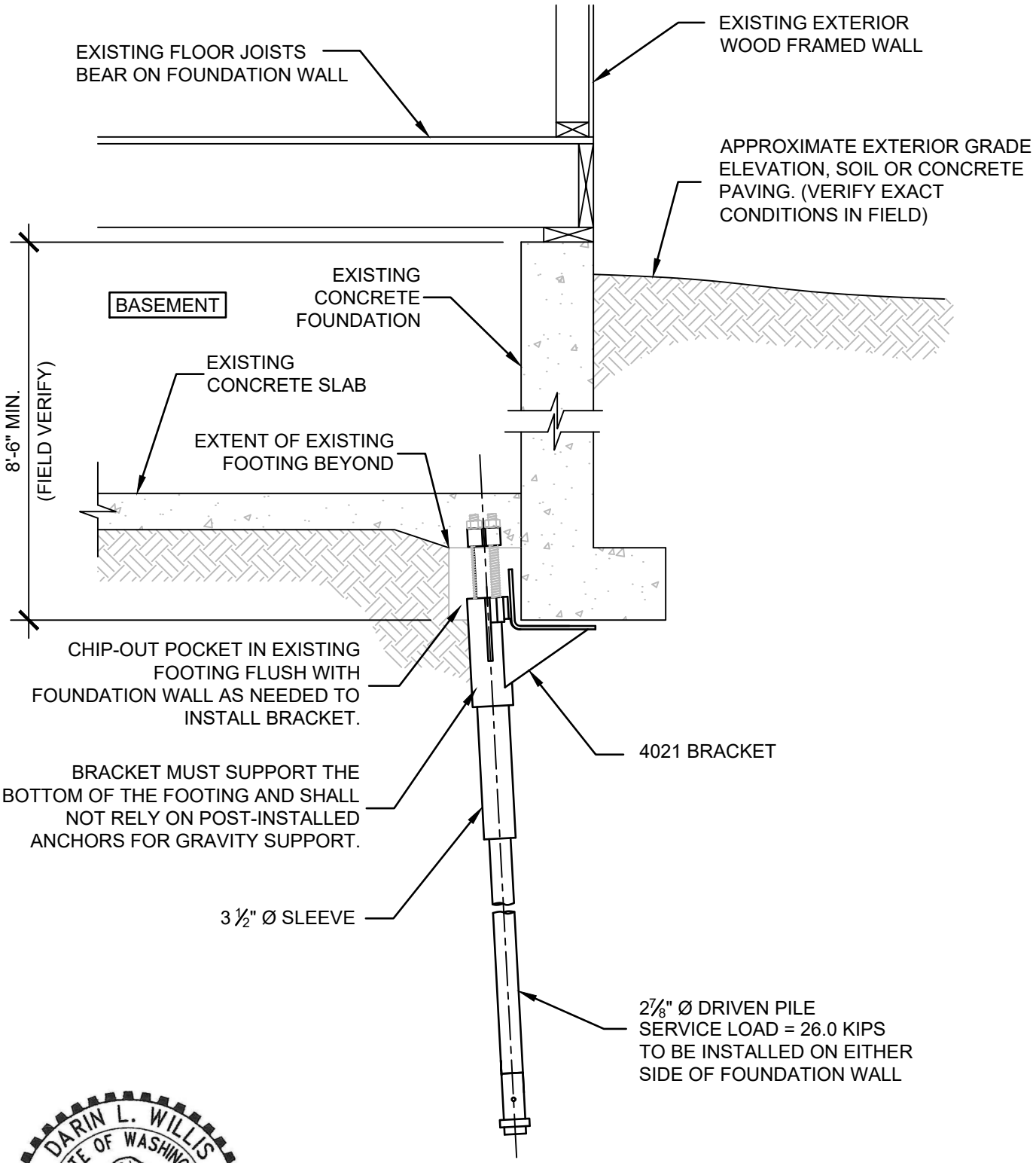
NORTHWEST ENGINEERING GROUP
P.O. BOX 10393
EUGENE, OR 97440 (541) 393-7363

CHRISTOPHER LEE
3619 81ST AVE SE
MERCER ISLAND, WA

SHEET: SK-2

SCALE: 3/4" = 1'-0

DATE: 08/09/2023



DARIN L. WILLIS
STATE OF WASHINGTON
57483
REGISTERED
PROFESSIONAL ENGINEER
8/9/2023

TYPICAL DRIVEN PILE DETAIL
@ EXTERIOR RETAINING WALL (PILE 11)

NORTHWEST
ENGINEERING GROUP
P.O. BOX 10393
EUGENE, OR 97440 (541) 393-7363

CHRISTOPHER LEE
3619 81ST AVE SE
MERCER ISLAND, WA

SHEET: SK-3

SCALE: 3/4" = 1'-0

DATE: 08/09/2023

NORTHWEST ENGINEERING GROUP
P.O. Box 10393
Eugene, OR, 97440

PILE CALCULATION

Date: 8/9/2023
Designer: Darin Willis, P.E.

Project: Christopher Lee
3619 81st Ave SE
Mercer Island, WA

Piles 01-07

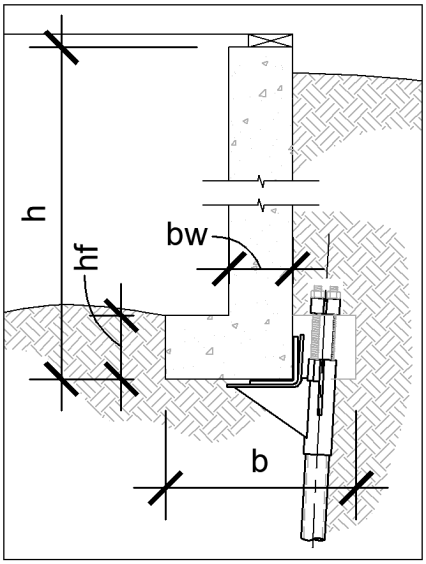
Design Loads:

Dead:

Roof =	15	psf
Second Floor =	25	psf
First Floor =	50	psf
Deck =	25	psf
Walls =	12	psf
Soil =	120	pcf

Live:

*Roof snow =	25	psf
*Roof live =	20	psf
Second Floor =	40	psf
First Floor =	40	psf
Deck =	60	psf



Foundation dimensions:

h =	20	in
bw =	8	in
b =	32	in
hf =	6	in

Vertical Design Loads:

Tributary Widths:

Roof =	20	ft	»	300	plf
Second Floor =	6	ft	»	150	plf
First Floor =	4	ft	»	200	plf
Deck =	5	ft	»	125	plf
Walls =	18	ft	»	216	plf
Soil =	0	ft^2	»	0	plf
Foundation self-weight =			»	316.667	plf
			∑ DL	1307.67	plf

Live:

Roof =	20	ft	»	500	plf
Second Floor =	6	ft	»	240	plf
First Floor =	4	ft	»	160	plf
Deck =	5	ft	»	300	plf
			∑ LL	1200	plf
(without roof LL)			∑ LL	700	plf

ASD Loads:

Load, $\omega_2 = \sum DL + \sum LL$	2008	**plf**	**(comb.#2 -without roof LL) OR**
Load, $\omega_4 = \sum DL + \sum LL(0.75)$	2208	**plf**	**(comb.#4 -with roof LL)**
Max. load ω ASD=	2208	**plf**	

Pile spacing (ℓ_1) = 6 **ft =** 72 in

Pile Working Loads:

Pile Service Load, P_{TL} =	**13246**	**lbs**	**(wall load x pile spacing)**
Pile Design Load =	**15000**	**lbs**	
Pile Ultimate Load, P_{ULT} =	37500	**lbs**	**Safety Factor of 2.5 Applied*

Minimum pile installation torque

$$T_{min} = \frac{Q_{ult}}{K_t}$$

Required ultimate soil capacity (Q_{ult}) =	37500	**lbs**
Pile Ø =	**2 7/8"**	
Torque factor (K_t) =	9	
Minimum pile installation torque, (T_{min}) =	4200	**ft-lbs**
Bracket =	4038	
Bracket Allowable Capacity =	19,700	**lbs**

NORTHWEST ENGINEERING GROUP
P.O. Box 10393
Eugene, OR, 97440

PILE CALCULATION

Date: 8/9/2023
Designer: Darin Willis, P.E.

Project: Christopher Lee
3619 81st Ave SE
Mercer Island, WA

Piles 08-10

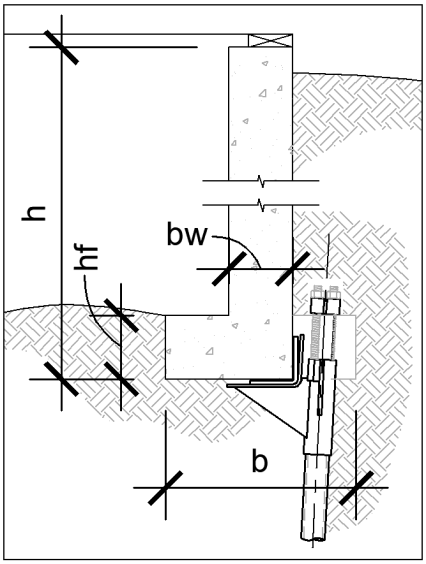
Design Loads:

Dead:

Roof =	15	psf
Second Floor =	25	psf
First Floor =	50	psf
Deck =	25	psf
Walls =	12	psf
Soil =	120	pcf

Live:

*Roof snow =	25	psf
*Roof live =	20	psf
Second Floor =	40	psf
First Floor =	40	psf
Deck =	60	psf



Foundation dimensions:

h =	20	in
bw =	8	in
b =	32	in
hf =	6	in

Vertical Design Loads:

Tributary Widths:

Roof =	4	ft	»	60	plf
Second Floor =	6	ft	»	150	plf
First Floor =	4	ft	»	200	plf
Deck =	4	ft	»	100	plf
Walls =	18	ft	»	216	plf
Soil =	0	ft^2	»	0	plf
Foundation self-weight =			»	316.667	plf
			∑ DL	1042.67	plf

Live:

Roof =	4	ft	»	100	plf
Second Floor =	6	ft	»	240	plf
First Floor =	4	ft	»	160	plf
Deck =	4	ft	»	240	plf
			∑ LL	740	plf
(without roof LL)			∑ LL	640	plf

ASD Loads:

Load, $\omega_2 = \sum DL + \sum LL$	1683	plf	(comb.#2 -without roof LL) OR
Load, $\omega_4 = \sum DL + \sum LL(0.75)$	1598	plf	(comb.#4 -with roof LL)
Max. load ω ASD=	1683	plf	

Angle Cantilevered or Simply Supported? Cantilevered

Concrete Analysis: ACI 318-14

LFRD Loads:

Load, $\omega_{1=}$	1460	plf	(comb 1)	
Load, $\omega 2_=$	2325	plf	(Comb 2)	
Load, $\omega 3_=$	2051	plf	(Comb 3)	
Load, $\omega 4_=$	1941	plf	(Comb 4)	
Max. load ω LFRD=	2325	plf		
Max. beam span(ℓ) =	4	ft =	48	in
$M_{max} = w_{u*}l^2/8$ =	55.80	in-kips =	4.65	k-ft
$Shear_{max} = (1/2)*w_{u*}\ell$ =	4.65	kips		

Foundation Width, bw =	8	in		Code Reference
Foundation Depth, d =	18	in	(h-2")	ACI 14.5.1.7
Cross Sectional Area, A =	144	in^2		
Section Modulus, S_{xb} =	432	in^3		
Gross Moment of Inertia, I_g =	3888	in^4		
Assumed Conc, f'_c =	2500	psi		
Y_t =	9	in		

Foundation Moment & Shear Capacity Per ACI 318-14

Conc Modulus of Rupture,f_r =	375	psi		ACI 19.2.3.1
Cracking Moment, M_{cr} =	13.5	k-ft		ACI 24.2.3.5
Flexure Reduction Factor, ϕ =	0.6			ACI 21.2.1
Design Moment, ϕMn =	5.40	k-ft	OK	ACI 14.5.2.1a & 14.5.2.1b
Shear Strength, Vn =	9.6	kips		ACI Table 14.5.5.1
Shear Reduction Factor, ϕ =	0.6			ACI 21.2.1
Design Shear, ϕVn =	5.76	kips	OK	

Notes:

1) Foundation analysis is based on having an unreinforced section
2) When calculating member in strength in flexure, combined flexure and axial load, or shear, the entire cross section shall be considered in design, except for concrete cast against soil where the overall thickness shall be taken as 2 in. less than the specified thickness. (ACI 14.5.1.7)

Max. beam span(ℓ) =	4	**ft =**	48	in
Pile spacing (ℓ_1) =	7	**ft =**	84	in
Angle total length ($\ell_2 = \ell_1 - \ell$) =	3	**ft =**	36	in

Pile Working Loads:

Pile Service Load, P_{TL} = **11779** **lbs** **(wall load x pile spacing)**

Pile Design Load = **15000** **lbs**

Pile Ultimate Load, P_{ULT} = 37500 **lbs** **Safety Factor of 2.5 Applied*

Deflection check

Beam EI =	2.19E+11	lb-in2				
Live Load Deflection =	**1.95E-05**	**in**	**<**	0.23	in	OK
Total Beam deflection =	**0.000**	**in**	**<**	0.35	in	OK

Minimum pile installation torque

$$T_{min} = \frac{Q_{ult}}{K_t}$$

Required ultimate soil capacity (Q_{ult}) =	37500	**lbs**
Pile Ø =	**2 7/8"**	
Torque factor (K_t) =	9	
Minimum pile installation torque, (T_{min}) =	4200	**ft-lbs**
Bracket =	4038	
Bracket Allowable Capacity =	19,700	**lbs**

Angle Size: **L6X6X3/8**

(Angle check below)

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: Lee Angle Check.ec6

DESCRIPTION: Angle check for 3ft

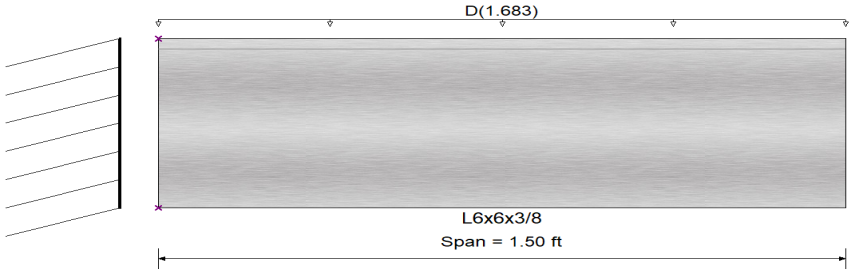
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	36.0 ksi
Beam Bracing :	Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		

Vertical Leg Up



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 1.683 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.284 : 1	Maximum Shear Stress Ratio =	0.087 : 1
Section used for this span	L6x6x3/8	Section used for this span	L6x6x3/8
Ma : Applied	1.893 k-ft	Va : Applied	2.525 k
Mn / Omega : Allowable	6.670 k-ft	Vn/Omega : Allowable	29.102 k
Load Combination	D Only	Load Combination	D Only
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.004 in	Ratio =	8753	>=180	Span: 1 : D Only
Max Upward Total Deflection	0 in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 1.50 ft	1	0.284	0.087		-1.89	1.89	11.14	6.67	1.00	1.00	2.52	48.60	29.10
+0.60D													
Dsgn. L = 1.50 ft	1	0.170	0.052		-1.14	1.14	11.14	6.67	1.00	1.00	1.51	48.60	29.10

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.525	
Max Upward from Load Combinations	1.515	
Max Upward from Load Cases	2.525	
D Only	2.525	
+0.60D	1.515	

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PILE CALCULATION

Date: 8/9/2023
Designer: Darin Willis, P.E.

Project: Christopher Lee
3619 81st Ave SE
Mercer Island, WA

Pile 11

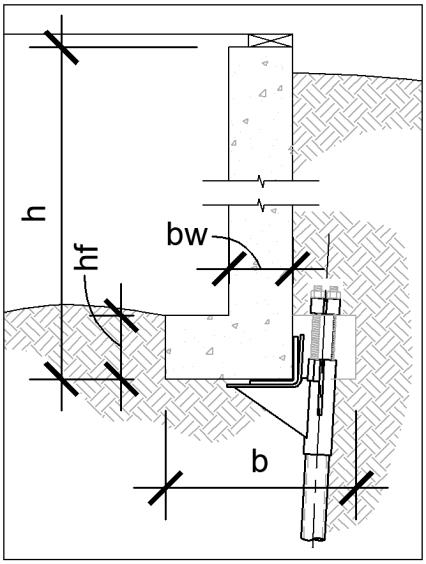
Design Loads:

Dead:

Roof =	15	psf
Second Floor =	25	psf
First Floor =	50	psf
Deck =	25	psf
Walls =	12	psf
Soil =	120	pcf

Live:

*Roof snow =	25	psf
*Roof live =	20	psf
Second Floor =	40	psf
First Floor =	40	psf
Deck =	60	psf



Foundation dimensions:

h =	102	in
bw =	8	in
b =	32	in
hf =	6	in

Vertical Design Loads:

Tributary Widths:

Roof =	4	ft	»	60	plf
Second Floor =	6	ft	»	150	plf
First Floor =	4	ft	»	200	plf
Deck =	4	ft	»	100	plf
Walls =	18	ft	»	216	plf
Soil =	16	ft^2	»	1920	plf
Foundation self-weight =			»	1000	plf
			∑ DL	3646	plf

Live:

Roof =	4	ft	»	100	plf
Second Floor =	6	ft	»	240	plf
First Floor =	4	ft	»	160	plf
Deck =	4	ft	»	240	plf
			∑ LL	740	plf
(without roof LL)			∑ LL	640	plf

ASD Loads:

Load, $\omega_2 = \sum DL + \sum LL$	4286	plf	(comb.#2 -without roof LL) OR
Load, $\omega_4 = \sum DL + \sum LL(0.75)$	4201	plf	(comb.#4 -with roof LL)
Max. load ω ASD=	4286	plf	

Concrete Analysis: ACI 318-14

LFRD Loads:

Load, $\omega_{1=}$	5104	plf	(comb 1)	
Load, $\omega 2_=$	5449	plf	(Comb 2)	
Load, $\omega 3_=$	5175	plf	(Comb 3)	
Load, $\omega 4_=$	5065	plf	(Comb 4)	
Max. load ω LFRD=	5449	plf		
Max. beam span(ℓ) =	6	ft =	72	in
$M_{max} = w_{u*}l^2/8$ =	294.26	in-kips =	24.52	k-ft
$Shear_{max} = (5/8)*w_{u*}\ell$ =	20.43	kips		

Foundation Width, bw =	8	in		Code Reference
Foundation Depth, d =	100	in	(h-2")	ACI 14.5.1.7
Cross Sectional Area, A =	800	in^2		
Section Modulus, S_{xb} =	13333.33	in^3		
Gross Moment of Inertia, I_g =	666666.7	in^4		
Assumed Conc, f'_c =	2500	psi		
Y_t =	50	in		

Foundation Moment & Shear Capacity Per ACI 318-14

				Code Reference
Conc Modulus of Rupture,f_r =	375	psi		ACI 19.2.3.1
Cracking Moment, M_{cr} =	416.7	k-ft		ACI 24.2.3.5
Flexure Reduction Factor, ϕ =	0.6			ACI 21.2.1
Design Moment, ϕMn =	166.67	k-ft	OK	ACI 14.5.2.1a & 14.5.2.1b
Shear Strength, Vn =	53.3	kips		ACI Table 14.5.5.1
Shear Reduction Factor, ϕ =	0.6			ACI 21.2.1
Design Shear, ϕVn =	32.00	kips	OK	

Notes:

1) Foundation analysis is based on having an unreinforced section
2) When calculating member in strength in flexure, combined flexure and axial load, or shear, the entire cross section shall be considered in design, except for concrete cast against soil where the overall thickness shall be taken as 2 in. less than the specified thickness. (ACI 14.5.1.7)

Pile spacing (ℓ_1) = 6 **ft =** 72 in

Pile Working Loads:

Pile Service Load, P_{TL} = **25716** **lbs** **(wall load x pile spacing)**

Pile Design Load = **26000** **lbs**

Pile Ultimate Load, P_{ULT} = 65000 **lbs** **Safety Factor of 2.5 Applied*

Deflection check

Beam EI = 7.46E+15 lb-in2

Live Load Deflection = **2.89E-09** **in** **<** 0.20 in OK

Total Beam deflection = **0.000** **in** **<** 0.30 in OK

Minimum driven pile load

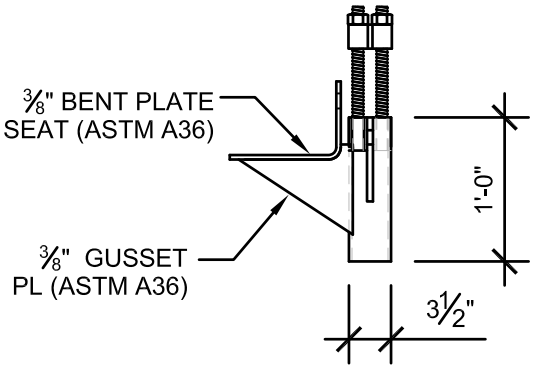
Required ultimate soil capacity (Q_{ult}) = 65000 **lbs**

Pile Ø = **2 7/8"**

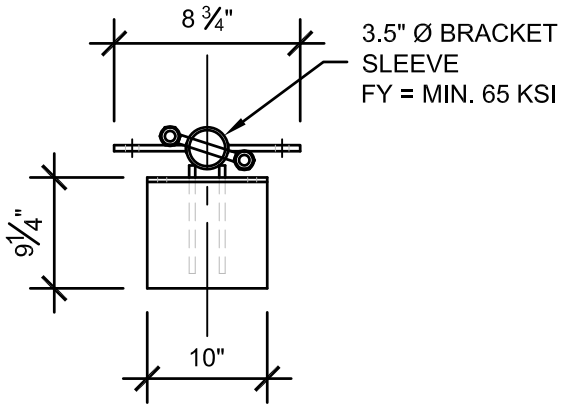
Bracket = 4021

Bracket Allowable Capacity = 33,650 **lbs**

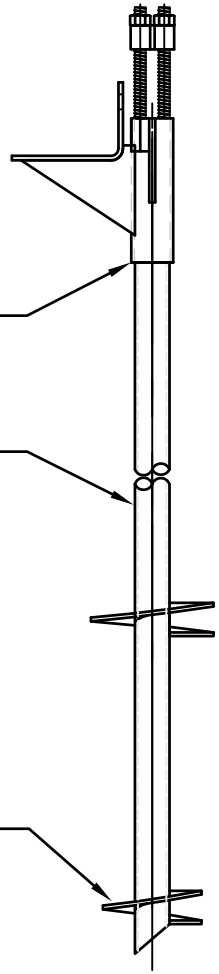
4038 SIDE LOAD BRACKET



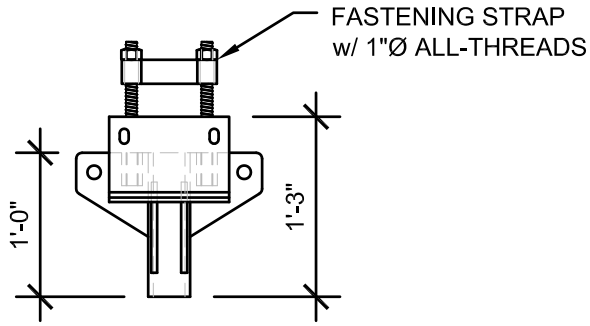
SIDE VIEW



TOP VIEW



TYP. INSTALLATION
NOT TO SCALE



FRONT VIEW

LOAD CHART	
ULTIMATE PILE ASSEMBLY CAPACITY	39,400 LBS
ALLOWABLE PILE ASSEMBLY CAP. (S.F. = 2)	19,700 LBS
BEARING AREA	90 IN²

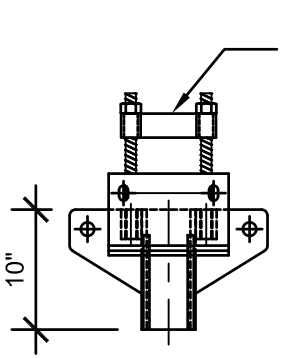
NOTES:

1. HOT-DIPPED OR COLD-SPRAYED GALVANIZING OR POLYETHYLENE COPOLYMER THEMOPLASTIC COATING.
2. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.
3. ALL WELDING IS TO BE DONE BY WELDERS CERTIFIED UNDER SECTION 5 OF THE AWS CODE D1.1.
4. THE CAPACITY OF THE UNDERPINNING SYSTEM IS A FUNCTION OF MANY INDIVIDUAL ELEMENTS, INCLUDING THE CAPACITY OF THE FOUNDATION, BRACKET, CASING, SOIL STRENGTH, AND BEARING STRATA, AS WELL AS THE STRENGTH OF THE FOUNDATION BRACKET CONNECTION AND THE QUALITY OF THE INSTALLATION OF THE PILE. YOUR ACHIEVABLE CAPACITIES COULD BE HIGHER OR LOWER THAN THOSE LISTED DEPENDING ON THE ABOVE FACTORS.

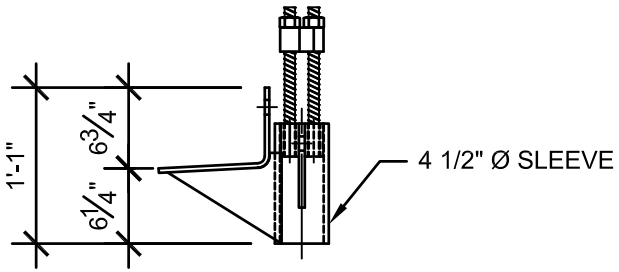
RAMJACK

4038 SIDE LOAD BRACKET			REV. 1
SCALE 3/4"= 1'-0	DRAWN BY SA	DATE: 9/28/2022	SHEET 1 OF 1

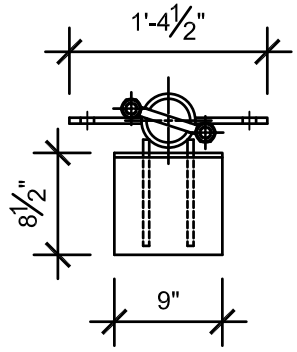
4021 BRACKET - 2 ⅞"Ø DRIVEN PILE



FRONT VIEW

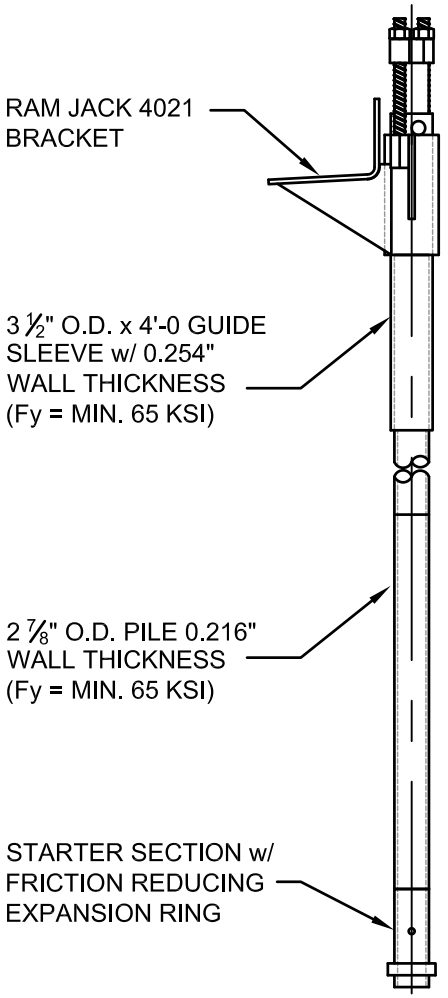


SIDE VIEW



TOP VIEW

LOAD CHART	
ULTIMATE PILE ASSEMBLY CAPACITY	67,300 LBS
ALLOWABLE PILE ASSEMBLY CAPACITY (S.F. = 2)	33,650 LBS
BEARING AREA	72 IN²



TYP. INSTALLATION
SCALE: 3/4" = 1'-0

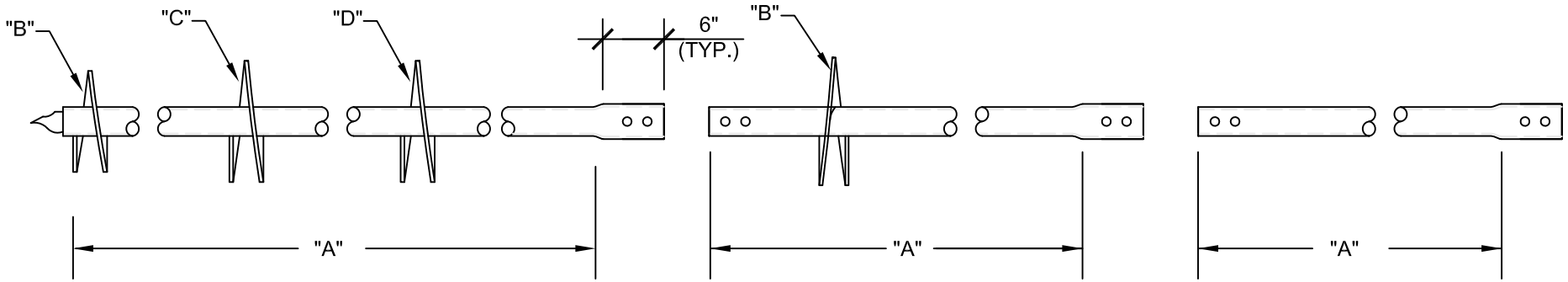
NOTES:

1. HOT-DIPPED OR COLD-SPRAYED GALVANIZING OR POLYETHYLENE COPOLYMER THEMOPLASTIC COATING.
2. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.
3. ALL WELDING IS TO BE DONE BY WELDERS CERTIFIED UNDER SECTION 5 OF THE AWS CODE D1.1.
4. THE CAPACITY OF THE UNDERPINNING SYSTEM IS A FUNCTION OF MANY INDIVIDUAL ELEMENTS, INCLUDING THE CAPACITY OF THE FOUNDATION, BRACKET, DESIGN UNBRACED LENGTH, PIER SHAFT, HELICAL PLATE, AND BEARING STRATA, AS WELL AS THE STRENGTH OF THE FOUNDATION BRACKET CONNECTION AND THE QUALITY OF THE INSTALLATION OF THE PILE. YOUR ACHIEVABLE CAPACITIES COULD BE HIGHER OR LOWER THAN THOSE LISTED DEPENDING ON THE ABOVE FACTORS.

RAMJACK®

4021 BRACKET W/ 2 7/8" PILE	CATALOG NO. : SEE TABLES		REV. 1
SCALE 3/4"= 1'-0	DRAWN BY SA	DATE: 10/05/2022	SHEET 1 OF 1

2.875"Ø HELICAL PILES AND ANCHORS - UPSET CONNECTION



LEAD SECTION | HELIX EXTENSION | EXTENSION

LEAD SECTION TABLE				
CAT. #	"A"	"B"	"C"	"D"
6125	5'-0	8"		
6140	5'-0	8"	10"	
6142	5'-0	10"	12"	
6143	7'-0	10"	12"	
6147	7'-0	8"	10"	12"
6148	7'-0	10"	12"	14"
6188	10'-0	10"	12"	14"

* MULTI-HELIX ARE SPACED 3 DIAMETERS OF THE LOWEST HELIX.

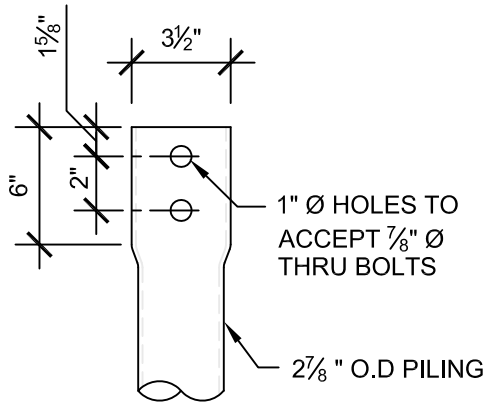
HELIX EXTENSIONS		
CAT #	"A"	"B"
8605-8	5'-0	8"
8605-10	5'-0	10"
8605-12	5'-0	12"
8607-10	7'-0	10"

EXTENSIONS	
CAT #	"A"
8602	2'-0
8605	5'-0
8607	7'-0
8610	10'-0

MECHANICAL TORQUE RATING - 7,500 FT-LB

ULTIMATE CAPACITY (COMPRESSION) - 67.5 KIP *
ALLOWABLE CAPACITY (COMPRESSION) - 33.8 KIP *
*BASED ON A TORQUE FACTOR (Kt) = 9

ULTIMATE CAPACITY (TENSION) - 67.5 KIP **
ALLOWABLE CAPACITY (TENSION) - 33.8 KIP **
**BASED ON A TORQUE FACTOR (Kt) = 9



CONNECTION DETAIL

NOTES:

1. HOT-DIPPED OR COLD-SPRAYED GALVANIZING OR POLYETHYLENE COPOLYMER THEMOPLASTIC COATING.
2. LEAD AND EXTENSION SECTION LENGTHS ARE NOMINAL.
3. SHAFT MATERIAL IS 2⅞" O.D., 0.216" WALL, MINIMUM Fy=65 KSI AND Fu=80 KSI, ASTM - A500.
4. HELIX BLADE MATERIAL IS HOT ROLLED, MINIMUM Fy=50 KSI AND Fu=80 KSI CARBON STEEL. PLATE THICKNESS IS AVAILABLE IN ⅜" AND ½" THICKNESSES.
5. NOMINAL SPACING BETWEEN HELICAL PLATES IS THREE TIMES THE DIAMETER OF THE LOWEST HELIX.
6. MANUFACTURER SHALL BE ISO 9001:2015 CERTIFIED.
7. ALL WELDING IS TO BE DONE BY WELDERS CERTIFIED UNDER SECTION 5 OF THE AWS CODE D1.1.
8. ALL COUPLING BOLTS TO BE ¾" Ø, SAE J429 GRADE 8 BOLTS.(SAE J429 GRADE 5 IF GALVANIZED).

RAMJACK

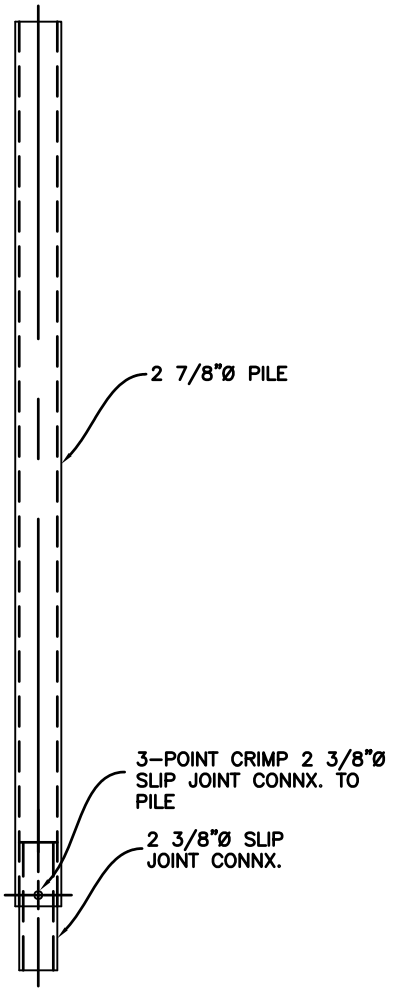
DWG. NO. : 2875.03	CATALOG NO. : SEE TABLES		REV. 1
SCALE 3/4"= 1'-0	DRAWN BY SA	DATE: 09/28/22	SHEET 1 OF 1

RevNo	Revision note	Date	Signature	Checked

2 7/8"Ø DRIVEN PILE SPECIFICATIONS

MECHANICAL PROPERTIES OF PILINGS

PILING DIAMETER	2 3/8"	2 7/8"
t (in)	0.190	0.217
R (in)	0.775	0.943
Fy (ksi)	65.0	65.0
Fu (ksi)	85.0	85.0
Ix (in^4)	0.784	1.611
Sx (in^3)	0.660	1.121
Zx (in^3)	0.909	1.536
J (in^4)	1.568	3.222



PILING CHART

PART NUMBER	ICC–ES PART #	LENGTH (ft)
4221	4221.1	2'–0
4223	4223.1	3'–0
4225	4225.1	5'–0
4227	4227.1	7'–0
4229	4229.1	10'–0

NOTES:

1. HOT–DIPPED OR COLD–SPRAYED GALVANIZING OR POLYETHYLENE COPOLYMER THEMOPLASTIC COATING.
2. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECONIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.
3. THE CAPACITY OF THE UNDERPINNING SYSTEM IS A FUNCTION OF MANY INDIVIDUAL ELEMENTS, INCLUDING THE CAPACITY OF THE FOUNDATION, BRACKET, PILING MATERIAL, AND BEARING STRATA, AS WELL AS THE STRENGTH OF THE FOUNDATION BRACKET CONNECTION AND THE QUALITY OF THE INSTALLATION OF THE PILE.
4. RAM JACK ENGINEERING HANDBOOK AND ESR–1854 FOR ALLOWABLE VALUES AND/OR CONDITIONS OF USE CONCERNING MATERIAL PRESENTED IN THIS DOCUMENT.

RAMJACK

UNLESS OTHERWISE SPECIFIED
* DIMENSIONS ARE IN INCHES
* TOLERANCES: ANGLE ±1°
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
* REMOVE ALL BURRS AND SHARP EDGES
* PARENTHETICAL INFO FOR REF ONLY

HOLE TOLERANCES

.013 THRU .125 +.004 −.001	.126 THRU .250 +.004 −.001	.251 THRU .500 +.006 −.001
.501 THRU .750 +.008 −.001	.751 THRU 1.000 +.010 −.001	1.001 THRU 2.000 +.012 −.001

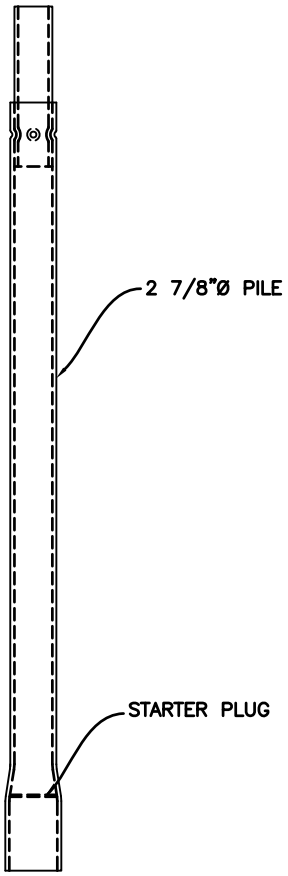
FILE NAME	2 7/8"Ø PILINGS	FSCM NO	
SIZE	A-SIZE TITLE BLOCK	SHEET	1 OF 1
DRAWN	10/05/2022	SCALE	1" = 1'-0
CHECK	DARIN WILLIS		CHARLES MARVIN
APPR.	DARIN WILLIS		
ISSUED			2 7/8"Ø PILINGS
REV		DWG NO	
CONTRACT NO			

RevNo	Revision note	Date	Signature	Checked

2 7/8"Ø DRIVEN PILE STARTER SPECIFICATIONS

MECHANICAL PROPERTIES OF STARTER

PILING DIAMETER	2 3/8"	2 7/8"
t (in)	0.190	0.217
R (in)	0.775	0.943
Fy (ksi)	65.0	65.0
Fu (ksi)	85.0	85.0
Ix (in^4)	0.784	1.611
Sx (in^3)	0.660	1.121
Zx (in^3)	0.909	1.536
J (in^4)	1.568	3.222



PILING CHART

PART NUMBER	LENGTH (ft)
4234	7'-0

NOTES:

1. HOT-DIPPED OR COLD-SPRAYED GALVANIZING OR POLYETHYLENE COPOLYMER THEMOPLASTIC COATING.
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3. THE CAPACITY OF THE UNDERPINNING SYSTEM IS A FUNCTION OF MANY INDIVIDUAL ELEMENTS, INCLUDING THE CAPACITY OF THE FOUNDATION, BRACKET, PILING MATERIAL, AND BEARING STRATA, AS WELL AS THE STRENGTH OF THE FOUNDATION BRACKET CONNECTION AND THE QUALITY OF THE INSTALLATION OF THE PILE.
4. RAM JACK ENGINEERING HANDBOOK AND ESR-1854 FOR ALLOWABLE VALUES AND/OR CONDITIONS OF USE CONCERNING MATERIAL PRESENTED IN THIS DOCUMENT.

RAMJACK

UNLESS OTHERWISE SPECIFED
* DIMENSIONS ARE IN INCHES
* TOLERANCES: ANGLE ±1°
3 PLACE DECIMALS ± .010
2 PLACE DECIMALS ± .02
* REMOVE ALL BURRS AND SHARP EDGES
* PARENTHETICAL INFO FOR REF ONLY

HOLE TOLERANCES

.013 THRU .125 +.004 −.001	.126 THRU .250 +.004 −.001	.251 THRU .500 +.006 −.001
.501 THRU .750 +.008 −.001	.751 THRU 1.000 +.010 −.001	1.001 THRU 2.000 +.012 −.001

FILE NAME	2 7/8"Ø STARTER	FSCM NO	
SIZE	A-SIZE TITLE BLOCK	SHEET	1 OF 1
DRAWN	10/05/2022	SCALE	1" = 1'-0
CHECK	DARIN WILLIS		SA
APPR.	DARIN WILLIS		
ISSUED			2 7/8"Ø STARTER
REV		DWG NO	
CONTRACT NO			