

---

## ORIGINATION FORM

---

### Proposed Revisions to a Standard Plans Index

(Please provide all information — Incomplete forms will be returned)

**Contact Information:**

Date: January 13, 2022

Originator: Joshua Turley

Phone: (850) 414-4475

Email: [joshua.turley@dot.state.fl.us](mailto:joshua.turley@dot.state.fl.us)

**Standard Plans:**

Index Number: 455-440

Sheet Number (s): 1 and 2 of 4

Index Title: PRECAST CONCRETE SHEET PILE WALL  
(CFRP/GFRP & HSSS/GFRP)

**Summary of the changes:**

Sheet 1: Changed Class V (Special) concrete to Class V.

Sheet 2: Updated Dimension B which takes into account the latest FRP bar bending radius's; Removed note 5 which was only required because of dimension B; Deleted the "See Note 5" reference in SECTION A-A, B-B, and C-C.

**Commentary / Background:**

Sheet1: Department has eliminated Class V (Special)

Sheet 2: In the early versions of the FRP Bar Bending Index (D21310) we had a standard minimum inside pin diameter of 4.5" (5.5" out-to-out dimension B) for #4 GFRP bars, which did not accommodate a 10" Sheet pile thickness with 3" cover. Since then, under Index 415-010 the FRP Bar Bending Standard dimensions for a #4 GFRP bar have been standardized/updated to the AASHTO standard minimum pin radius of 6-bar diameters (= 3" diameter). This now allows us to keep the standardized layout of 3" concrete cover.

**Other Affected Offices / Documents: (Provide name of person contacted)**

- | Yes                      | No                                  |                             |
|--------------------------|-------------------------------------|-----------------------------|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Other Standard Plans –      |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | FDOT Design Manual –        |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Basis of Estimates Manual – |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Standard Specifications –   |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Approved Product List –     |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Construction –              |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Maintenance –               |

**Origination Package Includes:** (Submit package to Rick Jenkins)

- | Yes                                 | N/A                      |   |
|-------------------------------------|--------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Redline Mark-ups                                    |
| <input type="checkbox"/>            | <input type="checkbox"/> | Revised or Proposed Standard Plan Instruction (SPI) |
| <input type="checkbox"/>            | <input type="checkbox"/> | Other Support Documents                             |

**Implementation:**

- |                                     |                                  |
|-------------------------------------|----------------------------------|
| <input type="checkbox"/>            | Design Bulletin (Interim)        |
| <input type="checkbox"/>            | DCE Memo                         |
| <input checked="" type="checkbox"/> | Program Mgmt. Bulletin           |
| <input checked="" type="checkbox"/> | FY-Standard Plans (Next Release) |

---

Contact the Roadway Design Office for assistance in completing this form

---

Email to: Rick Jenkins [rick.jenkins@dot.state.fl.us](mailto:rick.jenkins@dot.state.fl.us) and Darren Martin [darren.martin@dot.state.fl.us](mailto:darren.martin@dot.state.fl.us)

**SHEET PILE DESIGN CRITERIA AND NOTES**

**DESCRIPTION:**  
 This Index includes details for six types of piles with two thicknesses.  
 Type "A" is prestressed concrete construction with CFRP or HSSS strands.  
 Types "B1", "B2", "C1" and "C2" piles (corner piles) are reinforced concrete construction.  
 Manufacture, cure and install Sheet Piles in accordance with the requirements of the contract documents.

**MATERIALS:** (for materials not listed refer to the Specifications)  
**CONCRETE**  
 Class: V (Special) DELETED  
 Unit weight: 145 pcf  
 Modulus of Elasticity: Based on the use of Florida limerock aggregate concrete

**REINFORCING BARS**  
 Glass Fiber Reinforced Polymer (GFRP) bars meeting the requirements of Specification Section 932.

**PRESTRESSING STRAND**  
 Stainless Steel: Prestressing steel shall be seven-wire HSSS, Grade 240 strand, meeting the requirements of Specification Section 933.  
 Carbon FRP: Prestressing strand shall be CFRP strand, meeting the requirements of Specification Section 933.

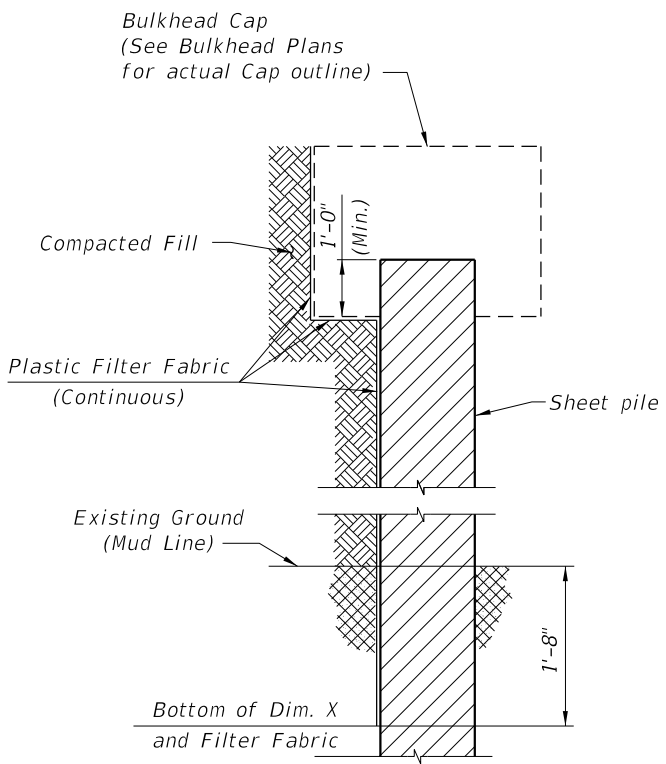
**DESIGN PARAMETERS:**  
 Type "A"  
 Concrete Compressive Strength at release of prestressing: 4000 psi minimum  
 Uniform compression after prestressing losses: 700 psi minimum  
 Pick-up, Storage and Transportation: 450 psi tension with 1.5 times pile self weight for single-point pick-up at  $f'c \geq 6000$  psi

Types "B1", "B2", "C1" & "C2"  
 Pick-up, Storage and Transportation: Minimum compressive strength  $f'ci \geq 4000$  psi required for two-point pick-up;  $f'c \geq 6000$  psi for single-point pick-up.

**PLASTIC FILTER FABRIC:**  
 The plastic filter fabric shall extend to the bottom of the "X" dimension.

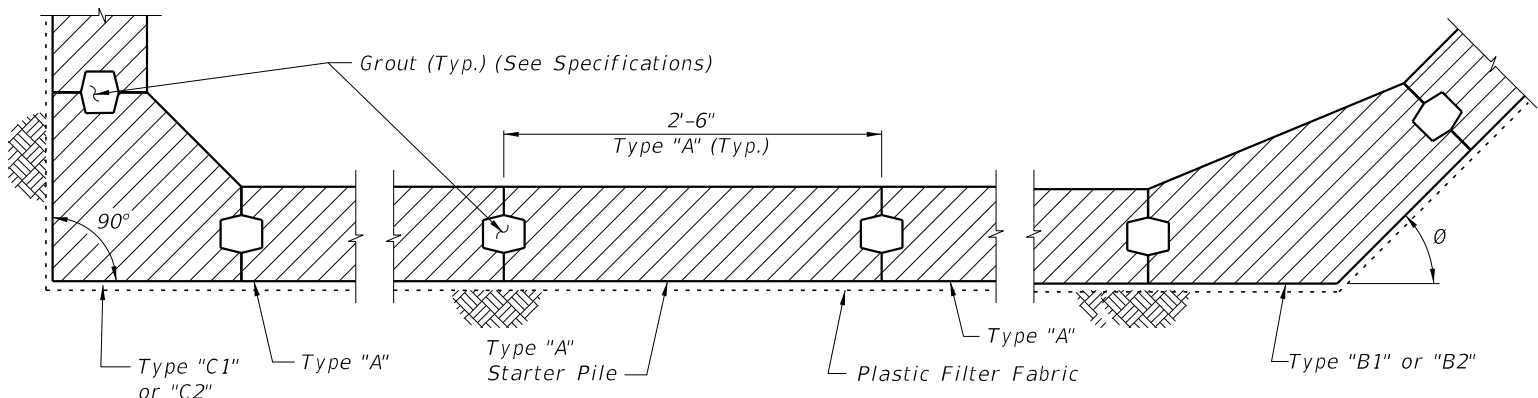
**PILE PICK-UP AND HANDLING:**  
 Two-point pick-up for lifting out of forms & two-point support for storage & transportation.  
 Single-point pick-up for installation only.

**PILE FIT-UP:**  
 The 2'-6" Sheet Pile dimension is nominal. This dimension may be shortened by the Manufacturer up to 1/2" to allow for Sheet Pile fit-up in its final position. Minimum Sheet Pile width is 2'-5 1/2". No changes shall be made to the tongues or grooves.



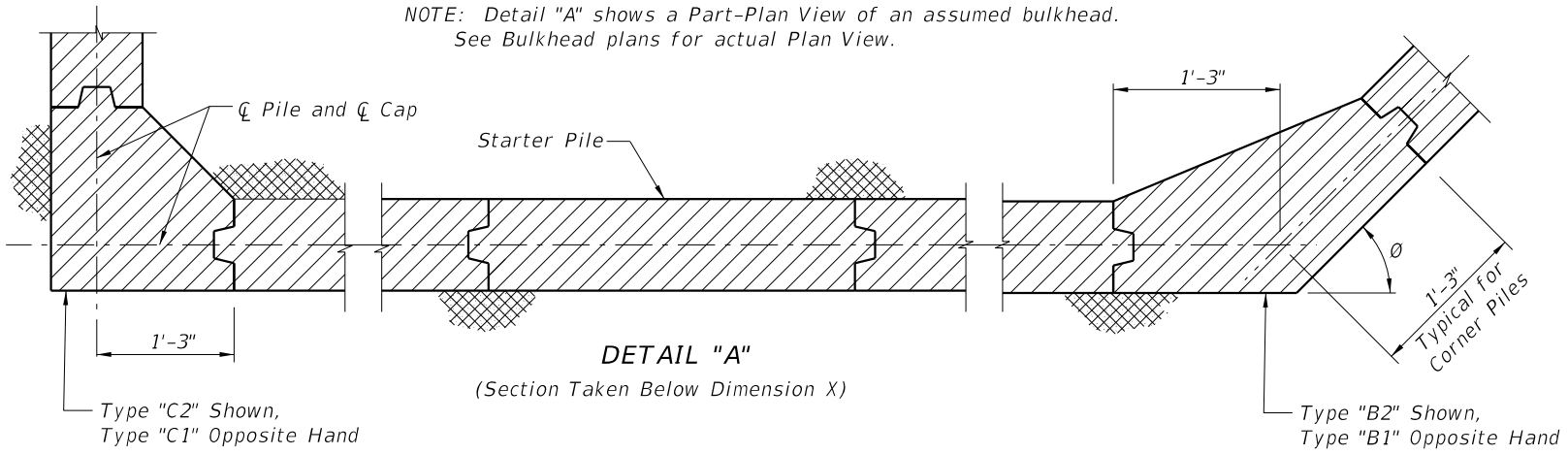
**SECTION THRU BULKHEAD**  
 (Showing Plastic Filter Fabric)

**CROSS REFERENCES:**  
 For Dimensions L and X see Sheet Pile Wall Data Table in Structures Plans.

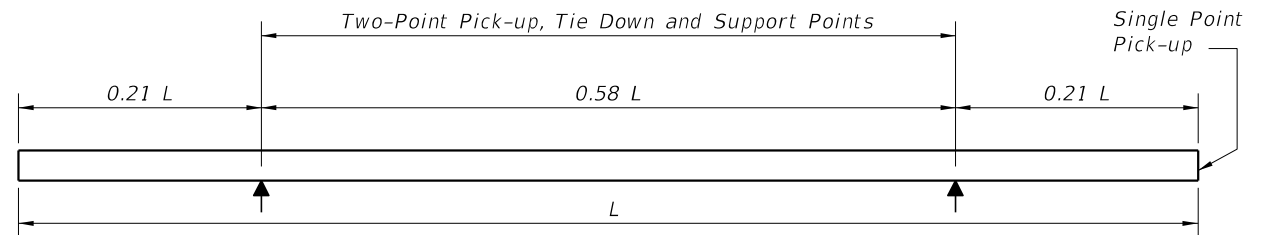


**DETAIL "A"**  
 (Cap and Anchoring System Not Shown)  
 (Section Taken Above Dimension X)

NOTE: Detail "A" shows a Part-Plan View of an assumed bulkhead. See Bulkhead plans for actual Plan View.



**DETAIL "A"**  
 (Section Taken Below Dimension X)



**PILE STORAGE AND TRANSPORTATION SUPPORT DETAILS**

9/21/2021 1:44:56 PM

LAST REVISION	DESCRIPTION:
11/01/20	11/02/22

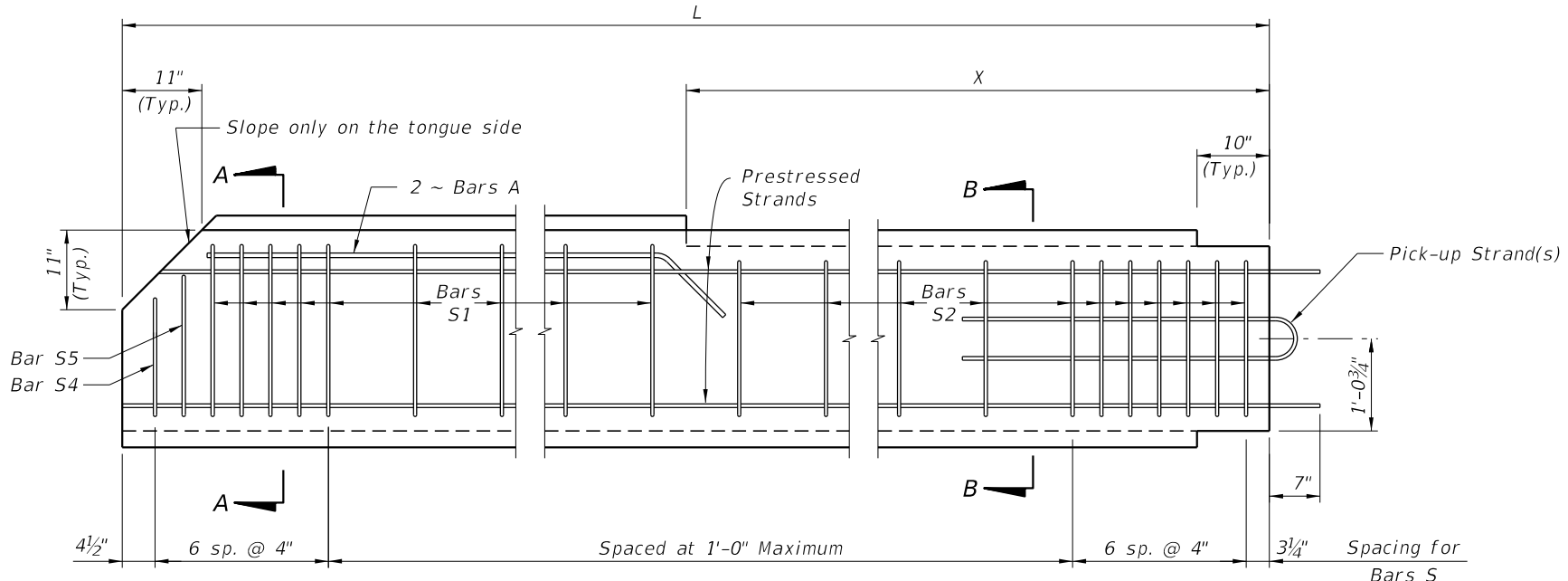


**FY 2022-23  
 STANDARD PLANS**

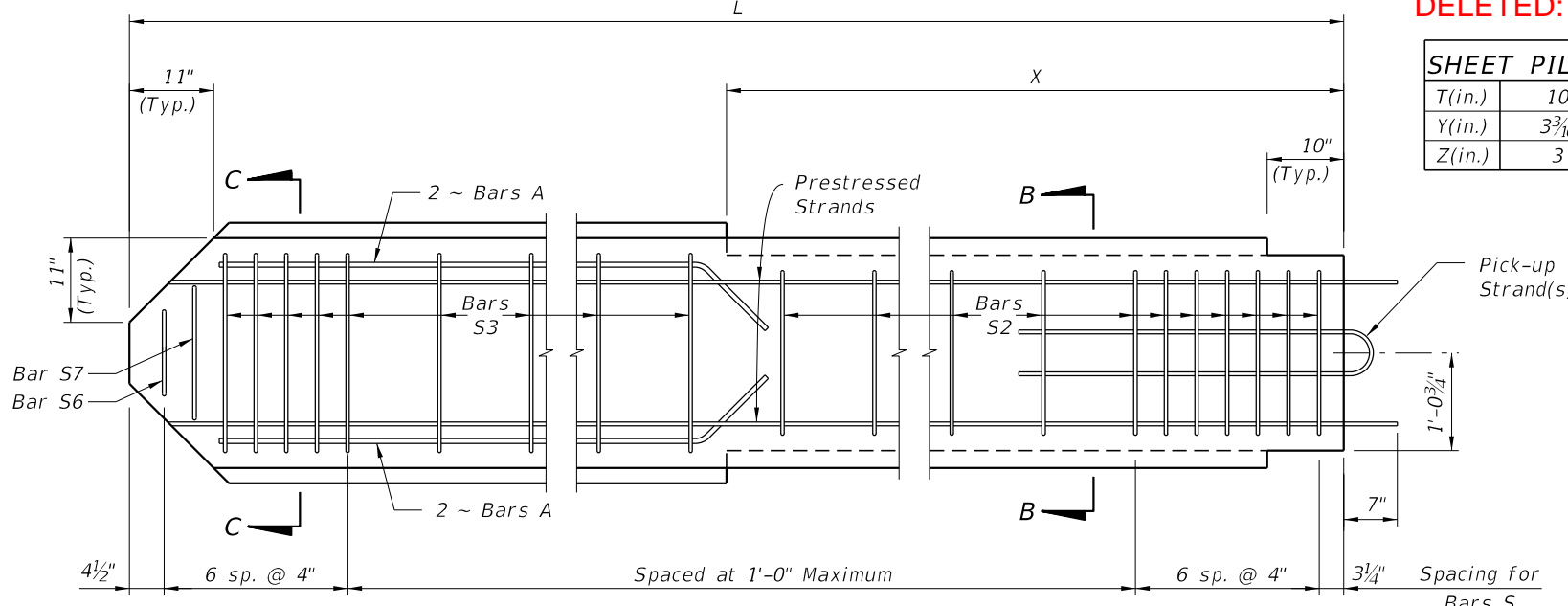
**PRECAST CONCRETE SHEET PILE WALL  
 (CFRP/GFRP & HSSS/GFRP)**

**NOTES AND DETAILS**

INDEX	SHEET
455-440	1 of 4



TYPICAL PILE



STARTER PILE

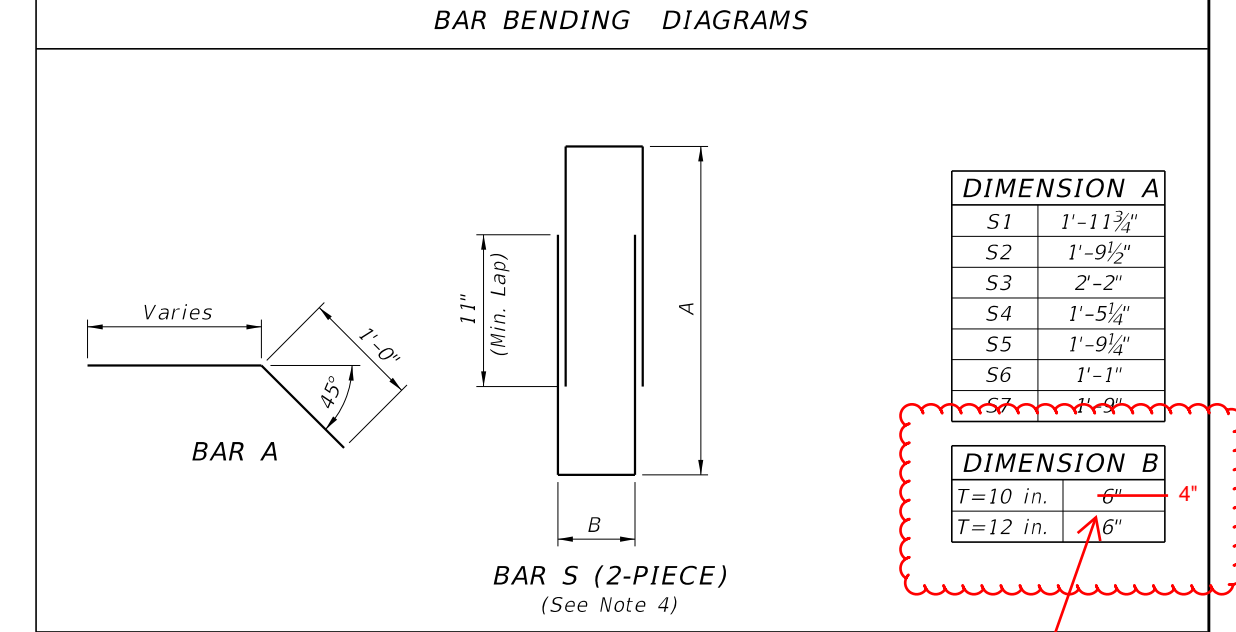
DELETED: Note 5

SHEET PILE DIMENSIONS		
T(in.)	10	12
Y(in.)	3 3/16	4 3/16
Z(in.)	3	4

NOTES:

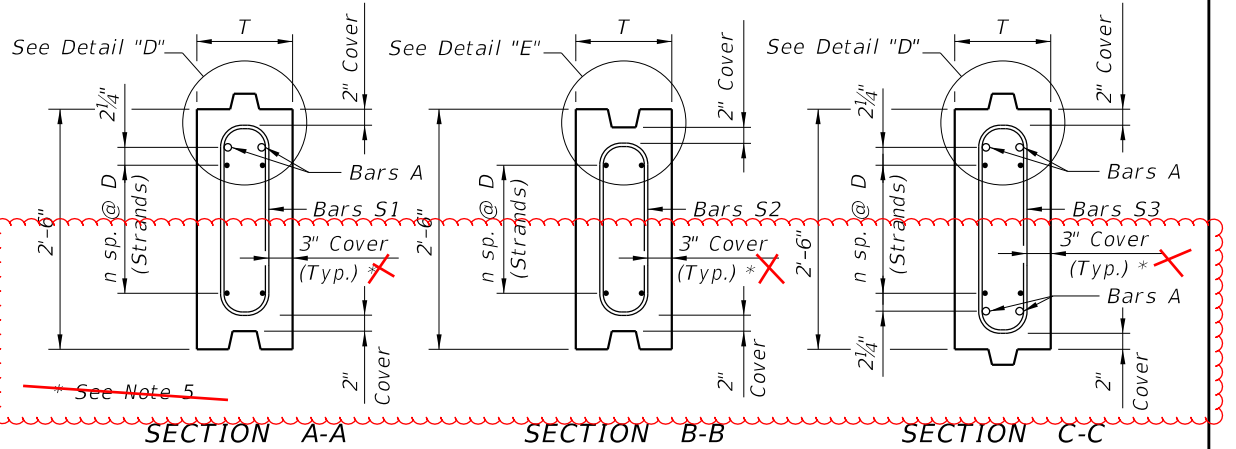
- Intermediate Prestress Strands not shown in Elevations and Sections.
- All bar dimensions are out-to-out.
- Bars A are GFRP #5
- Bars S are GFRP #4 and may be a single closed bar (hoop) with equivalent area and tensile strength.
- ~~For 10" thick Sheet Piles, Bars S may be tilted to achieve contact with strands or provide supplemental GFRP Bars to offset Bars S from strands and maintain 2" Nominal cover.~~
- ~~For Dimensions L and X see Sheet Pile Data Table in Structures Plans.~~

UPDATED: Dimension



DIMENSION A	
S1	1'-11 3/4"
S2	1'-9 1/2"
S3	2'-2"
S4	1'-5 1/4"
S5	1'-9 1/4"
S6	1'-1"
S7	1'-9"

DIMENSION B	
T=10 in.	6" → 4"
T=12 in.	6"

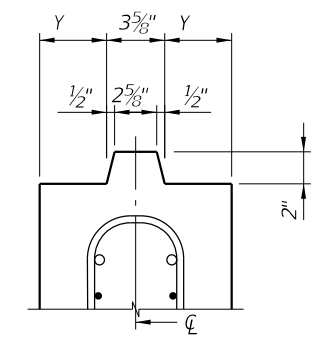


Strand Material	Wall Thickness	STRAND DIA. (in.)	MAXIMUM L *	n	D (in.)	TOTAL # OF STRANDS	Initial (Jacking) FORCE (Kip)
CFRP Strand	T=10 in.	0.49 (12.5mm)	26'-0"	4	4	10	28.7
		0.5 (12.7mm)	27'-0"	3	5 1/4 <sup>(2)</sup>	8	41.3
		0.6 (15.2mm)	27'-0"	3	5 1/4 <sup>(2)</sup>	8	42.7
	T=12 in.	0.49 (12.5mm)	31'-0"	5	3 1/4 <sup>(1)</sup>	12	28.7
		0.5 (12.7mm)	31'-0"	3	5 1/4 <sup>(2)</sup>	8	41.3
		0.6 (15.2mm)	31'-0"	3	5 1/4 <sup>(2)</sup>	8	42.7
HSSS Strand	T=10 in.	0.5 (12.7mm)	27'-0"	5	3 1/4 <sup>(1)</sup>	12	25.7
		0.6 (15.2mm)	26'-0"	3	5 1/4 <sup>(2)</sup>	8	36.5
	T=12 in.	0.5 (12.7mm)	32'-0"	6	2 3/4 <sup>(3)</sup>	14	25.7
		0.6 (15.2mm)	32'-0"	4	4	10	36.5

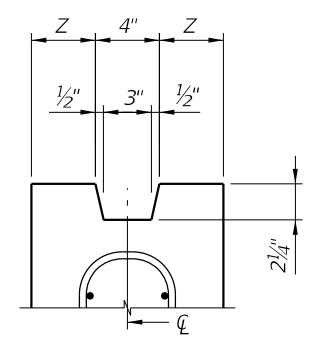
Alternate symmetrical strand patterns:

- 4 sp. @ 2" & 1 sp. @ 8"
- 2 sp. @ 4" & 1 sp. @ 8"
- 4 sp. @ 2" & 2 sp. @ 4"

\* Based on lifting using single point pick-up.



DETAIL "D" (Typical Tongue)



DETAIL "E" (Typical Groove)

TYPE "A" STANDARD SECTION

9/21/2021 1:44:57 PM

LAST REVISION	DESCRIPTION:
11/01/19	
11/02/22	



FY 2022-23  
STANDARD PLANS

PRECAST CONCRETE SHEET PILE WALL  
(CFRP/GFRP & HSSS/GFRP)

INDEX  
455-440

SHEET  
2 of 4

**SHEET PILE DESIGN CRITERIA AND NOTES**

**DESCRIPTION:**  
 This Index includes details for six types of piles with two thicknesses.  
 Type "A" is prestressed concrete construction with CFRP or HSSS strands.  
 Types "B1", "B2", "C1" and "C2" piles (corner piles) are reinforced concrete construction.  
 Manufacture, cure and install Sheet Piles in accordance with the requirements of the contract documents.

**MATERIALS:** (for materials not listed refer to the Specifications)  
**CONCRETE**  
 Class: V  
 Unit weight: 145 pcf  
 Modulus of Elasticity: Based on the use of Florida limerock aggregate concrete

**REINFORCING BARS**  
 Glass Fiber Reinforced Polymer (GFRP) bars meeting the requirements of Specification Section 932.

**PRESTRESSING STRAND**  
 Stainless Steel: Prestressing steel shall be seven-wire HSSS, Grade 240 strand, meeting the requirements of Specification Section 933.  
 Carbon FRP: Prestressing strand shall be CFRP strand, meeting the requirements of Specification Section 933.

**DESIGN PARAMETERS:**  
 Type "A"  
 Concrete Compressive Strength at release of prestressing: 4000 psi minimum  
 Uniform compression after prestressing losses: 700 psi minimum  
 Pick-up, Storage and Transportation: 450 psi tension with 1.5 times pile self weight for single-point pick-up at  $f'c \geq 6000$  psi

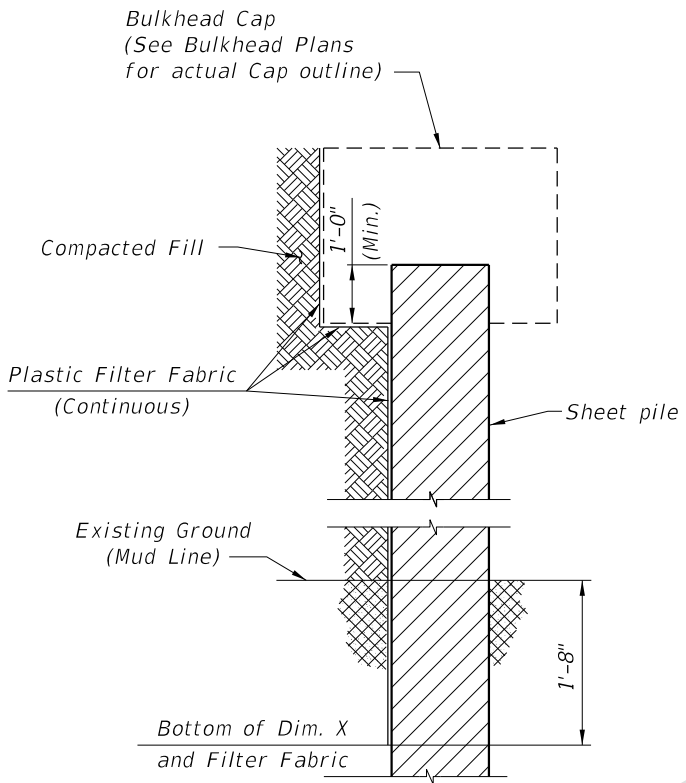
Types "B1", "B2", "C1" & "C2"  
 Pick-up, Storage and Transportation: Minimum compressive strength  $f'ci \geq 4000$  psi required for two-point pick-up;  $f'c \geq 6000$  psi for single-point pick-up.

**PLASTIC FILTER FABRIC:**  
 The plastic filter fabric shall extend to the bottom of the "X" dimension.

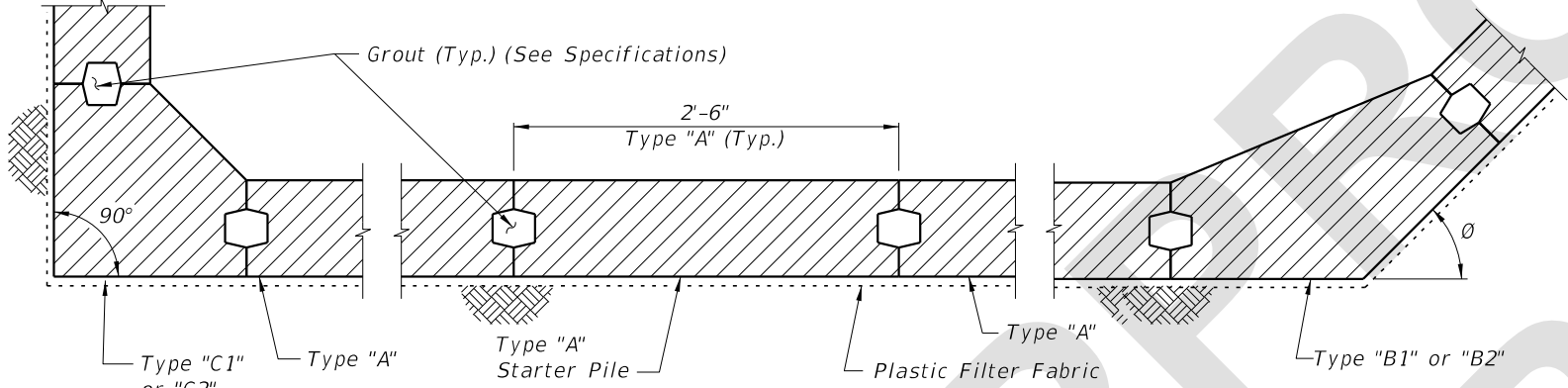
**PILE PICK-UP AND HANDLING:**  
 Two-point pick-up for lifting out of forms & two-point support for storage & transportation.  
 Single-point pick-up for installation only.

**PILE FIT-UP:**  
 The 2'-6" Sheet Pile dimension is nominal. This dimension may be shortened by the Manufacturer up to 1/2" to allow for Sheet Pile fit-up in its final position. Minimum Sheet Pile width is 2'-5 1/2". No changes shall be made to the tongues or grooves.

**CROSS REFERENCES:**  
 For Dimensions L and X see Sheet Pile Wall Data Table in Structures Plans.

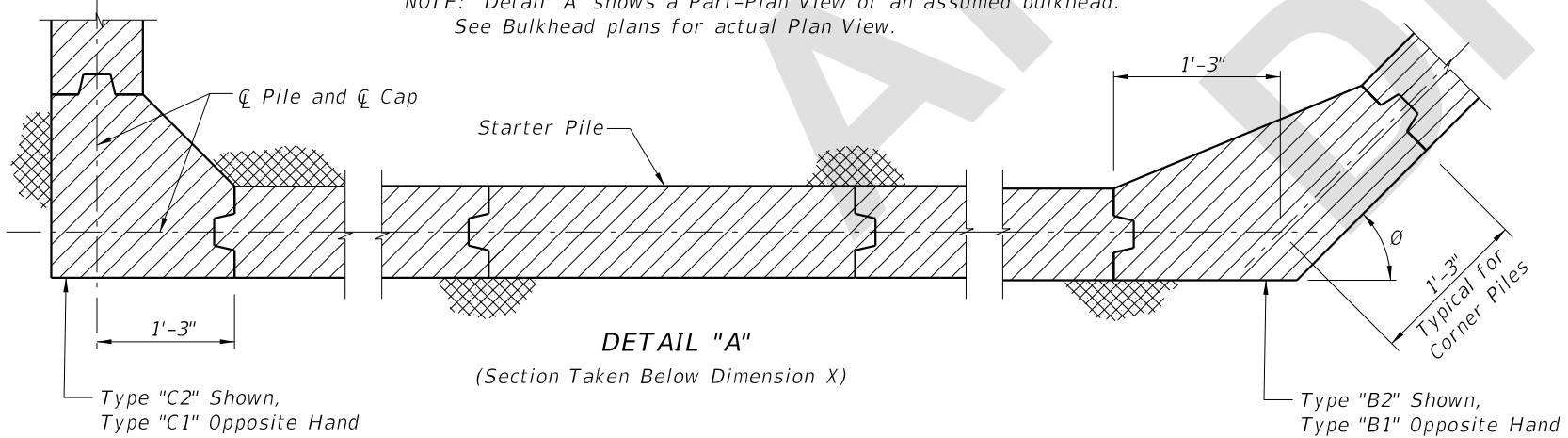


**SECTION THRU BULKHEAD**  
 (Showing Plastic Filter Fabric)

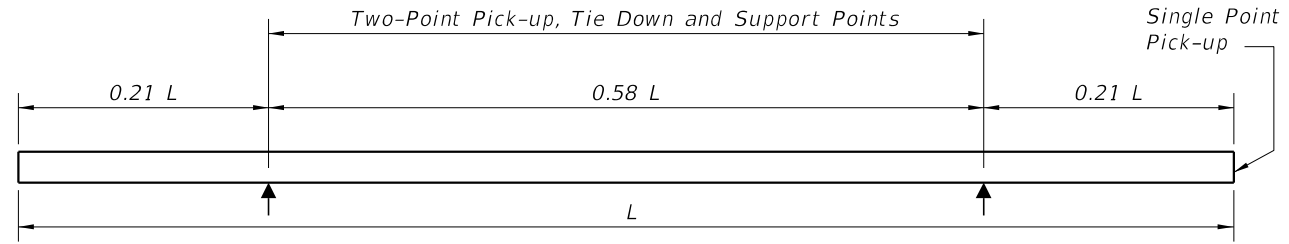


**DETAIL "A"**  
 (Cap and Anchoring System Not Shown)  
 (Section Taken Above Dimension X)

NOTE: Detail "A" shows a Part-Plan View of an assumed bulkhead.  
 See Bulkhead plans for actual Plan View.



**DETAIL "A"**  
 (Section Taken Below Dimension X)



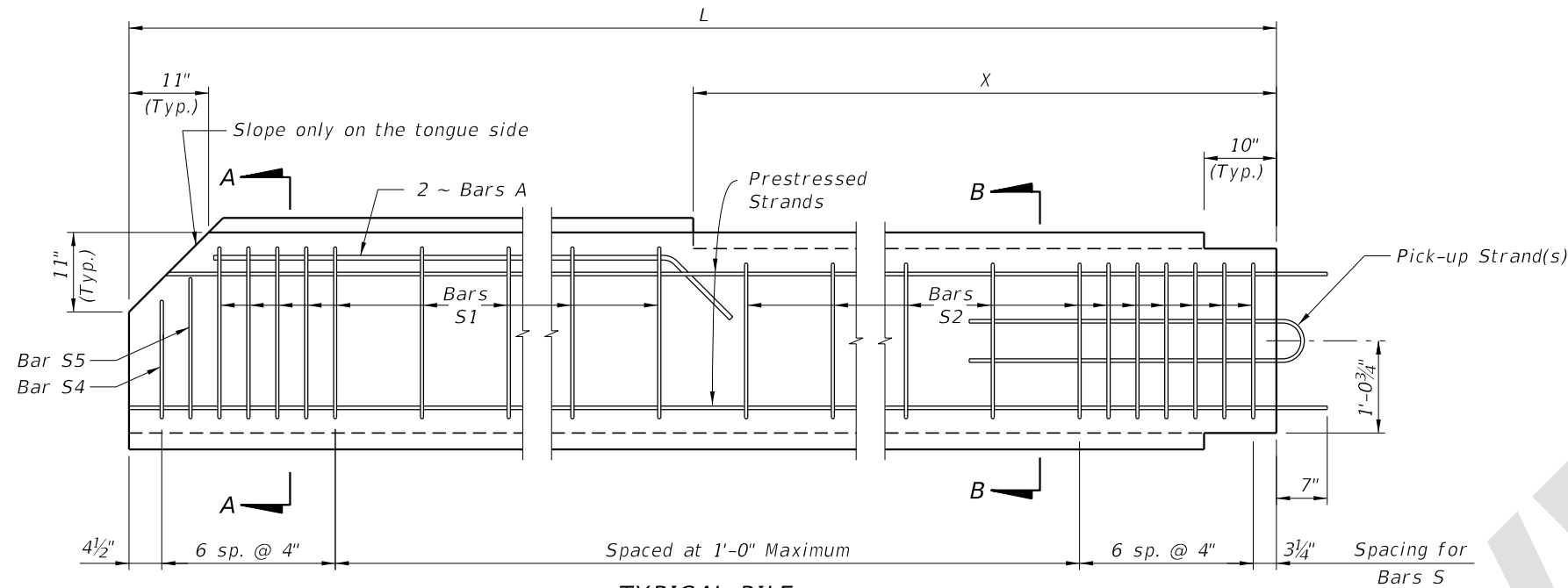
**PILE STORAGE AND TRANSPORTATION SUPPORT DETAILS**

7/11/2022 1:31:21 PM

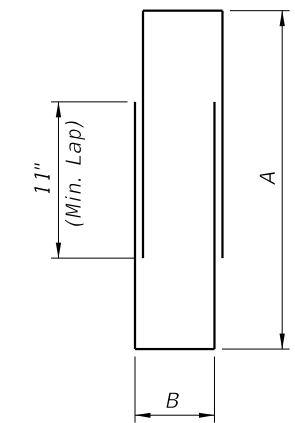
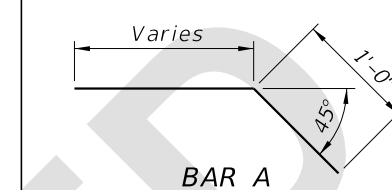
LAST REVISION 11/01/22	DESCRIPTION:		FY 2023-24 STANDARD PLANS	PRECAST CONCRETE SHEET PILE WALL (CFRP/GFRP & HSSS/GFRP)	INDEX 455-440	SHEET 1 of 4
---------------------------	--------------	--	------------------------------	---	------------------	-----------------

NOTES AND DETAILS

BAR BENDING DIAGRAMS



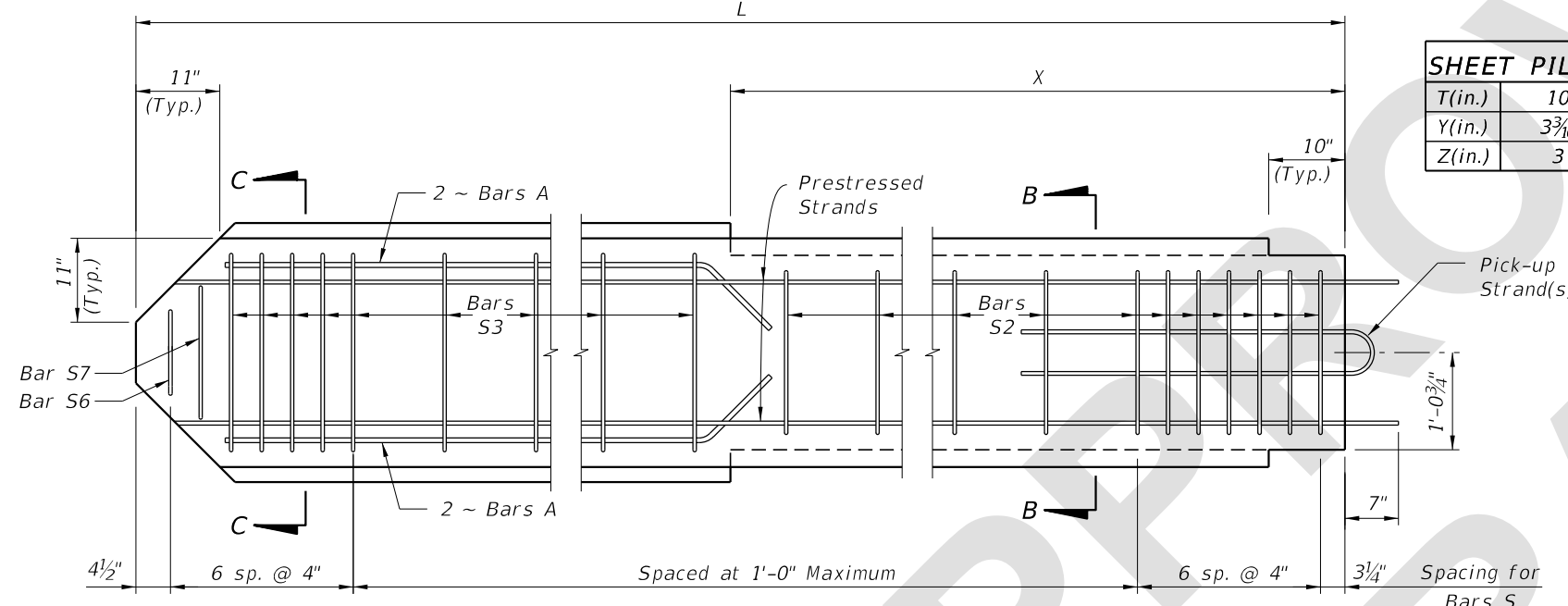
TYPICAL PILE



DIMENSION A	
S1	1'-11 3/4"
S2	1'-9 1/2"
S3	2'-2"
S4	1'-5 1/4"
S5	1'-9 1/4"
S6	1'-1"
S7	1'-9"

DIMENSION B	
T=10 in.	4"
T=12 in.	6"

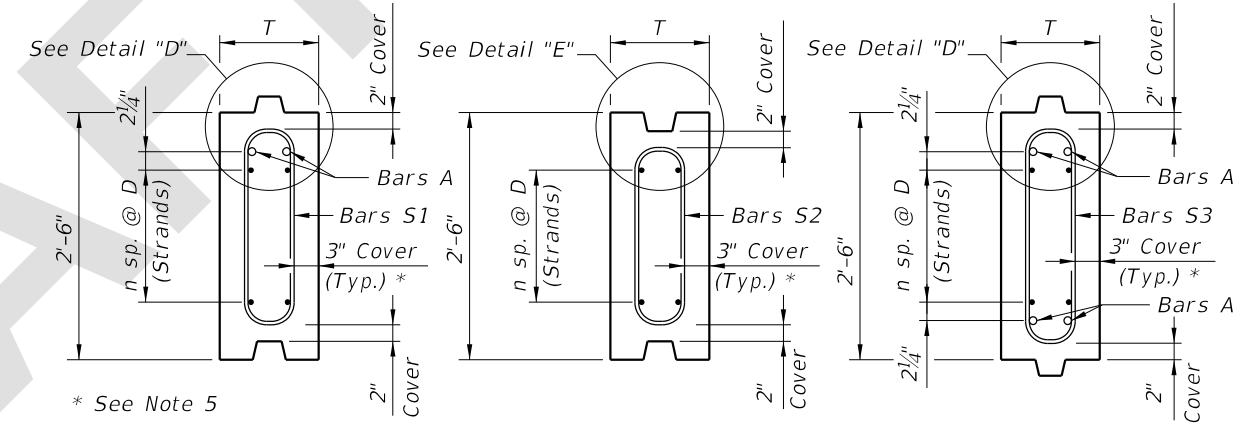
BAR S (2-PIECE)  
(See Note 4)



STARTER PILE

SHEET PILE DIMENSIONS		
T(in.)	10	12
Y(in.)	3 3/16	4 3/16
Z(in.)	3	4

- NOTES:
- Intermediate Prestress Strands not shown in Elevations and Sections.
  - All bar dimensions are out-to-out.
  - Bars A are GFRP #5
  - Bars S are GFRP #4 and may be a single closed bar (hoop) with equivalent area and tensile strength.
  - For Dimensions L and X see Sheet Pile Data Table in Structures Plans.

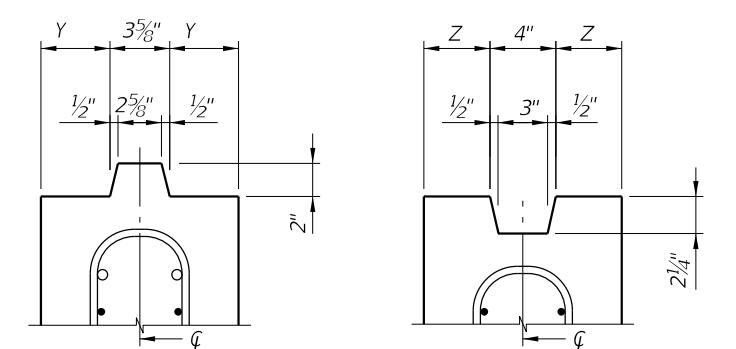


SECTION A-A SECTION B-B SECTION C-C

Strand Material	Wall Thickness	STRAND DIA. (in.)	MAXIMUM L *	n	D (in.)	TOTAL # OF STRANDS	Initial (Jacking) FORCE (Kip)
CFRP Strand	T=10 in.	0.49 (12.5mm)	26'-0"	4	4	10	28.7
		0.5 (12.7mm)	27'-0"	3	5 1/4 <sup>(2)</sup>	8	41.3
		0.6 (15.2mm)	27'-0"	3	5 1/4 <sup>(2)</sup>	8	42.7
	T=12 in.	0.49 (12.5mm)	31'-0"	5	3 1/4 <sup>(1)</sup>	12	28.7
		0.5 (12.7mm)	31'-0"	3	5 1/4 <sup>(2)</sup>	8	41.3
		0.6 (15.2mm)	31'-0"	3	5 1/4 <sup>(2)</sup>	8	42.7
HSSS Strand	T=10 in.	0.5 (12.7mm)	27'-0"	5	3 1/4 <sup>(1)</sup>	12	25.7
		0.6 (15.2mm)	26'-0"	3	5 1/4 <sup>(2)</sup>	8	36.5
	T=12 in.	0.5 (12.7mm)	32'-0"	6	2 3/4 <sup>(3)</sup>	14	25.7
		0.6 (15.2mm)	32'-0"	4	4	10	36.5

- Alternate symmetrical strand patterns:
- 4 sp. @ 2" & 1 sp. @ 8"
  - 2 sp. @ 4" & 1 sp. @ 8"
  - 4 sp. @ 2" & 2 sp. @ 4"

\* Based on lifting using single point pick-up.



DETAIL "D" (Typical Tongue) DETAIL "E" (Typical Groove)

TYPE "A" STANDARD SECTION

7/11/2022 1:31:25 PM