

CITY OF MERCER ISLAND

COMMUNITY PLANNING & DEVELOPMENT

9611 SE 36TH STREET | MERCER ISLAND, WA 98040

PHONE: 206.275.7605 | www.mercergov.org



REVISION/DEFERRED SUBMITTAL FORM

Site Address _____ Permit Number _____

CONTACT INFORMATION

Name: _____

Phone Number: _____

Email Address: _____

Description of revision:

Check all boxes that apply					
<input type="checkbox"/>	This is a revision to an already issued permit.				
<input type="checkbox"/>	This is a revision or modification to a plan currently in review.				
<input type="checkbox"/>	This is a deferred submittal to an already issued permit.				
<input type="checkbox"/>	The Proposed Change Increases or Decreases the Project Valuation.				
	Updated Valuation is Now:				
<input type="checkbox"/>	Changes to Building Footprint*	<input type="checkbox"/>	Trees Retained/Removed	<input type="checkbox"/>	Stormwater Revision
<input type="checkbox"/>	Add/Reduce Floor Area*	<input type="checkbox"/>	Changes to Tree Protection	<input type="checkbox"/>	Sewer Revision
<input type="checkbox"/>	Framing Changes	<input type="checkbox"/>	Site Plan Changes*	<input type="checkbox"/>	Water Revision
<input type="checkbox"/>	Structural Changes	<input type="checkbox"/>	Changes to Hardscape*	<input type="checkbox"/>	Rockery/Retaining Wall
<input type="checkbox"/>	Other				

* include updated Site Development Worksheet w/ submittal

Instructions:

1. Consider how the revision impacts the architectural, structural and civil plan sets.
 - a. Updated all affected plan sheets and cloud changes.
 - b. Merge updated plan sheets into a single pdf file.
 - c. Bookmark each sheet with sheet number and description. Ie: A1 – Site Plan
2. On page two of this form, list each sheet number that has changes and briefly describe those changes. Provide additional sheets if necessary.
3. Review associated City Forms and update as needed. Ie: an updated Site Development Worksheet or Residential Fire Area Square Footage Calculation may be required.
4. Upload this form along with the revised plans, and any relevant forms or supplemental documents to the File Transfer Site. See instructions for the upload on page two.

FTP SITE INSTRUCTIONS

- A. Please upload to the File Transfer Site <https://sftp.mercergov.org> (user name: guest, password: eplan)
- B. Click on the inbox to open
- C. Create a new folder (use your permit number or project address as the folder name)
- D. Click on your new folder to open
- E. Upload the files into the new folder

Indicate each sheet number that has changes and briefly describe changes that were made:

Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	
Sheet #	

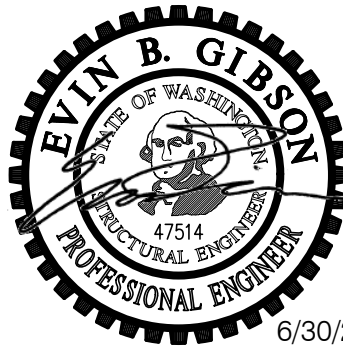
ALL CHANGES TO PLANS MUST BE INDICATED WITH CLOUDS



Structural Calculations for:

Chase Residence Helical Tieback Anchors

4525 FOREST AVE SE
MERCER ISLAND, WA 98040



6/30/2024

Prepared for: McDowell Pike King
Job #: 01255-2023-13
Date: 6/30/2024



SEATTLE
TACOMA

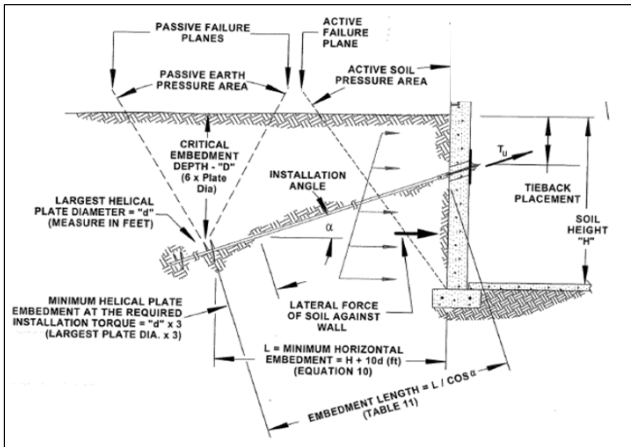
2124 Third Ave, Suite 100, Seattle, WA 98121
934 Broadway, Suite 100, Tacoma, WA 98402

○ 206.443.6212
○ 253.284.9470

⊕ ssfengineers.com

Chase Residence Helical Torque Anchor Tieback Design In Cohesionless Soils

Helical anchors installed in cohesionless soils, generally sands and gravels, develop capacity related to overburden pressure and bearing capacity according to equation 1b:



Equation 1b:
Ultimate Capacity - Cohesionless Soil
 P_u or $T_u = \Sigma A_H (q N_q)$ or $\Sigma A_H = P_u$ or $T_u / (q N_q)$

Soil Density Description	SPT Blow Count "N"	Friction Angle "φ"	Bearing Capacity Factor "N _q "	Density "γ" lb/ft ³	
				Moist Soil	Submerged
Very Loose	≤ 2	28°	12	70 - 100	45 - 62
	3 - 4	28°	13		
Loose	5 - 7	29°	14 - 15	90 - 115	52 - 65
	8 - 10	30°	15 - 16		
Medium Dense	11 - 15	30° - 32°	17 - 19	110 - 130	68 - 90
	16 - 19	32° - 33°	20 - 22		
	20 - 23	33° - 34°	23 - 25		
	24 - 27	34° - 35°	26 - 29		
Dense	28 - 30	35° - 36°	30 - 32	110 - 140	80 - 97
	31 - 34	36° - 37°	34 - 37		
	35 - 38	37° - 38°	39 - 43		
	39 - 41	38° - 39°	45 - 48		
Very Dense	42 - 45	39° - 40°	50 - 56	140+	> 85
	46 - 50	40° - 41°	59 - 68		
	> 50	> 42°	End Bearing		

Determine overburden pressure and Nq from soils investigation and using table 7:

SOIL PROPERTIES

Soil Density at Helical Anchor Depth	γ =	110	lb/ft ²
Nq At Helical Anchor Depth	Nq =	50	

TIEBACK INSTALLATION:

Backfill Condition		Level
Approximate Backfill Incline Angle		0°
Soil Height	H =	10 ft
Use Placement Depth	H _{PILE} =	10 ft
Use Installation Angle (From 5° to 30°)	α =	15°
Use Embedment Length		20 ft
Horizontal Embedment	L =	19 ft

Check Critical Embedment Depth, "D"	OK
Check Minimum Horizontal Embedment	OK

TORQUE ANCHOR REQUIRED CAPACITY

Minimum Tieback Spacing (4 x d)	3.3	ft
Use Tieback Spacing	6	ft
Use Tieback Loading	20000	lbs
Desired Factor of Safety	2	
Required Ultimate Capacity = S.F. x Capacity = P _{u, RQD} =	40000	lbs
Loading Condition (Compression, Tension, Both)		Tension
Try Helical Lead Section:	*TAF-150-84 (8-10)	
	(Maclean Dixie D6 w/ 8/10" PL)	

CHECK ESTIMATED INSTALLATION TORQUE:

Empirical Torque Factor, k	k =	10.0
Estimated Installation Torque, T = (P _{u, RQD})/k	T =	4000 ft-lb
Section Usable Torsional Strength =	T _a =	5500 ft-lb
Section Installation Torque Check	T _a > T	OK

CHECK SECTION LOAD LIMITS:

Section Ultimate Tension Strength	T _{u, Max} =	55000	lbs
Tension Strength Check	T _{u, Max} > T _{u, RQD}	OK	

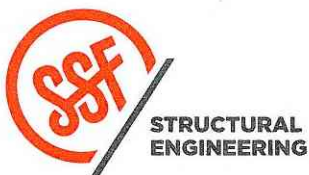
CHECK LEAD SECTION ULTIMATE SOIL CAPACITY:

Plate Projected Area	A _H =	0.86	ft ²
Soils Depth at Highest Anchor	d =	12.0	ft
Overburden Pressure At Highest Anchor	q =	1320	lb/ft ²
Ultimate Capacity of Anchor	T _u =	56958	lbs
Soils Capacity Check	T _u > T _{u, RQD}	OK	

CHECK HELICAL PLATE CAPACITY:

Ultimate Plate Capacity /Plate		30,000	lbs
Lead Section Number of Plates		2	Plates
Total Helical Plate Ultimate Strength	T _{u, Plates}	60000	lbs
Plate Strength Check	T _{u, Plates} > T _{u, RQD}	OK	

Soils Capacity Check	OK
Section Installation Torque Check	OK
Tension Check	OK
Plate Strength Check	OK
Critical Embedment Depth	OK
Minimum Horizontal Embedment	OK
Minimum Tieback Spacing	OK



Chase Residence
Helical Tieback Anchors

PROJECT _____

6/30/2024

DATE _____
 PROJ. # **EBG**
 DESIGN _____
 SHEET _____



associated
earth sciences
incorporated

Exploration Boring

EB-2

Chase Residence

Sheet: 1 of 2

Mercer Island, WA

Start Date: 7/12/22

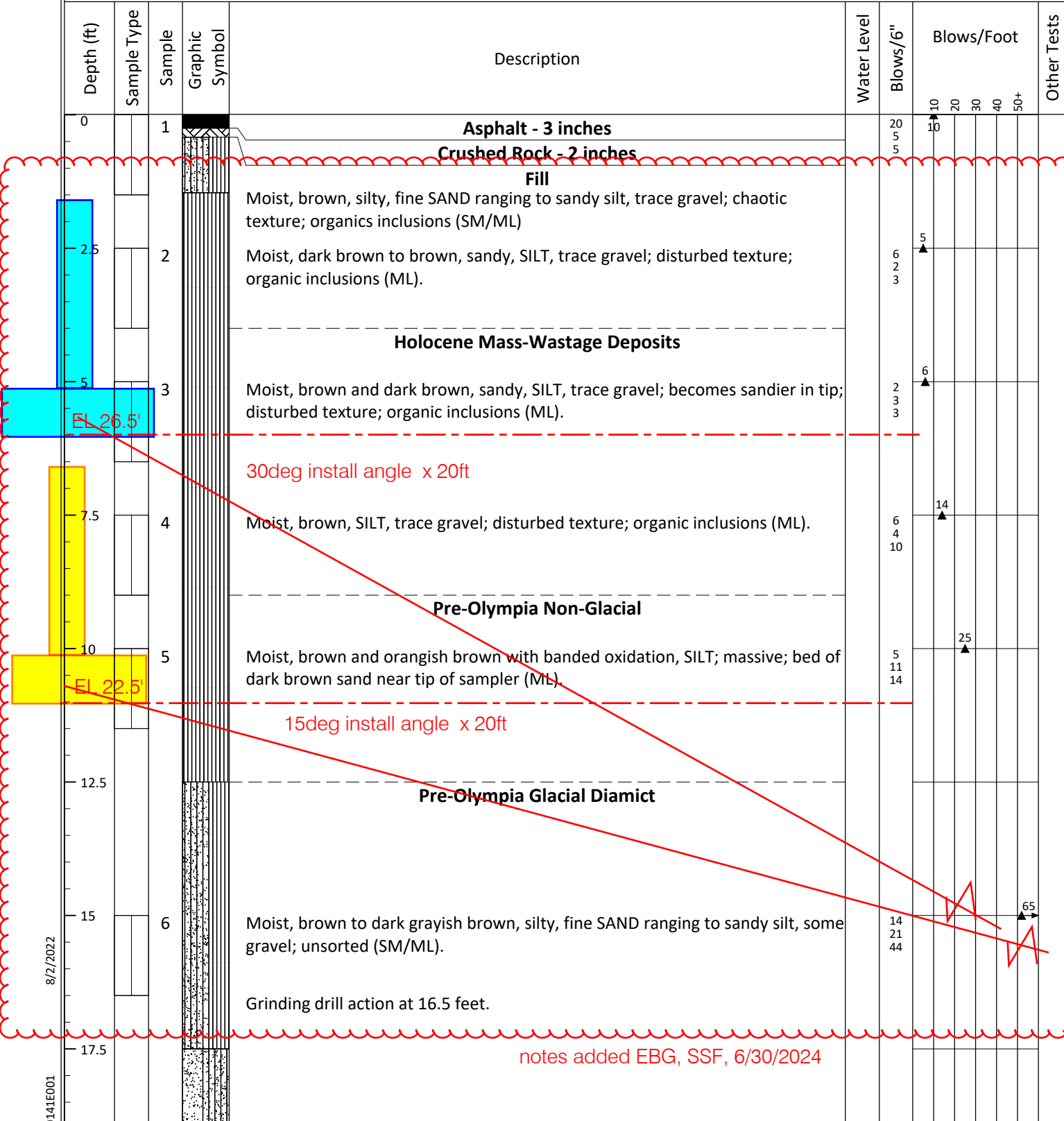
Logged By: PL

20220141E001

Ending Date: 7/12/22

Approved By: CMM

Driller/Equipment: Geologic Drill Partners/Mini-Track Drill Total Depth (ft): 21.5
 Hammer Weight/Drop: 140lbs/30" Ground Surface Elevation (ft): ≈34
 Hole Diameter (in): 7 Inches Datum: NAVD88
 ▼ Groundwater Depth ATD (ft): N/A ∇ Groundwater Depth Post Drilling (ft) (Date): ()



8/12/2022

20220141E001

notes added EBG, SSF, 6/30/2024

D6 Series 1-1/2" High Strength RCS Steel Helical Piles/Anchors

MacLean-Dixie D6 Series 1-1/2 RCS Steel Helical Piles/Anchors for Compression and Tension Applications

Awarded ESR3032 by ICC-ES for AC358 Acceptance Criteria for Helical Foundation Systems and Devices



D6 Series 1-1/2" RCS Helical Pile	
Torque Capacity (ft-lbs)	5,500 ft-lbs (Kt = 10)
Ultimate Mechanical Axial Shaft Capacity	68 KIPS
Ultimate Tension/Compression Geotechnical Capacity (pounds-force)	55 KIPS (27.5 tons)
Shaft Size across the Flats - inches	1-1/2"
Shaft Material	ASTM A576 Grade 10V45
Helix Material	AISI Grade 1011/1018 HSLA 55



ISO9001:2008
Certificate # QSR-938



Building Solid Foundations

11411 Addison Avenue • Franklin Park, IL 60131
T: (847) 455-0014 F: (847) 455-0029 • www.macleandixie.com

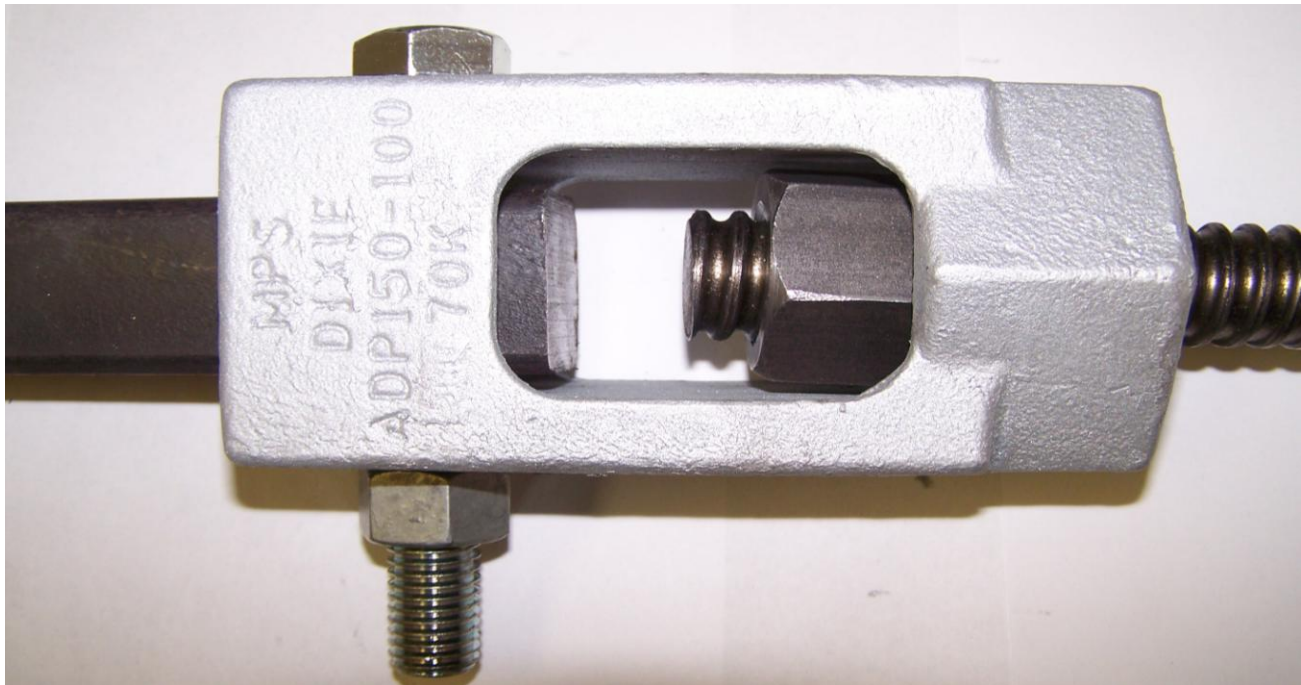
Tieback Adapters

MacLean Dixie introduces a new tieback adapter for tension and compression applications. The tieback adapter is a ductile iron casting that bolts directly to the RCS extension. A Williams's nut is placed in the tieback adapter within the hex socket interface. A Williams threaded rod is inserted through the tieback adapter and secured with the nut for a typical tension application. For a compression application a Williams nut is added to the outside of the tieback adapter.

Advantages of the MacLean-Dixie Tieback Adapter

- Integral cast adapter – no welded parts
- Develops the full anchor tension rating
- Available for 1-1/2 and 1-3/4 RCS shafts
- Compatible with CHPP foundation pile system
- Threads are stronger than standard all thread for added torque capacity when tightening nut
- Williams threaded rod is field cut to length to adjust as needed
- Hot Dip galvanized to ASTM A153

Catalog Number	For RCS Size	Standard Pack Qty	Carton Weight Lbs	Ultimate Tension Rating Lbs.	Williams Nut Catalog #	Williams Rod size in.
ADP150-100	1-1/2	6	46	70,000	#8-1,R63-08	#8-1", R61-08
ADP175-125	1-3/4	4	49	100,000	#10-1-1/4, R63-10	#10-1.255", R61-10



GRADE 75 & GRADE 80 ALL-THREAD REBAR



BAR DESIGNATION NOMINAL DIAMETER & PITCH	MINIMUM NET AREA THRU THREADS	MINIMUM ULTIMATE STRENGTH	GRADE 75 MINIMUM YIELD STRENGTH	GRADE 80 MINIMUM YIELD STRENGTH	NOMINAL WEIGHT	APPROXIMATE THREAD MAJOR DIAMETER	PART NUMBER
#6 - 3/4" - 5 (19 mm)	0.44 in ² (284 mm ²)	44 kips (196 kN)	33 kips (147 kN)	35 kips (156 kN)	1.5 lbs/ft (2.4 kg/m)	7/8" (22 mm)	R61-06
#7 - 7/8" - 5 (22 mm)	0.60 in ² (387 mm ²)	60 kips (267 kN)	45 kips (200 kN)	48 kips (214 kN)	2.0 lbs/ft (3.0 kg/m)	1" (25 mm)	R61-07
#8 - 1" - 3-1/2 (25 mm)	0.79 in ² (510 mm ²)	79 kips (351 kN)	59 kips (264 kN)	63 kips (280 kN)	2.7 lbs/ft (3.8 kg/m)	1-1/8" (29 mm)	R61-08
#9 - 1-1/8" - 3-1/2 (29 mm)	1.00 in ² (645 mm ²)	100 kips (445 kN)	75 kips (334 kN)	80 kips (356 kN)	3.4 lbs/ft (5.1 kg/m)	1-1/4" (32 mm)	R61-09
#10 - 1-1/4" - 3 (32 mm)	1.27 in ² (819 mm ²)	127 kips (565 kN)	95 kips (424 kN)	102 kips (454 kN)	4.3 lbs/ft (5.5 kg/m)	1-3/8" (35 mm)	R61-10
#11 - 1-3/8" - 3 (36 mm)	1.59 in ² (1006 mm ²)	156 kips (694 kN)	117 kips (521 kN)	125 kips (556 kN)	5.3 lbs/ft (7.9 kg/m)	1-1/2" (38 mm)	R61-11
#14 - 1-3/4" - 3 (43 mm)	2.25 in ² (1452 mm ²)	225 kips (1001 kN)	169 kips (750 kN)	180 kips (801 kN)	7.65 lbs/ft (11.8 kg/m)	1-7/8" (48 mm)	R61-14
#18 - 2-1/4" - 3 (57 mm)	4.00 in ² (2581 mm ²)	400 kips (1780 kN)	300 kips (1335 kN)	320 kips (1423 kN)	13.6 lbs/ft (19.6 kg/m)	2-7/16" (62 mm)	R61-18
#20 - 2-1/2" - 2-3/4 (64 mm)	4.91 in ² (3168 mm ²)	491 kips (2184 kN)	368 kips (1637 kN)	393 kips (1748 kN)	16.7 lbs/ft (24.8 kg/m)	2-3/4" (70 mm)	R61-20
#24 - 3" - 2-3/4 (76 mm) *	6.82 in ² (4400 mm ²)	682 kips (3034 kN)	512 kips (2277 kN)	546 kips (2429 kN)	24.0 lbs/ft (35.8 kg/m)	3-3/16" (81 mm)	R61-24
#28 - 3-1/2" - 2-3/4 (89 mm) *	9.61 in ² (6200 mm ²)	961 kips (4274 kN)	720 kips (3206 kN)	769 kips (3421 kN)	32.7 lbs/ft (48.6 kg/m)	3-3/4" (95 mm)	R61-28
#32 - 4" - 2-3/4 (102 mm) *	12.56 in ² (8103 mm ²)	1256 kips (5587 kN)	942 kips (4190 kN)	1004 kips (4466 kN)	43.0 lbs/ft (64.0 kg/m)	4-1/4" (108 mm)	R61-32

R63 Hex Nuts / R64 Collar Nuts



Hex Nut



Rounded Collar Nut

BAR DIAMETER	ACROSS FLATS	ACROSS CORNERS	THICKNESS	PART NUMBER
#6 - 3/4" (19 mm)	1-1/4" (32 mm)	1.44" (37 mm)	1-1/8" (29 mm)	R63-06
#7 - 7/8" (22 mm)	1-7/16" (37 mm)	1.66" (42 mm)	1-1/4" (32 mm)	R63-07
#8 - 1" (25 mm)	1-5/8" (41 mm)	1.88" (48 mm)	1-3/8" (35 mm)	R63-08

Chase Residence
Helical Tieback Anchors

PROJECT

6/30/2024

DATE

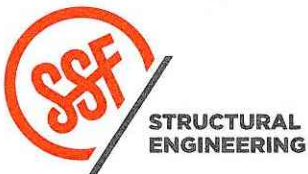
PROJ. #

EBG

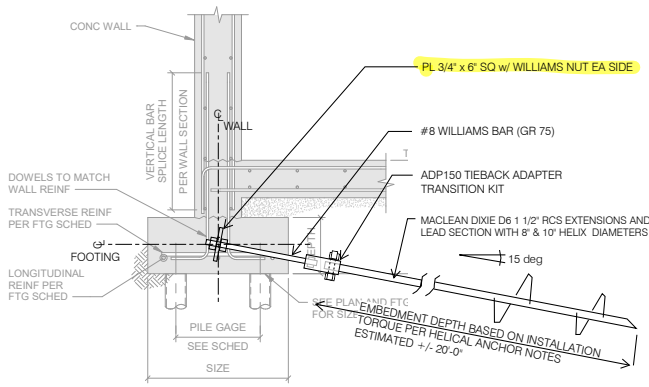
DESIGN

Page 5 of 6

SHEET



Tieback Bearing Plate



HELICAL TIEBACK @ FTG EL 22'-6"

Plate Design: R = 20 kips (ASD)

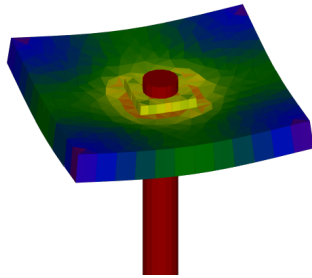
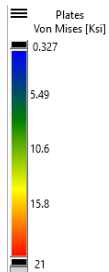
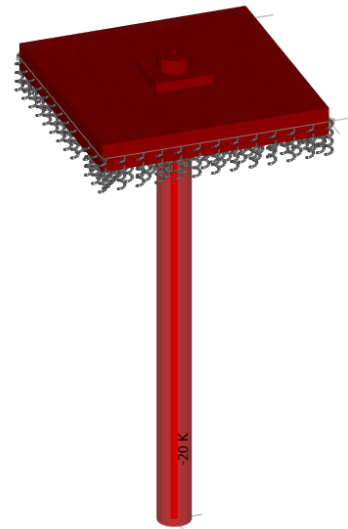


Plate Stress

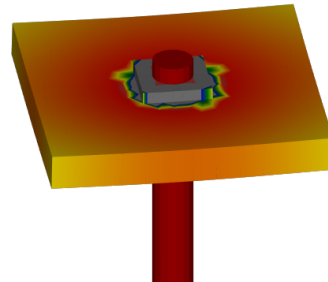
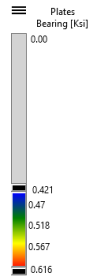


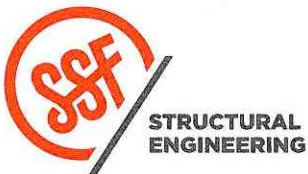
Plate Bearing

Stress (Von Mises)

Max (ASD) = ~21ksi
 Use $F_n/\Omega = 60\text{ksi}/1.67 = 21.6\text{ksi}$
 (conservative, elastic design)
 $R_n/\Omega > F_u \rightarrow \text{OK}$

Bearing Stress

Use allowable = $0.85 f_c / 1.4$
 $= 0.85 * 3000 / 1.4 = 1821\text{psi}$
 Max = ~616 psi $\rightarrow \text{OK}$



Chase Residence
Helical Tieback Anchors

PROJECT

6/30/2024

DATE

PROJ. #

EBG

DESIGN

Page 6 of 6

SHEET



DRAWN: EBG
DESIGN: EBG
CHECKED: EBG
APPROVED: EBG

REVISIONS:

DPD:

PROJECT TITLE:
**CHASE RESIDENCE
HELICAL TIEBACKS**
4525 FOREST AVE SE
MERCER ISLAND, WA 98040

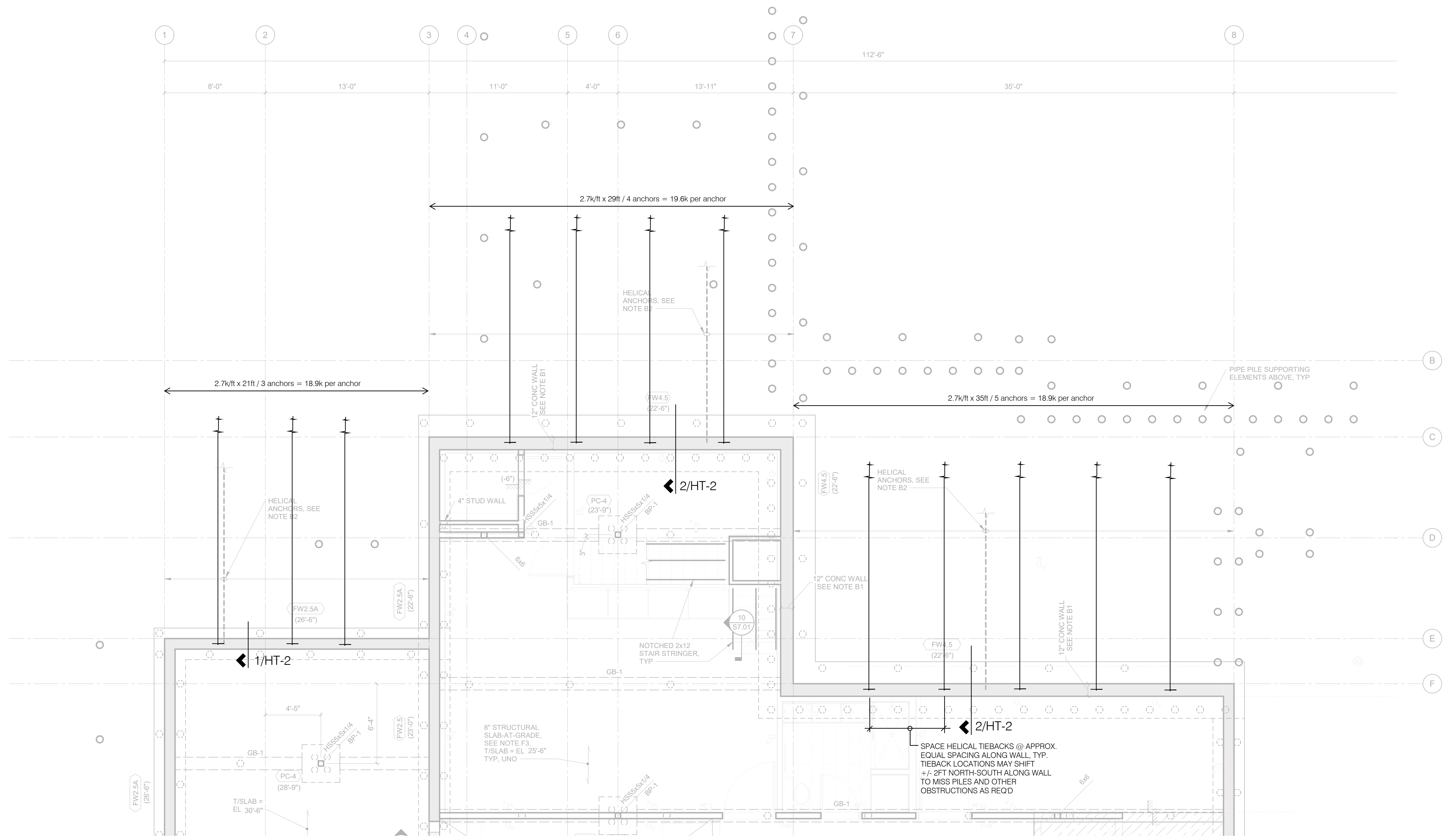


ISSUE:
CONSTRUCTION

SHEET TITLE:
**HELICAL TIEBACK
ANCHOR
PLAN**

SCALE:
DATE: 6/30/2024
PROJECT NO: 01255-2023-13
SHEET NO:

HT-1
NO: 1 OF 2 SHEETS:



NOTES

- BACKGROUND DRAWING IS FROM PARTIAL SHEET S2.00 BY KPFF ENGINEERS, DATED 4/25/2024. LOCATE ALL HELICAL ANCHORS PER STRUCTURAL DRAWINGS.
- DO NOT SCALE DRAWINGS. REFER TO STRUCTURAL DRAWINGS FOR ALL DIMENSIONS AND ELEVATIONS.

LEGEND

⊕ HELICAL ANCHOR CENTERED IN FOOTING, SEE HELICAL ANCHOR SECTIONS ON SHEET HT-2

HELICAL TIEBACK ANCHOR PLAN

1/4" = 1'-0"



