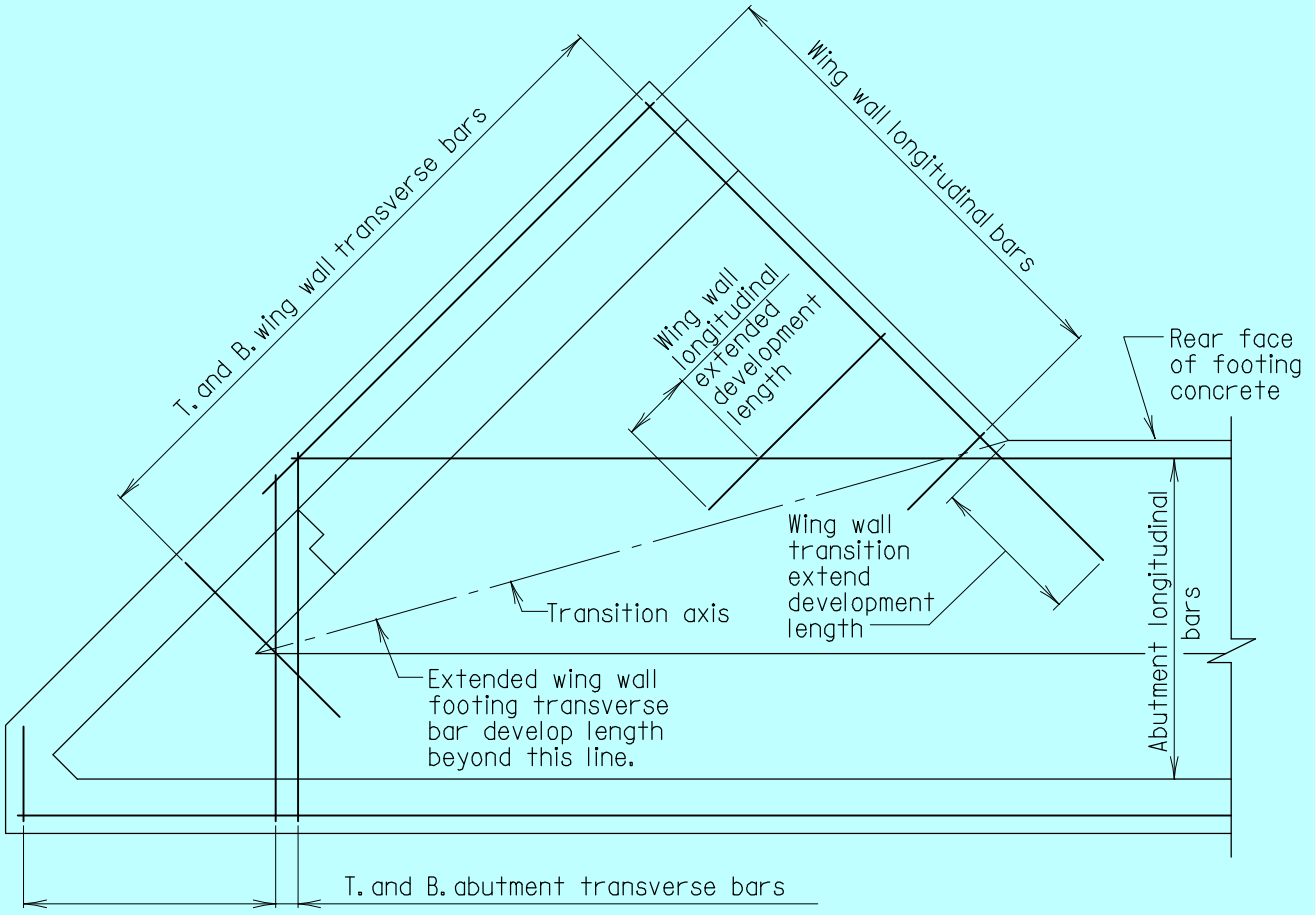
FOUNDATIONS

(FND)

FOUNDATIONS

GENERAL

(FND-GN)



ACUTE CORNER

Scale: 3/8" = 1'-0"

* FOR OFFICE USE ONLY *

APPROVAL
E.S. Friedman DIRECTOR OFFICE OF STRUCTURES
DATE: 11/17/97

REVISIONS	
SHA	FHWA

FHWA APPROVAL	
DATE:	

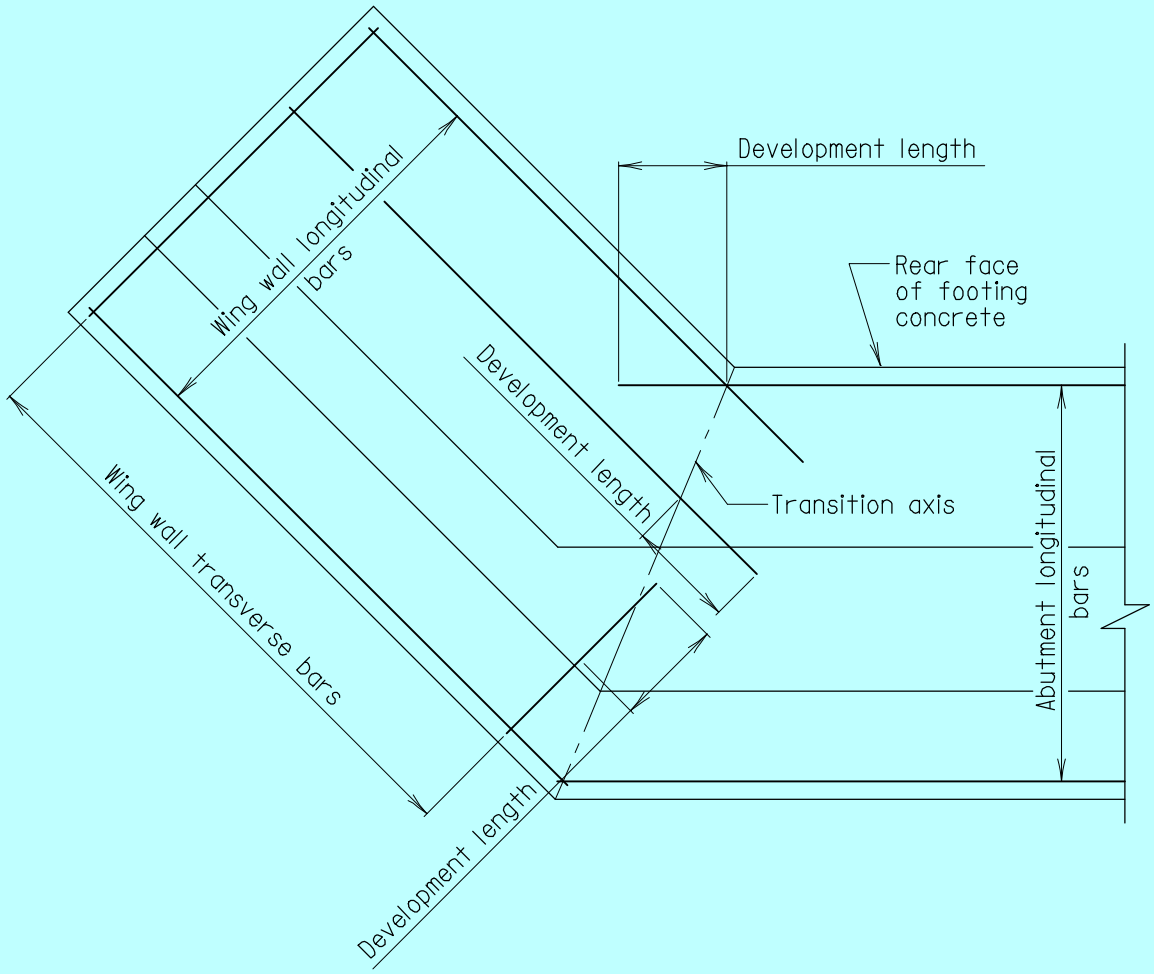
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

SKEWED ABUTMENT AND WING WALL FOOTING INTERSECTION

STANDARD NO. FND-GN-101 SHEET 1 OF 2

FOUNDATION - GENERAL

OLD NO. BR-FD(0.14)-97-322



OBTUSE CORNER

Scale: 3/8" = 1'-0"

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E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 11/17/97

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DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

SKEWED ABUTMENT AND WING WALL FOOTING INTERSECTION

STANDARD NO. FND-GN-101

SHEET 2 OF 2

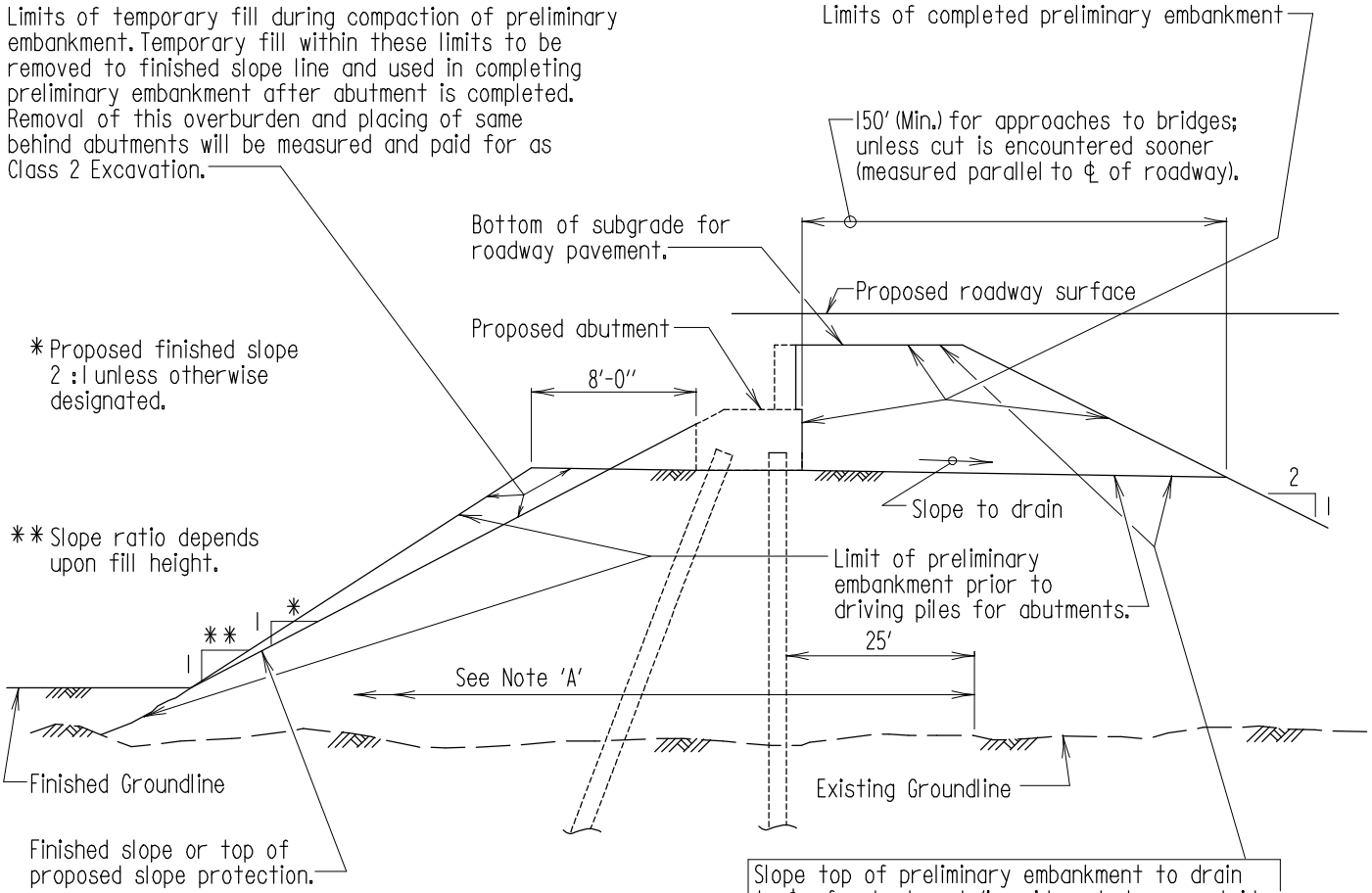
FOUNDATION - GENERAL

OLD NO. BR-FD(0.14)-97-322

FOUNDATIONS

PILE FOUNDATIONS

(FND-PF)



ELEVATION

Scale: None

Note A:
No boulders, rocks, or stumps in this area of fill and all stumps, surface boulders and rocks to be removed from existing ground within these limits.

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 1/8/76

REVISIONS	
SHA	FHWA
11-9-76	11-9-76
4-28-94	
3-20-01	
7-24-01	

FHWA APPROVAL
DATE: 11-9-76

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

PRELIMINARY EMBANKMENT FOR PEDESTAL TYPE BRIDGE ABUTMENTS ON PILES

STANDARD NO. FND-PF-101 SHEET 1 OF 1

FOUNDATION - PILES

OLD NO. BR-FD(0.10)-75-17

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 9/6/85

REVISIONS	
SHA	FHWA
6-23-87	6-8-90
4-27-94	
3-20-01	
7-24-01	

FHWA APPROVAL
DATE: 6-8-90

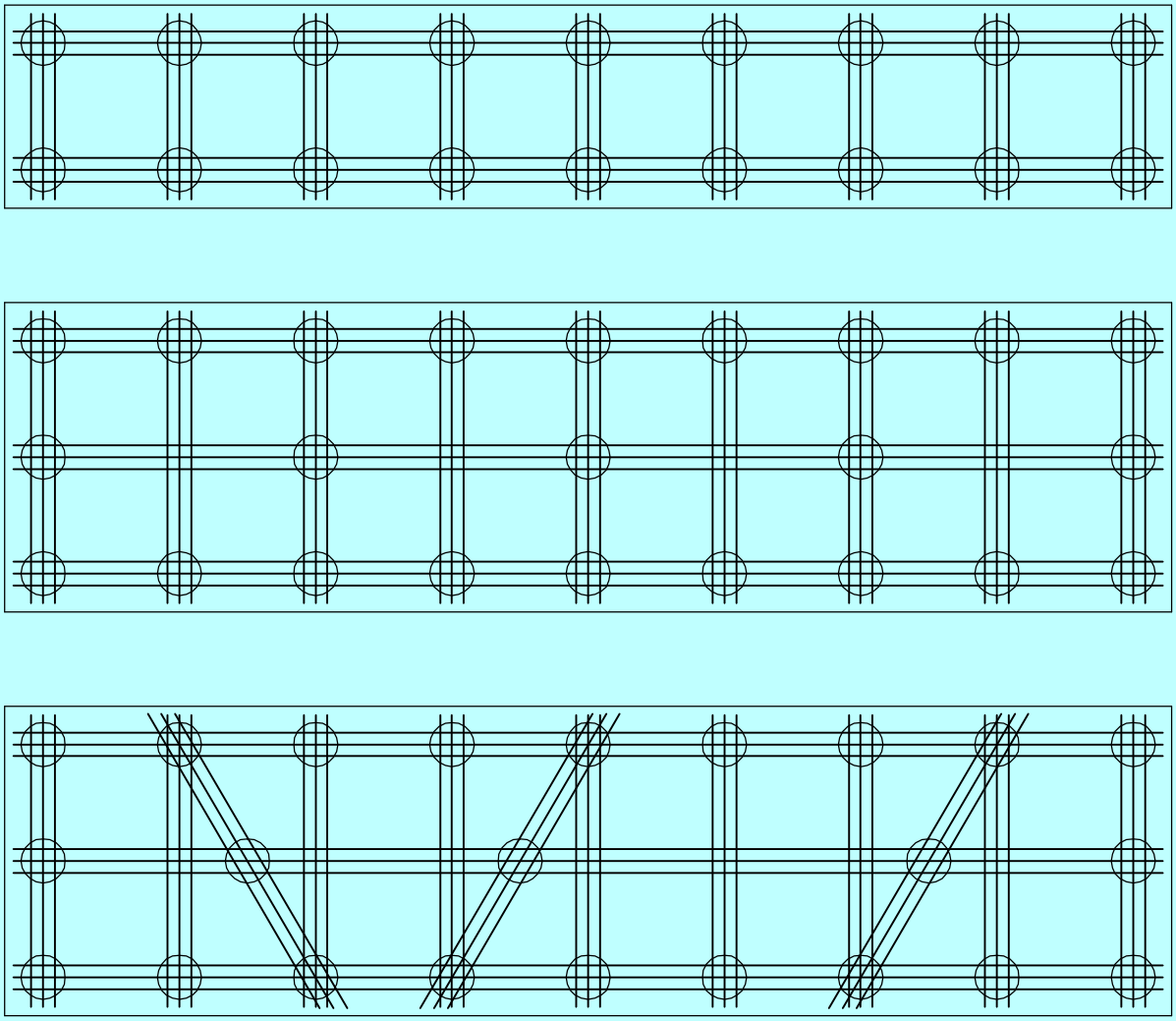
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

PRELIMINARY EMBANKMENT FOR SEMI-CANTILEVER TYPE ABUTMENTS ON PILES WITH STEPPED WING WALL FOOTERS

STANDARD NO. FND-PF-102 SHEET 1 OF 1

FOUNDATION - PILES

OLD NO. BR-FD(0.12)-85-174



TYPICAL PIER FOOTING PLANS

Scale: 3/16"=1'-0"

Notes:

1. All rebars shall be 3-#6 @ 4" c/c.
2. Lower mat of bars shall be 3" (vertical) above top of center line of pile.
3. All piles shall be crossed at least twice.
4. The direction taken by bars shall wherever possible be, the shortest distance between piles.
5. In all cases the total pattern shall be shown on Contract Documents.
6. O denotes all piling, cast-in-place, steel H piles, etc. When showning on Contract Documents H piles shall be shown with the normal "H" symbol.
7. In laying out pile plan, if possible, piles shall be positioned to minimize need for diagonal bars.
8. A note in area of rebar pattern shall appear on Contract Documents as follows "Shop plans shall show how rebars are to be tied as well as how they will be held in place above piling while pour is being made."

* FOR OFFICE USE ONLY *

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 10/14/82

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SHA	FHWA
1-22-01	

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DATE:	

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
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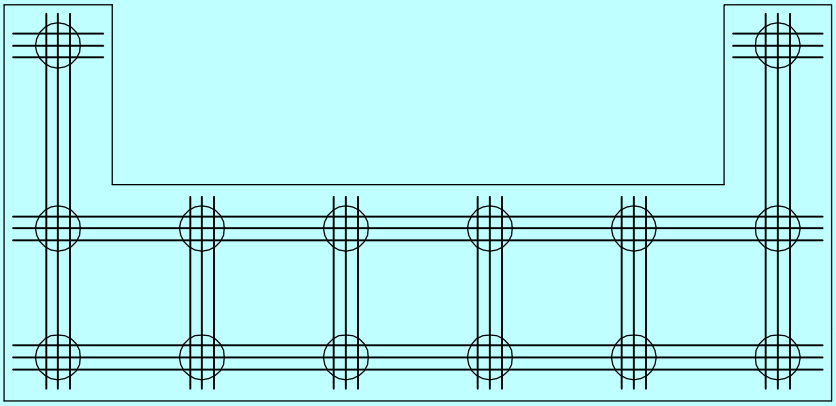
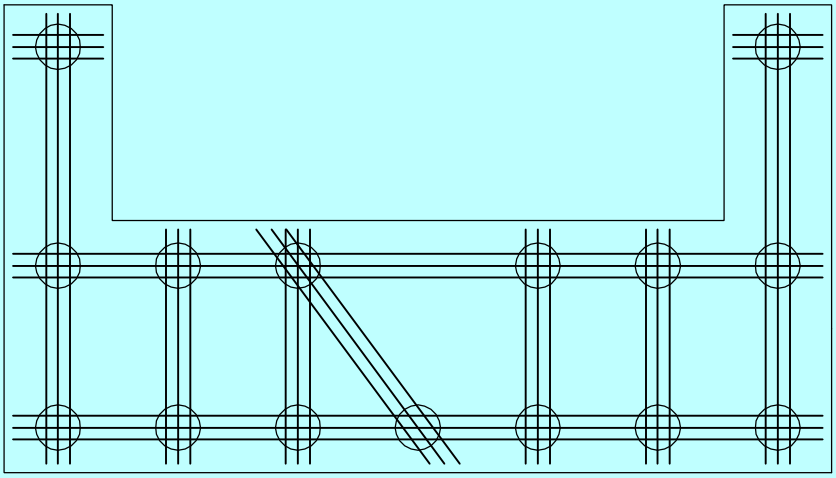
REBAR MAT PATTERN OVER PILING

STANDARD NO. FND-PF-201 SHEET 1 OF 3

FOUNDATION - PILES

OLD NO. BR-SB(6.04)-82-132





TYPICAL ABUTMENT FOOTING PLANS

Scale: 3/16''=1'-0''

See notes on Sheet 1 of 3.

* FOR OFFICE USE ONLY *

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 10/14/82

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SHA	FHWA
11-30-87	
3-22-89	
1-22-01	

FHWA APPROVAL	
DATE:	

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

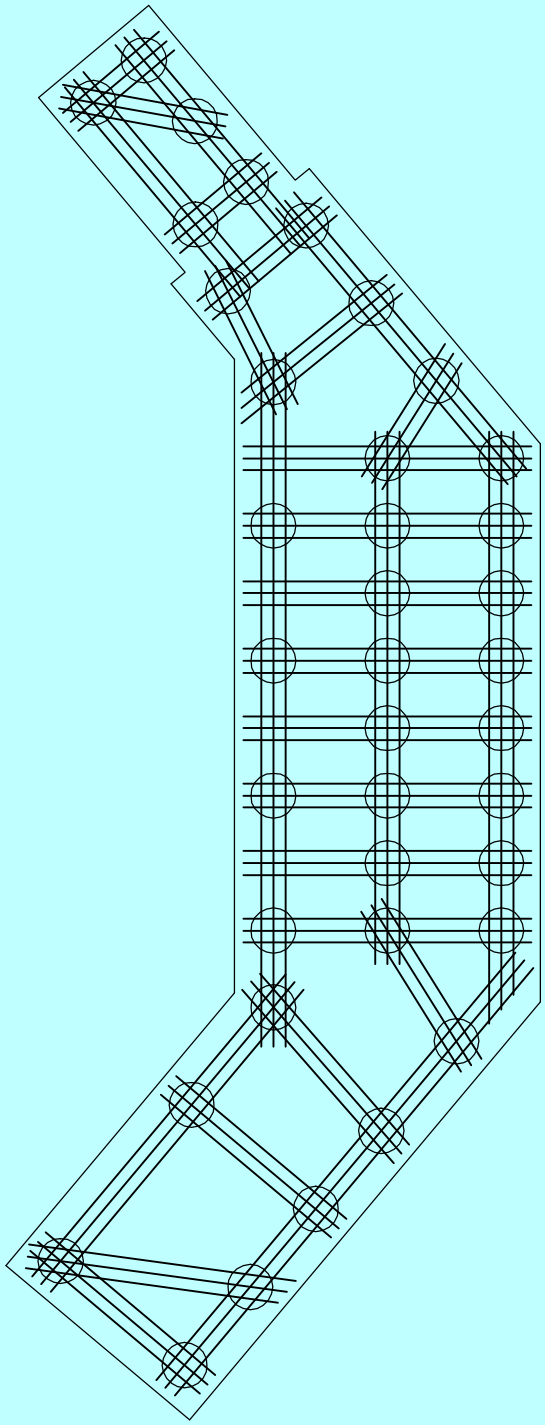
REBAR MAT PATTERN OVER PILING

STANDARD NO. FND-PF-201

SHEET 2 OF 3

FOUNDATION - PILES

OLD NO. BR-SB(6.04)-82-132



TYPICAL ABUTMENT FOOTING PLAN

Scale: 3/16 ''=1'-0''

See notes on Sheet 1 of 3.

* FOR OFFICE USE ONLY *

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 10/14/82

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1-22-01	

FHWA APPROVAL	
DATE:	

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

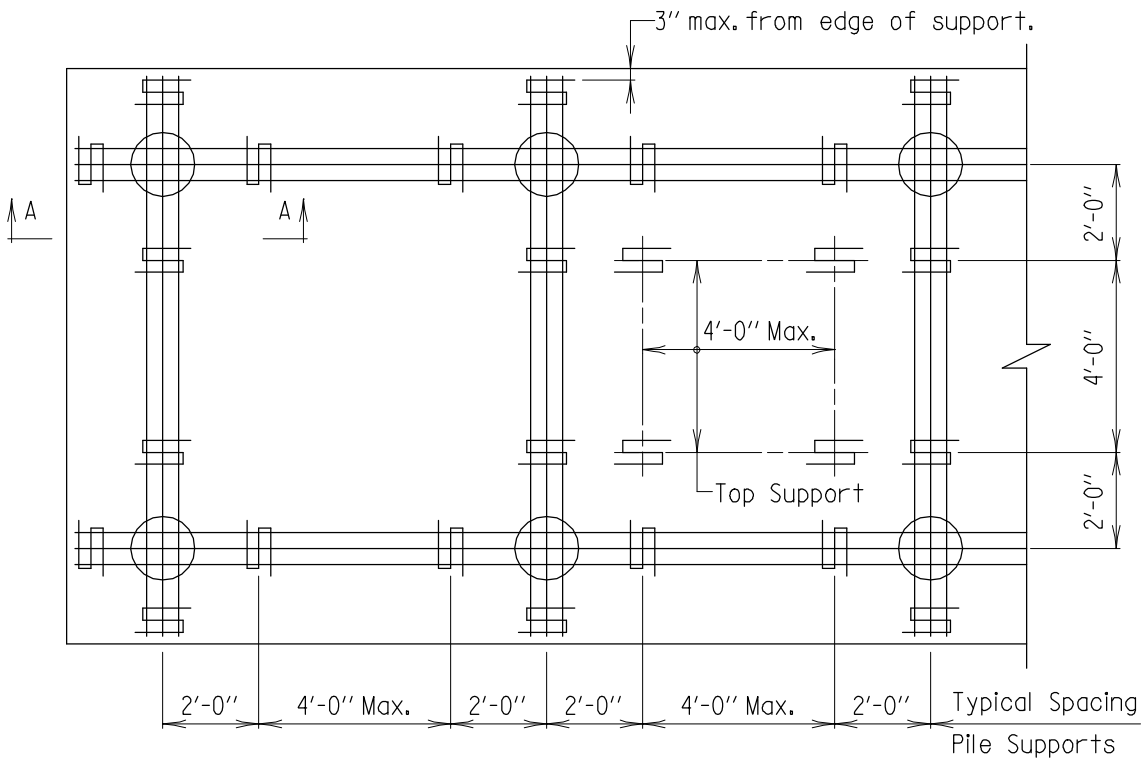
REBAR MAT PATTERN OVER PILING

STANDARD NO. FND-PF-201

SHEET 3 OF 3

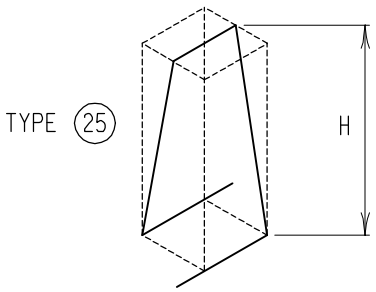
FOUNDATION - PILES

OLD NO. BR-SB(6.04)-82-132



PLAN - PILES (SHOWING MAXIMUM SPACING OF BAR SUPPORTS)

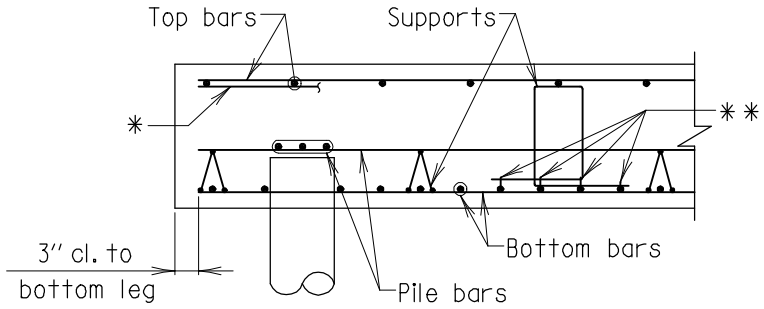
Scale: 1/4'' = 1'-0''



ISOMETRIC VIEW

SEE TYPICAL BAR SHEET FOR DIMENSIONS

SIZE	HEIGHT
#4	0'-7'' ≤ H ≤ 1'-6''
#5	1'-6'' ≤ H ≤ 3'-6''



** Tie each base leg at two intersections to bottom footing bars for stability.

SECTION A-A

Scale: None

DIMENSIONS AND QUANTITIES TO BE SUPPLIED BY CONTRACTOR

* Top bar cannot be dropped to act as a support bar. If support bar is required, separate #5 bars are to be used.

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 3/7/91

REVISIONS	
SHA	FHWA

FHWA APPROVAL
DATE:

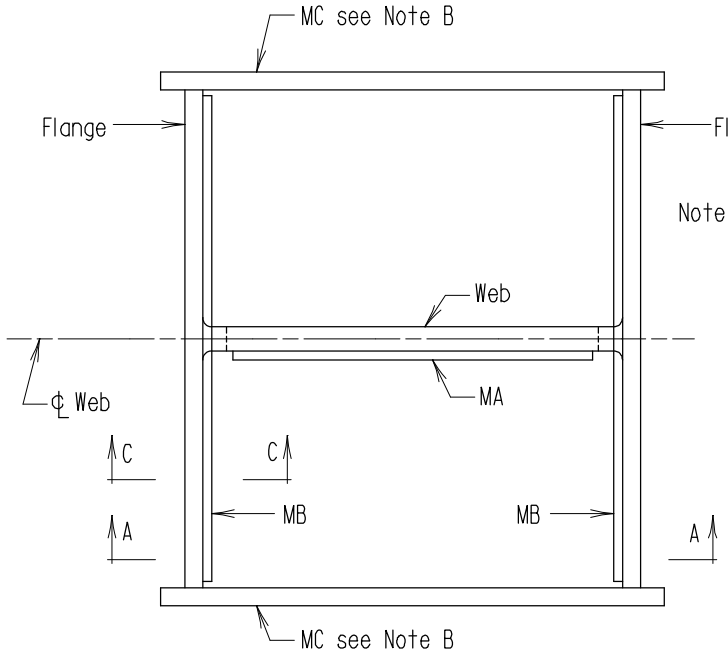
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

REINFORCING BAR STANDARD
FOOTING SUPPORT SYSTEM

STANDARD NO. FND-PF-202 SHEET 1 OF 1

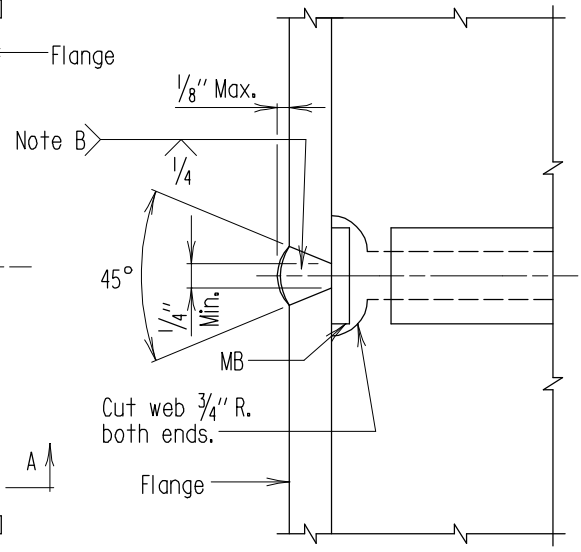
FOUNDATION - PILES

OLD NO. REBAR-PL(1.01)-91-251



PLAN

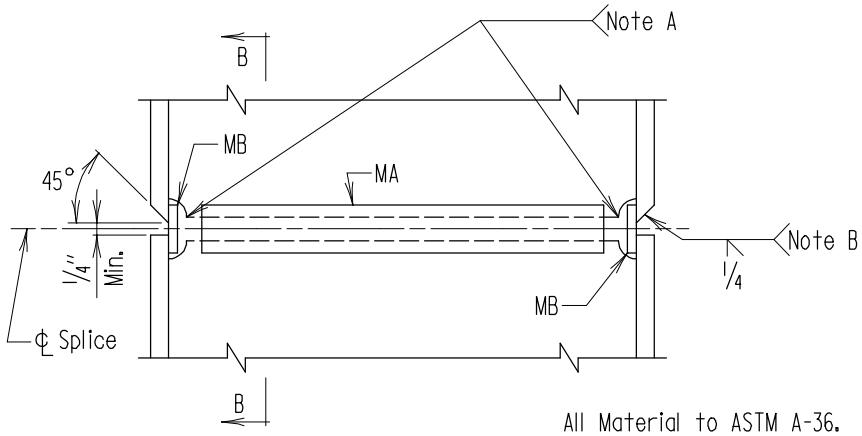
Scale: None



SECTION C-C

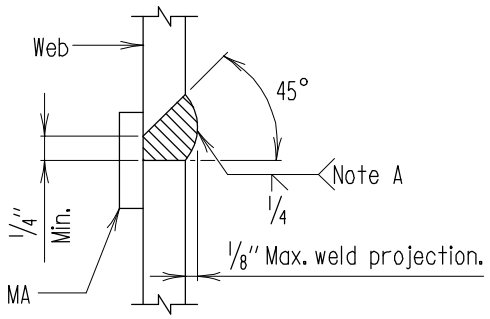
ALTERNATE FLANGE WELD

Scale: 6" = 1'-0"



SECTION A-A

Scale: None



SECTION B-B

Scale: 6" = 1'-0"

All Material to ASTM A-36.

Material Required:

	1 Bar MA 1" x 3/16" x 7 1/4"		1 Bar MA 1" x 3/16" x 9 3/8"		1 Bar MA 1" x 3/16" x 1'-0"
For HP 10 Piles	2 Bars MB 1" x 3/16" x 10"	For HP 12 Piles	2 Bars MB 1" x 3/16" x 1'-0"	For HP 14 Piles	2 Bars MB 1" x 3/16" x 1-2 1/2"
	2 Bars MC 3" x 3/8" x 11"		2 Bars MC 3" x 3/8" x 1'-1"		2 Bars MC 3" x 3/8" x 1'-3"

Note A:
End of weld to be smooth and flush with web cut, 1/4" min. effective throat.

Note B:
Bar MC to be tack welded to flange at splice to back up end of flange weld, remove MC after weld is completed. End of weld must be smooth and flush with edge of flange. Grind weld smooth with edge of flange if pile is unsupported in weld area such as: in air, water, or soft mud, 1/4" min. effective throat.

Note C:
Let welds cool to air temperature before driving piles.

Note D:
No pile splicing to be allowed on any portion of pile that is to remain exposed or to be above finished groundline in completed structure.

APPROVAL		
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES		
DATE: 6/30/75		
REVISIONS		
SHA	FHWA	
9-26-83	6-8-90	
4-10-86	6-8-90	
FHWA APPROVAL	2-19-92	
DATE: 8-24-76	1-22-01	

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

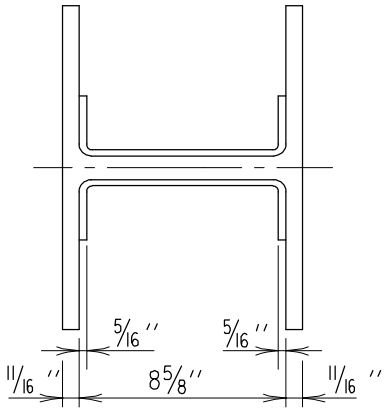
STEEL H PILE SPLICE DETAILS

STANDARD NO. FND-PF-301

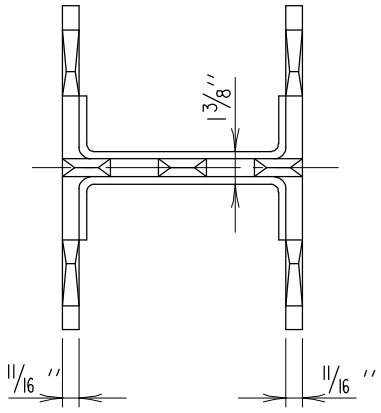
SHEET 1 OF 1

FOUNDATION - PILES

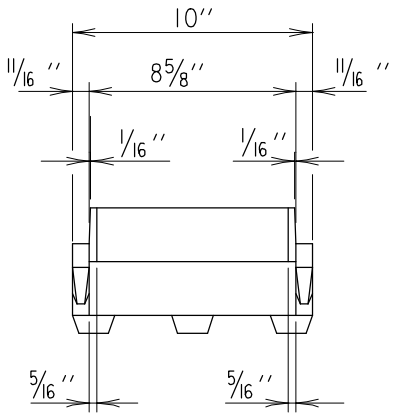
OLD NO. BR-FD(0.01)-75-15



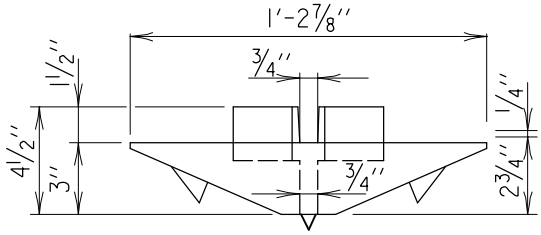
PLAN
Scale: 1 1/2'' = 1'-0''



PLAN
Scale: 1 1/2'' = 1'-0''



ELEVATION
Scale: 1 1/2'' = 1'-0''



SIDE VIEW
Scale: 1 1/2'' = 1'-0''

Size of Pile	Size of 45 Bevel	Size of Groove Weld
10 x 42	1/4	5/16
10 x 57	1/4	5/16

Note:
1. Material: Cast Steel A.S.T.M. A27 65/35. All fillets 3/8''.
2. Point to be welded to pile with a continuous single bevel groove weld along outside face of flange. Exterior face of flange to be flame cut beveled at 45° prior to welding.
3. For each shipment of points a foundry certificate verifying material meets the Specifications is required.

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 10/17/79

REVISIONS	
SHA	FHWA
12-13-79	1-29-80

FHWA APPROVAL		
DATE: 1-16-80		

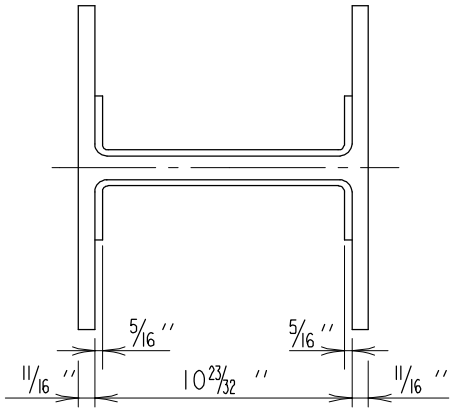
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

TOOTHED PILE POINT FOR 10'' H PILE

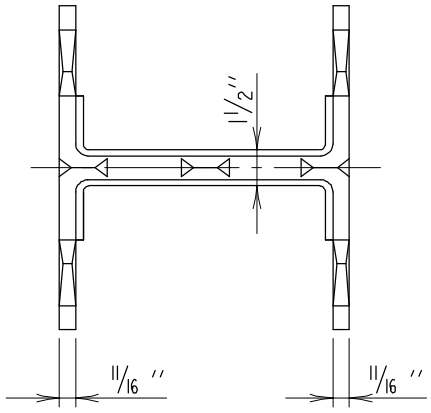
STANDARD NO. FND-PF-302 SHEET 1 OF 1

FOUNDATION - PILES

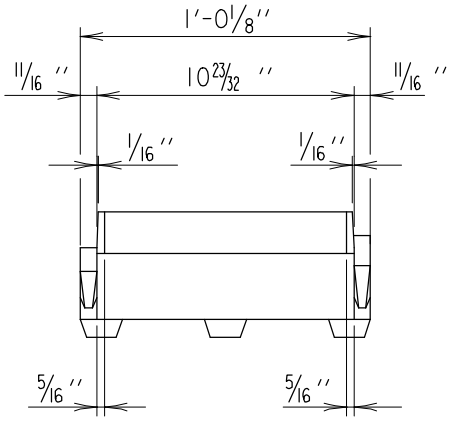
OLD NO. BR-FD(0.07)-79-87



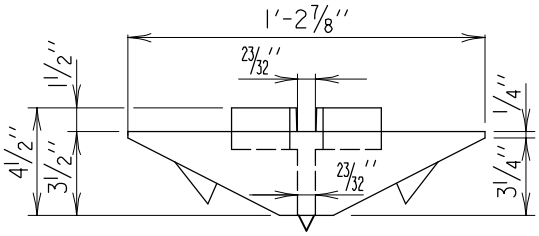
PLAN
Scale: 1 1/2'' = 1'-0''



PLAN
Scale: 1 1/2'' = 1'-0''



ELEVATION
Scale: 1 1/2'' = 1'-0''



SIDE VIEW
Scale: 1 1/2'' = 1'-0''

Size of Pile	Size of 45 Bevel	Size of Groove Weld
12 x 53	1/4	5/16
12 x 74	5/16	5/16

Note:
1. Material: Cast Steel A27 65/35. All fillets 3/8''.
2. Point to be welded to pile with a continuous single bevel groove weld along outside face of flange. Exterior face of flange to be flame cut beveled at 45° prior to welding.
3. For each shipment of points a foundry certificate verifying material meets the Specifications is required.

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCUTRES
DATE: 10/17/79

REVISIONS	
SHA	FHWA
12-13-79	1-29-80
4-28-94	

FHWA APPROVAL		
DATE: 1-16-80		

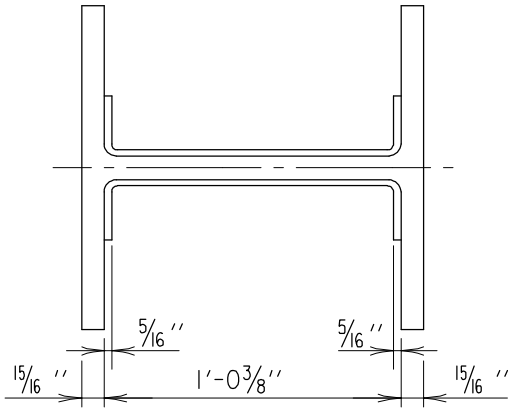
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

TOOTHED PILE POINT FOR 12'' H PILE

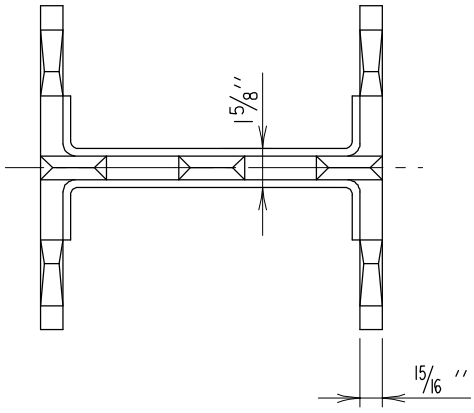
STANDARD NO. FND-PF-303 SHEET 1 OF 1

FOUNDATION - PILES

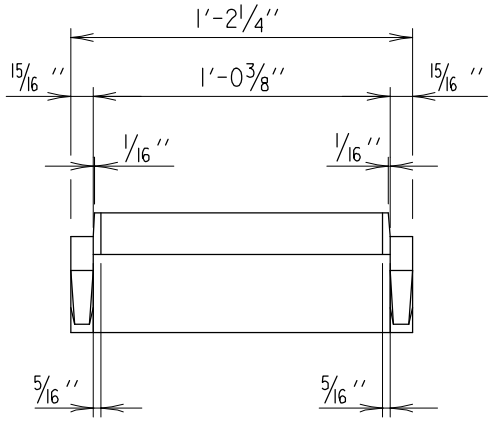
OLD NO. BR-FD(0.08)-79-88



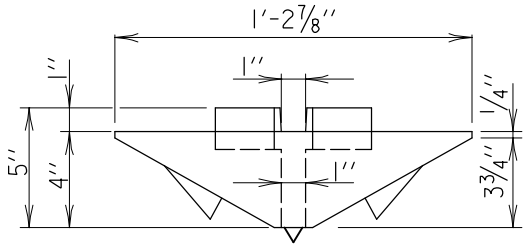
PLAN
Scale: 1 1/2'' = 1'-0''



PLAN
Scale: 1 1/2'' = 1'-0''



ELEVATION
Scale: 1 1/2'' = 1'-0''



SIDE VIEW
Scale: 1 1/2'' = 1'-0''

Size of Pile	Size of 45 Bevel	Size of Groove Weld
14 x 73	1/4	5/16
14 x 89	5/16	5/16
14 x 102	3/8	3/8
14 x 117	3/8	7/16

Note:
1. Material: Cast Steel A.S.T.M. A27 65/35. All fillets 3/8''.
2. Point to be welded to pile with a continuous single bevel groove weld along outside face of flange. Exterior face of flange to be flame cut beveled at 45° prior to welding.
3. For each shipment of points a foundry certificate verifying material meets the Specifications is required.

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 11/14/79

REVISIONS	
SHA	FHWA
12-13-79	1-29-80

FHWA APPROVAL		
DATE: 1-16-80		

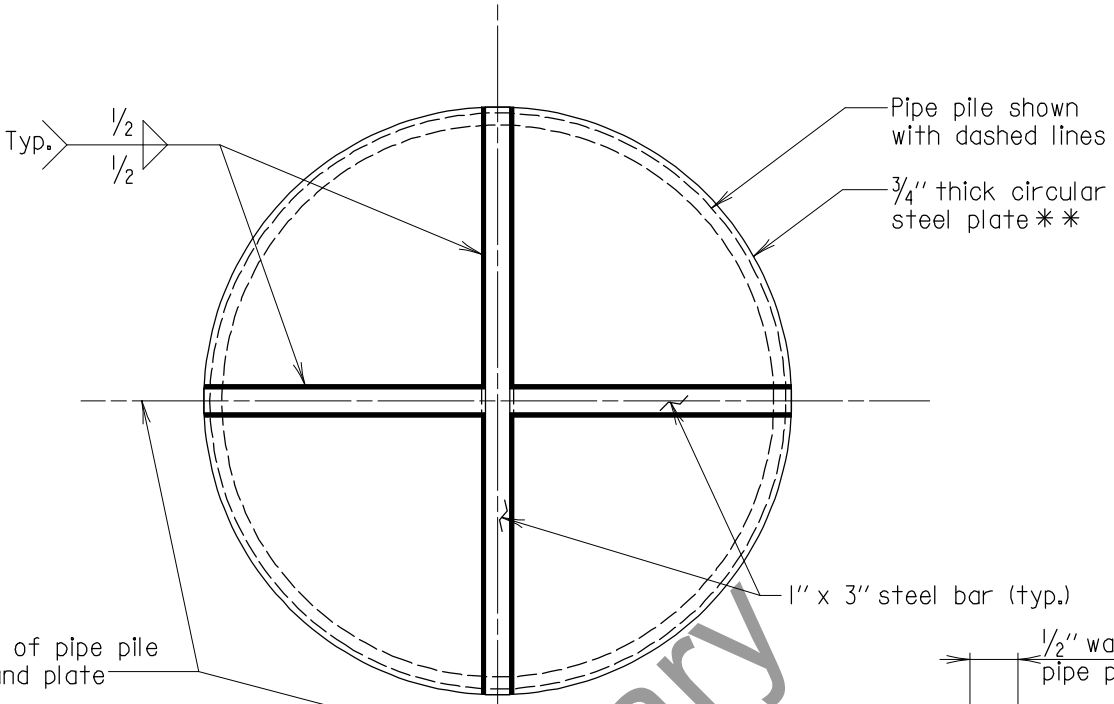
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

TOOTHED PILE POINT FOR 14'' H PILE

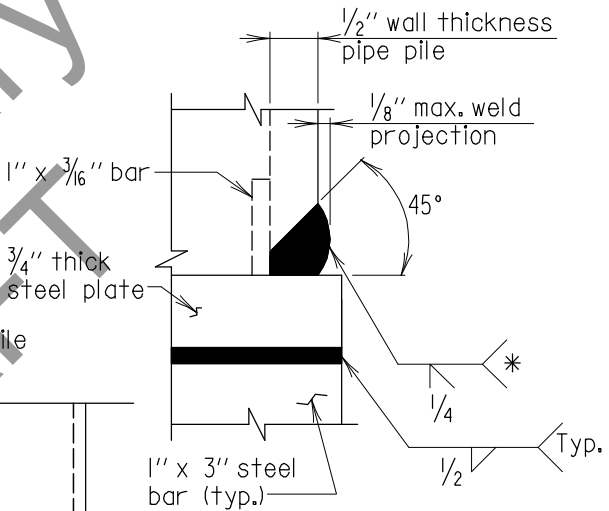
STANDARD NO. FND-PF-304 SHEET 1 OF 1

FOUNDATION - PILES

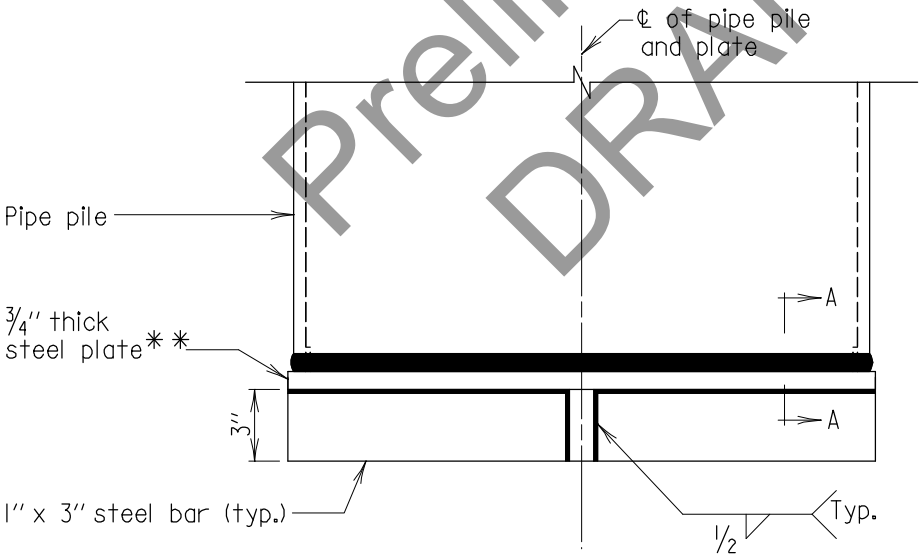
OLD NO. BR-FD(0.09)-79-89



PLAN (BOTTOM VIEW)
Scale: 1 1/2" = 1'-0"



SECTION A-A
Scale: 1/2" = 1'-0"



ELEVATION
Scale: 1 1/2" = 1'-0"

* End of weld to be smooth and flush with pipe pile wall cut, 1/4" min. effective throat.

Notes:
1. Plate to be welded to pile with a continuous single bevel groove weld along outside face of pile.
2. Exterior face of pile to be flame cut beveled at 45°, prior to welding.
**3. Circular steel plate shall have a diameter that is 1/2" larger than outside diameter of steel pipe pile.

* PRELIMINARY DRAFT *

APPROVAL
_____ DEPUTY CHIEF ENGR. BRIDGE DEVEL.
DATE:

REVISIONS	
SHA	FHWA

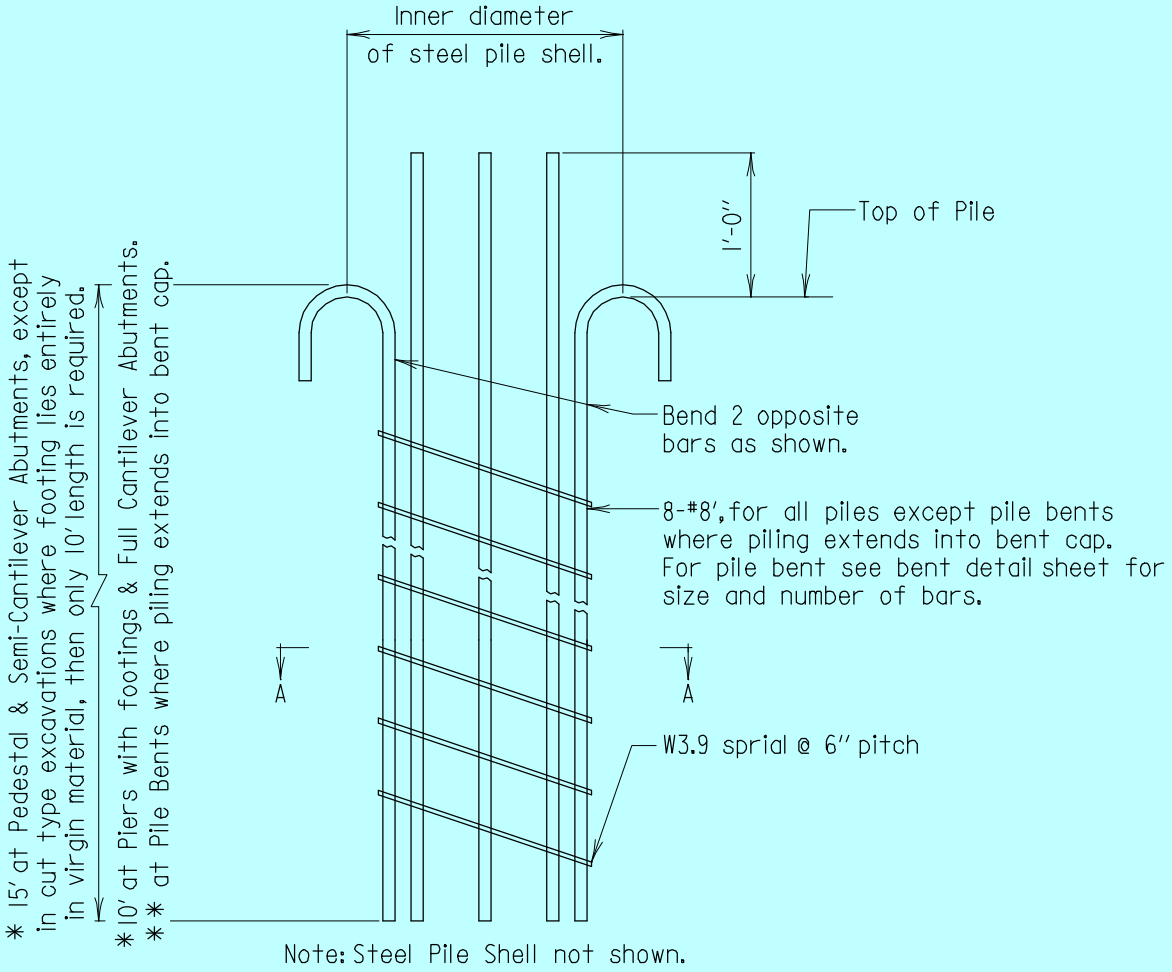
FHWA APPROVAL	
DATE:	

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF BRIDGE DEVELOPMENT

PILE POINT FOR PIPE PILES

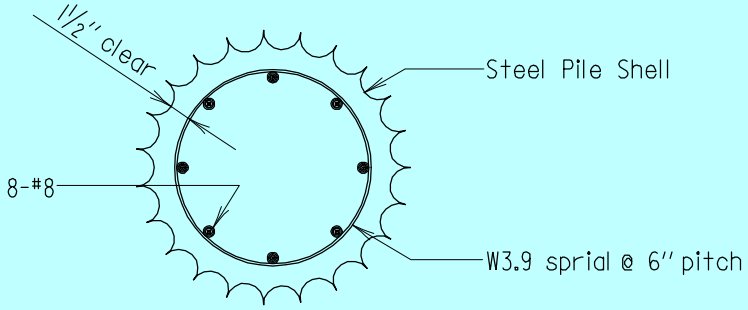
NO. FND-PF-401 SHEET 1 OF 1

FOUNDATION - PILES



Note: Steel Pile Shell not shown.

ELEVATION
Scale:None



SECTION A-A
Scale:None

Note:
1. * Unless otherwise indicated on substructure contract drawing.
2. ** Full height of pile above finished groundline plus 10' unless otherwise indicated on substructure contract drawings.
3. Unless otherwise indicated on other Contract Plans or in the Special Provisions the Steel Pile Shell shall be a minimum #5 gauge. This will apply to pile shells with or without deformations.
4. Cage required for all pile shells with or without deformations.
5. All materials and dimensions shown are minimums. Engineer shall design.

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APPROVAL
R.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 8/9/79

REVISIONS	
SHA	FHWA
6-16-92	
10-27-92	
1-22-01	
10-9-07	

FHWA APPROVAL
DATE: 12-19-79

STATE OF MARYLAND
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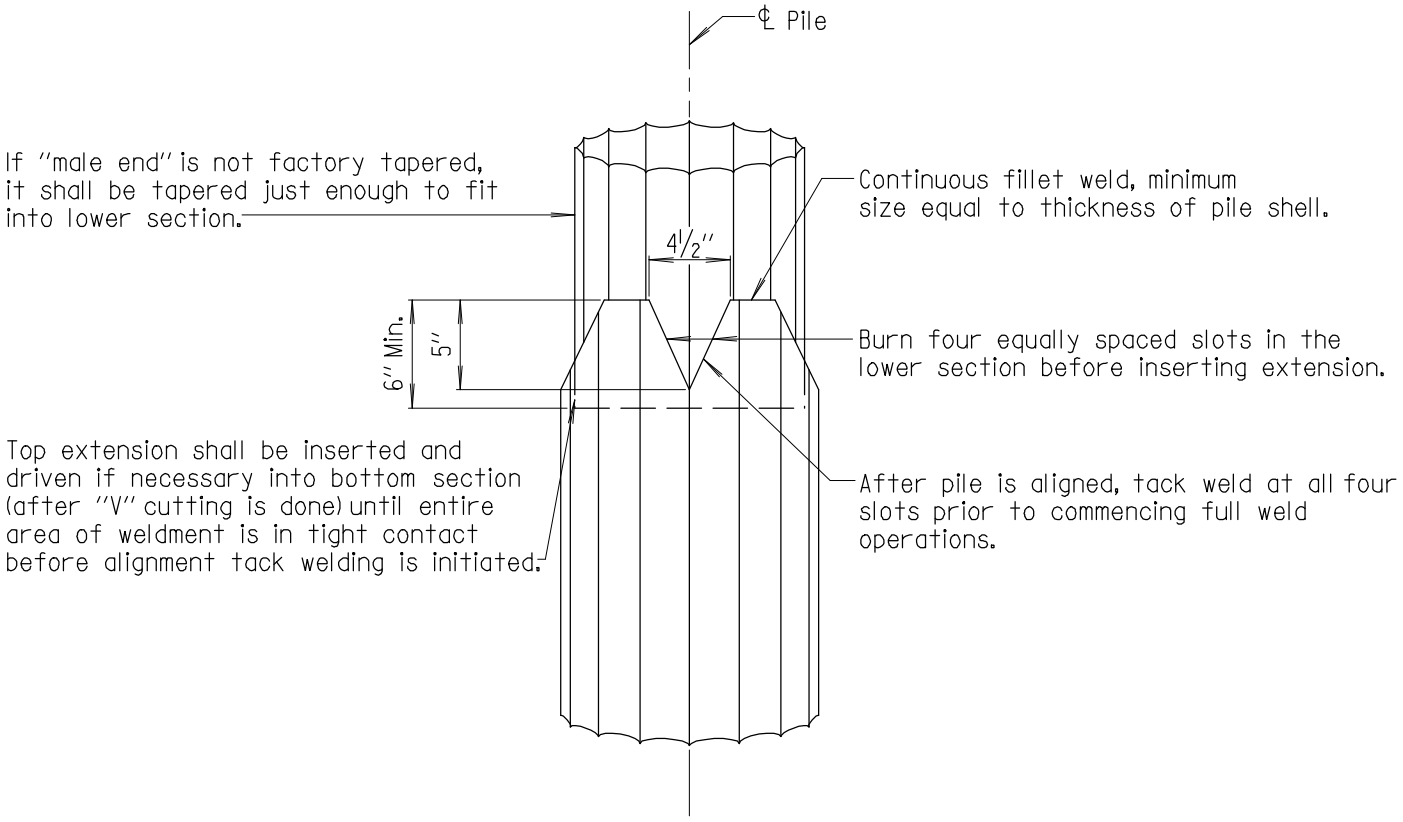
VERIFIED 10-9-2007 LRFD

DETAILS FOR CAST-IN-PLACE CONCRETE PILES

STANDARD NO. FND-PF-501 SHEET 1 OF 1

FOUNDATION - PILES

OLD NO. BR-FD(0.03)-79-81(L)



ELEVATION
Scale: None

Note:
No pile splicing to be allowed on any portion of pile that is to remain exposed in completed structure.

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 6/20/75

REVISIONS	
SHA	FHWA

FHWA APPROVAL		
DATE: 8-24-76		

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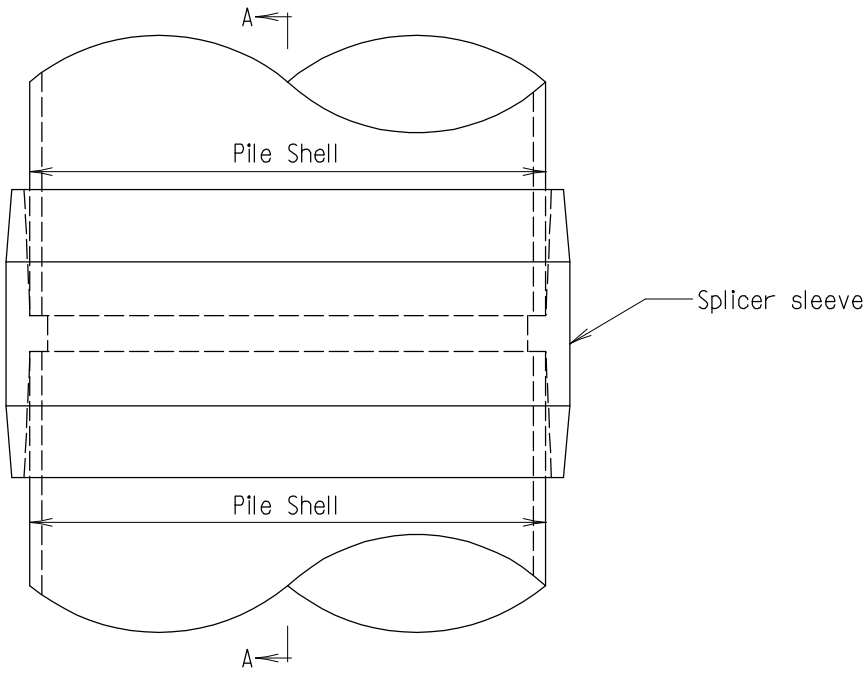
SPLICE FOR CAST-IN-PLACE CONCRETE PILE SHELL

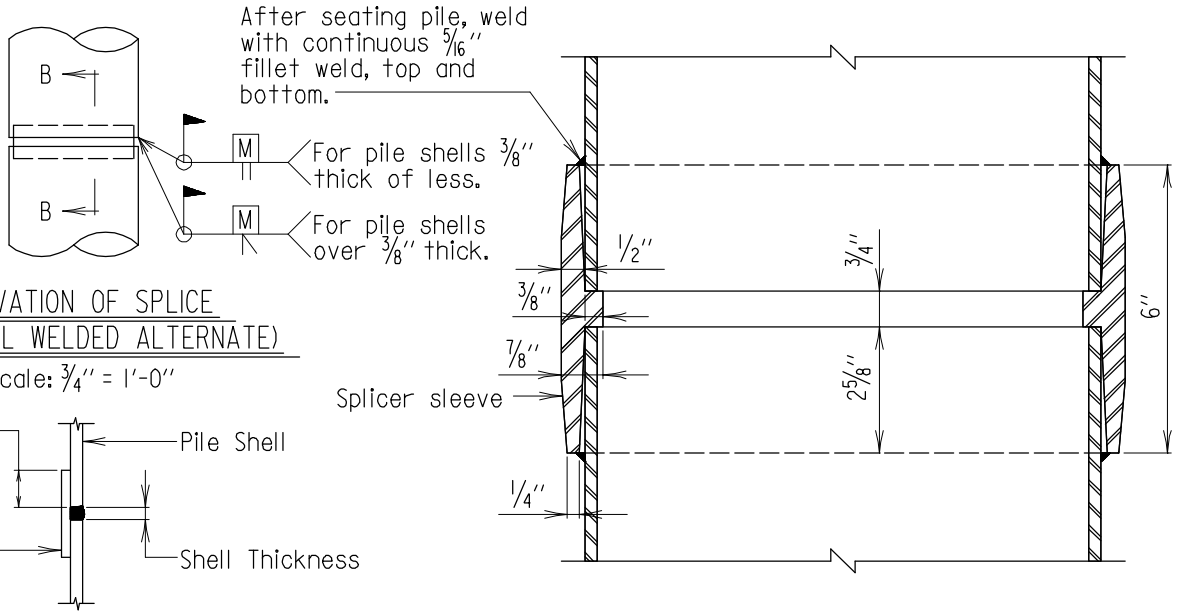
STANDARD NO. FND-PF-502 SHEET 1 OF 1

FOUNDATION - PILES

OLD NO. BR-FD(0.02)-75-16



ELEVATION OF SPLICE
(USING SPLICER SLEEVE)
Scale: 3" = 1'-0"



ELEVATION OF SPLICE
(USING ALL WELDED ALTERNATE)
Scale: 3/4" = 1'-0"

Note:
Back-up plate to be cut from same pile size as is being spliced. Cut and bend to fit inside diameter of pile.

SECTION B-B
Scale: None

SECTION A-A
Scale: 3" = 1'-0"

Notes:
1. No pile splicing to be allowed on any portion of pile that is to remain exposed in completed structure.
2. Splicer sleeve material shall be steel conforming to ASTM A-36.
3. Contractor has the option of using either the "Splicer Sleeve" or "All " Welded" alternates.

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 8/29/83

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SHA	FHWA
6-8-84	11-8-84
11-14-85	6-8-90

FHWA APPROVAL	1-22-01	
DATE: 11-4-84		

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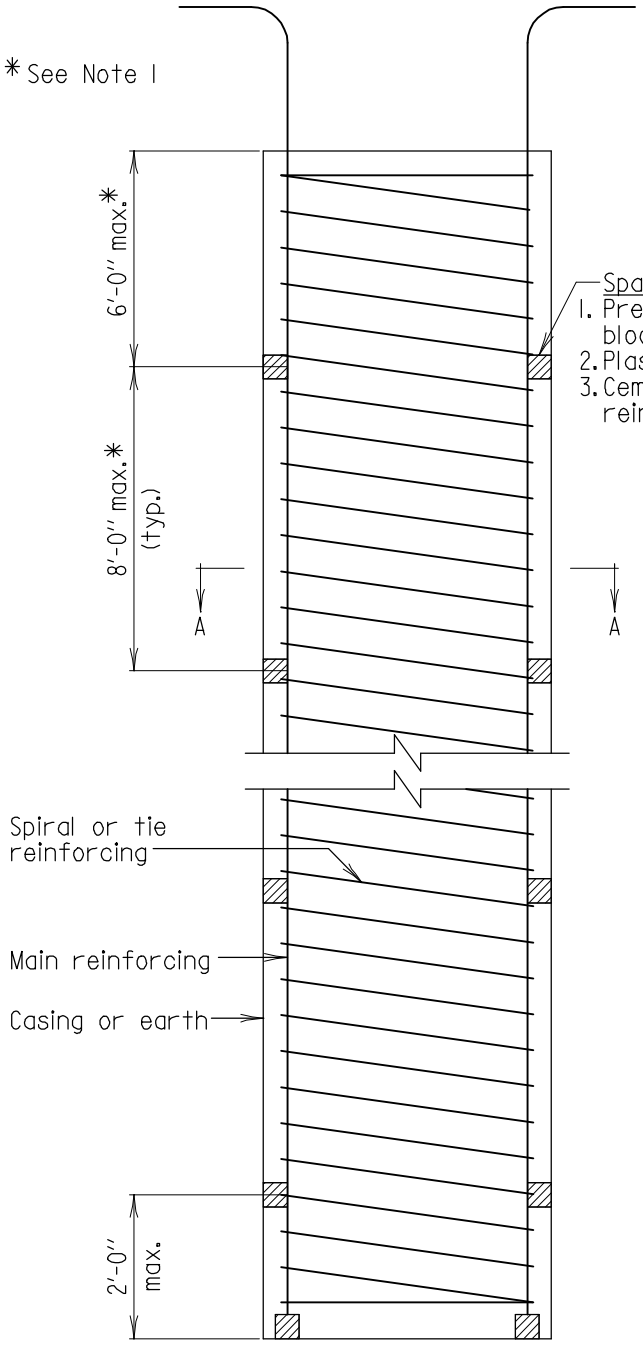
SPLICE FOR CAST-IN-PLACE CONCRETE PIPE PILE SHELL

STANDARD NO. FND-PF-503 SHEET 1 OF 1

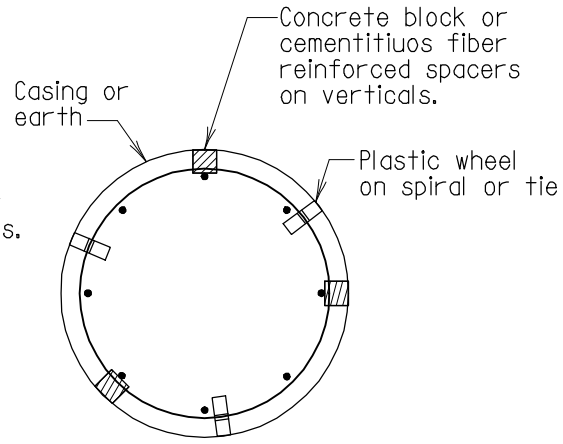
FOUNDATION - PILES

OLD NO. BR-FD(0.11)-83-152



PILE OR CAISSON

Scale: 3/8" = 1'-0"



SECTION A-A

Scale: 3/8" = 1'-0"

Notes:

1. The Contractor has the option of using any of the spacers shown for the reinforcement cage. The spacing of the spacers for proprietary items shall be as recommended by the manufacturer.
2. The pitch of spiral reinforcement must be considered for some wheel type spacers.
3. Concrete spacer blocks to be tied to main reinforcing with a double tie of #16 tie wire or equivalent.
4. For size and number of main reinforcing steel and size of spiral or tie reinforcing steel see other details elsewhere.
5. Use 3 spacers per horizontal plane for caissons less than 36" in diameter. Use 4 spacers per horizontal plane for caissons 36" in diameter and greater or as recommended by the manufacturer of the proprietary items.

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E.S. Freedman DIRECTOR OFFICE OF STRUCTURES DATE: 11/14/95		
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8-7-98		
FHWA APPROVAL		
DATE:		

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CAISSON/PILE REBAR CAGE CLEARANCE SPACING DEVICES

STANDARD NO. FND-PF-504 SHEET 1 OF 1

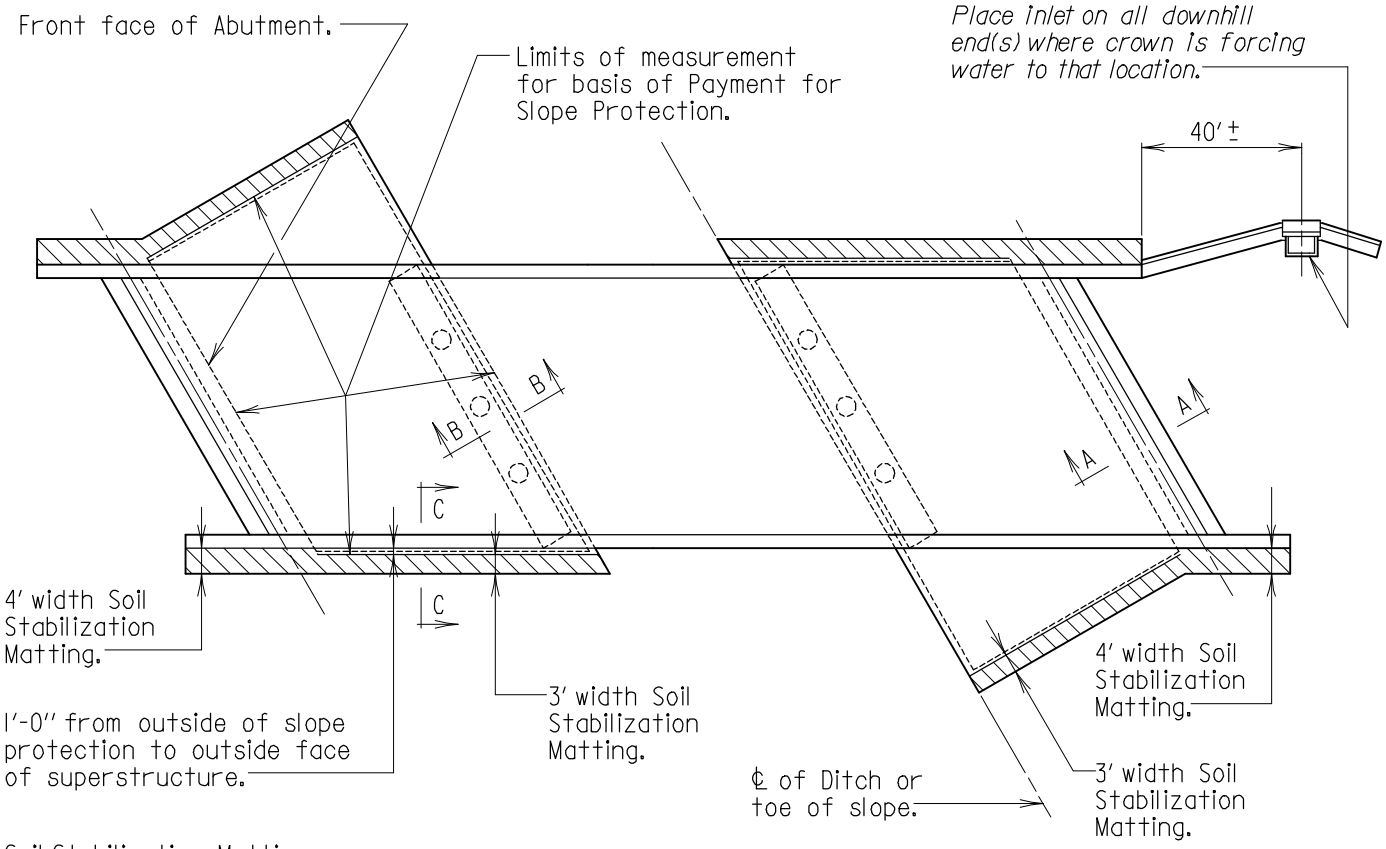
FOUNDATION - PILES

OLD NO. BR-FD(0.13)-95-310

FOUNDATIONS

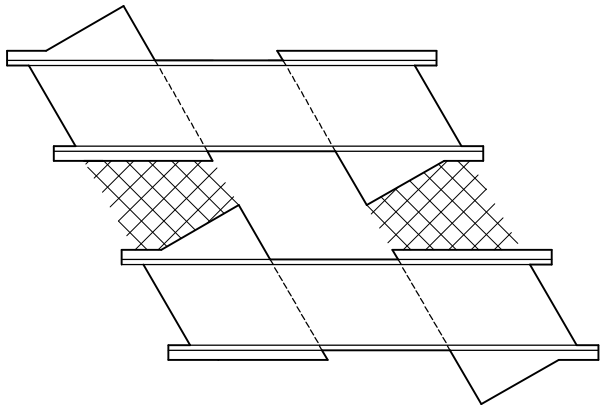
SLOPE PROTECTION

(FND-SP)



PLAN

Scale: None



SKETCH-PLAN

Note:
On dual bridges where perpendicular distance between bridge faces is less than 30′ or on skewed dual bridges if where the unprotected area for both ends of the bridges (hatched areas ▨ in sketch-Plan) were added is less than 200 s.y.,then slope protection is to be continuous thru median area.

Notes:
1. For Sections A-A, B-B, and C-C see sheets 2 thru 6 of 6.
2. If limits for slope protection are shown on Contract Drawings, then those limits take precedent over what is shown on this sheet.

Slanted lettering indicate notes "For Office Use Only".

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DATE: 4/15/78

REVISIONS	
SHA	FHWA
8-3-81	8-20-81
9-25-81	11-25-85
3-21-89	6-8-90
11-15-95	

FHWA APPROVAL
DATE: 10-17-78

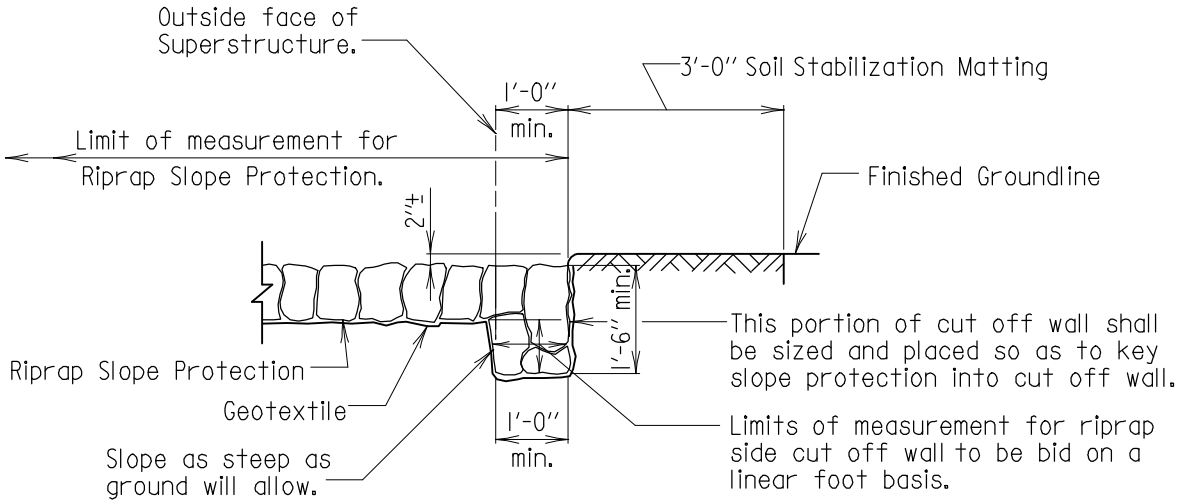
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

SLOPE PROTECTION FOR BRIDGES CARRYING ROAD OVER ROAD OR RAILROADS

STANDARD NO. FND-SP-101 SHEET 1 OF 6

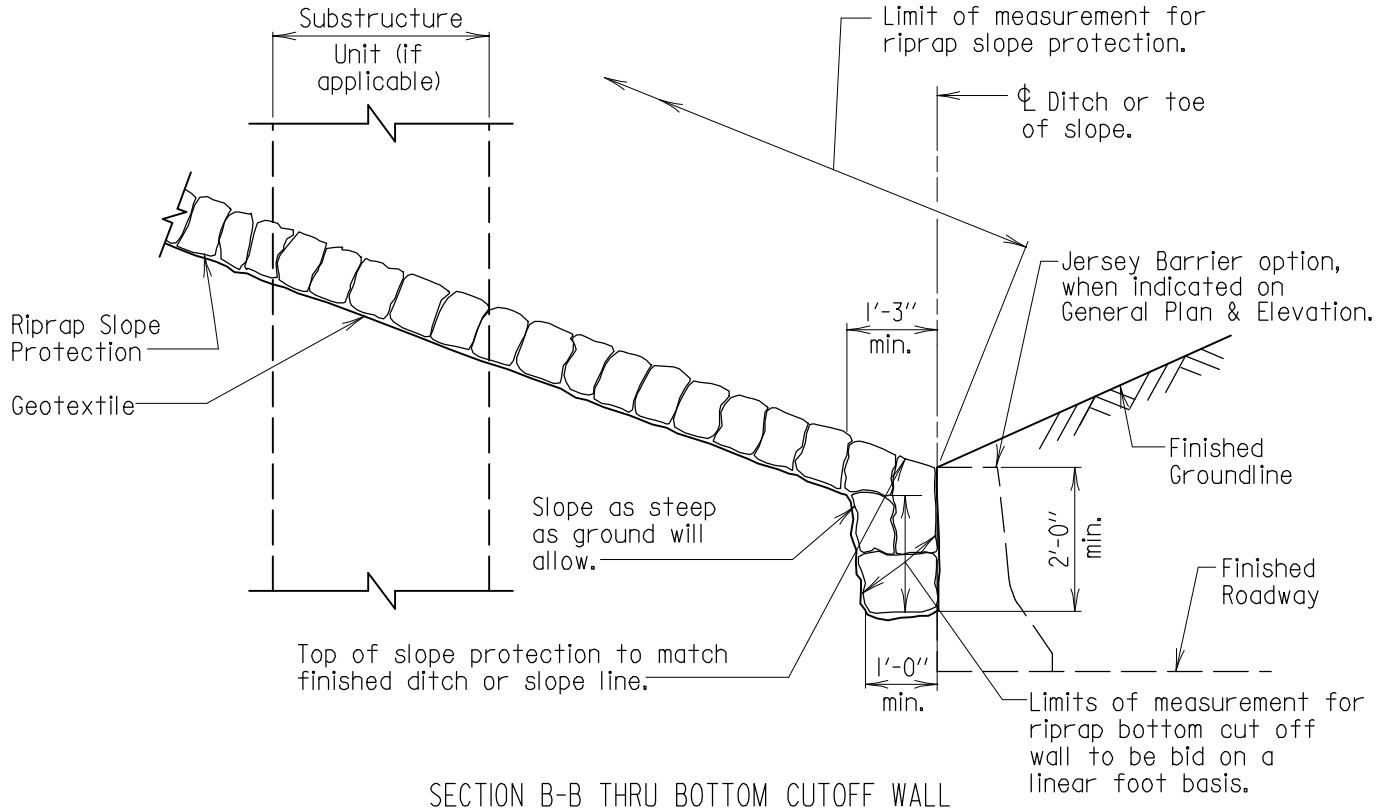
FOUNDATION - SLOPE

OLD NO. M(6.02)-78-75



SECTION C-C THRU SIDE OF CUTOFF WALL

Scale: 3/8"=1'-0"



SECTION B-B THRU BOTTOM CUTOFF WALL

Scale: 3/8"=1'-0"

Note:
If a barrier configuration is used at bottom of slope, the bottom cut off wall shall be eliminated.

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DATE: 12/2/81

REVISIONS	
SHA	FHWA
3-15-90	6-8-90
11-15-95	
1-22-01	
6-29-05	

FHWA APPROVAL	
DATE: 11-29-85	

STATE OF MARYLAND
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STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

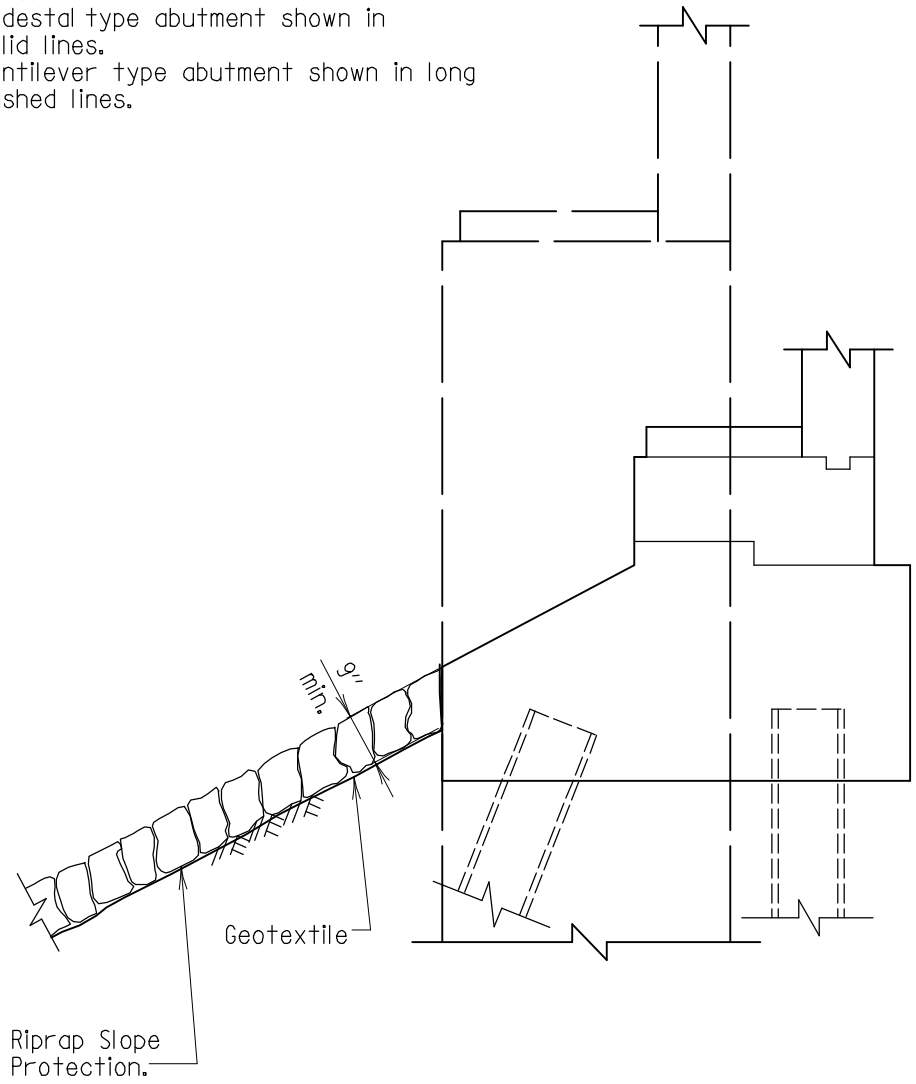
RIPRAP SLOPE PROTECTION FOR BRIDGES CARRYING ROAD OVER ROAD OR RAILROAD

STANDARD NO. FND-SP-101 SHEET 2 OF 6

FOUNDATION - SLOPE

OLD NO. M(6.02)-78-75

Note:
Pedestal type abutment shown in solid lines.
Cantilever type abutment shown in long dashed lines.



SECTION A-A THRU ABUTMENT
Scale: 3/8" = 1'-0"

Notes:
1. Bottom cut off wall may be eliminated if slope protection can be founded in rock.
2. All material for riprap slope protection shall be Class 1 conforming to 901.02.
3. Refer to Section 312 for other requirements.

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 3/21/89

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1-22-01	
7-26-06	
5-19-09	
9-16-11	

FHWA APPROVAL
DATE: 6-8-90

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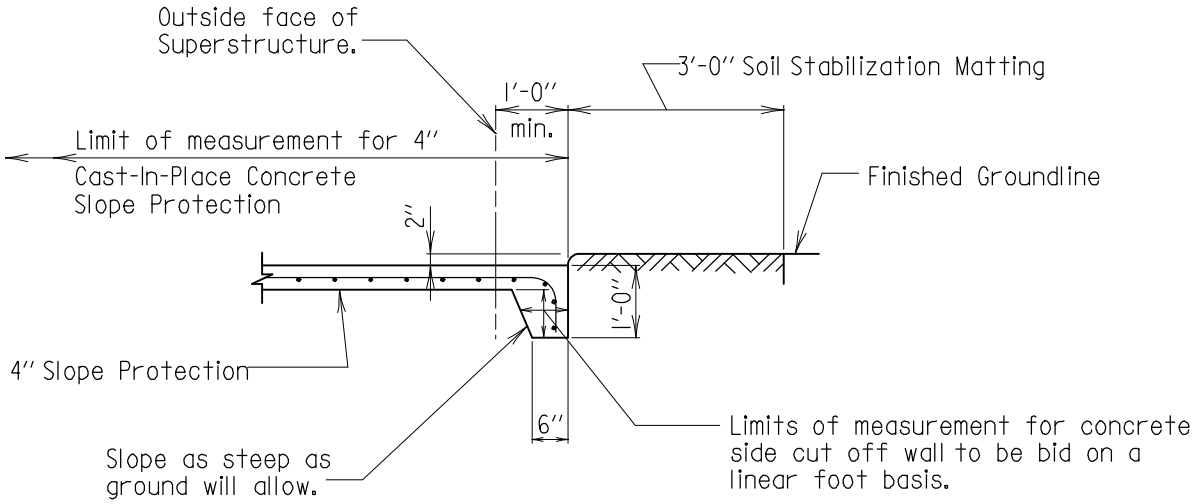
RIPRAP SLOPE PROTECTION FOR BRIDGES CARRYING ROAD OVER ROAD OR RAILROAD

STANDARD NO. FND-SP-101 SHEET 3 OF 6

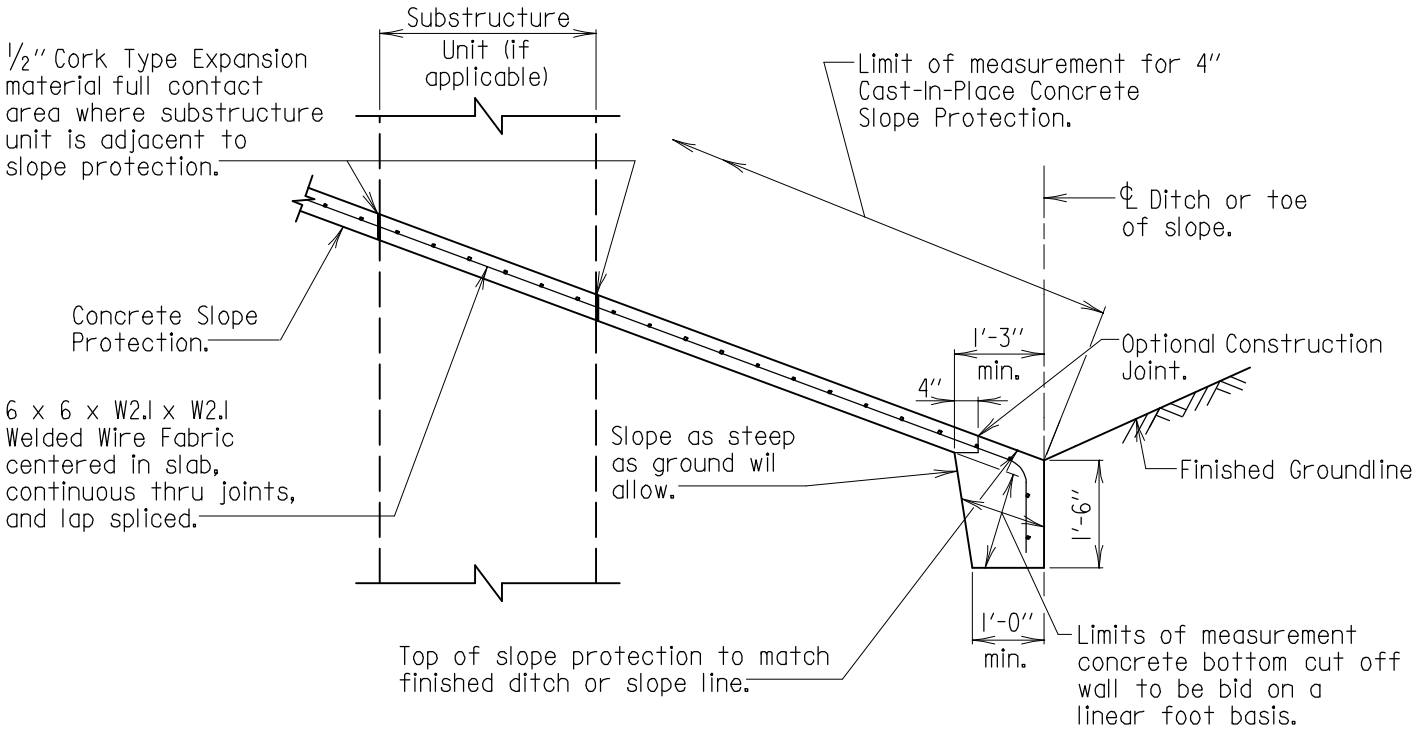
FOUNDATION - SLOPE

OLD NO. M(6.02)-78-75



SECTION C-C THRU SIDE OF CUTOFF WALL

Scale: 3/8"=1'-0"



SECTION B-B BOTTOM OF CUTOFF WALL

Scale: 3/8"=1'-0"

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DATE: 4/12/78

REVISIONS	
SHA	FHWA
2-17-87	6-8-90
3-21-89	6-8-90
11-15-95	
1-22-01	

FHWA APPROVAL
DATE: 10-17-78

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CONCRETE SLOPE PROTECTION FOR BRIDGES CARRYING ROAD OVER ROAD OR RAILROAD

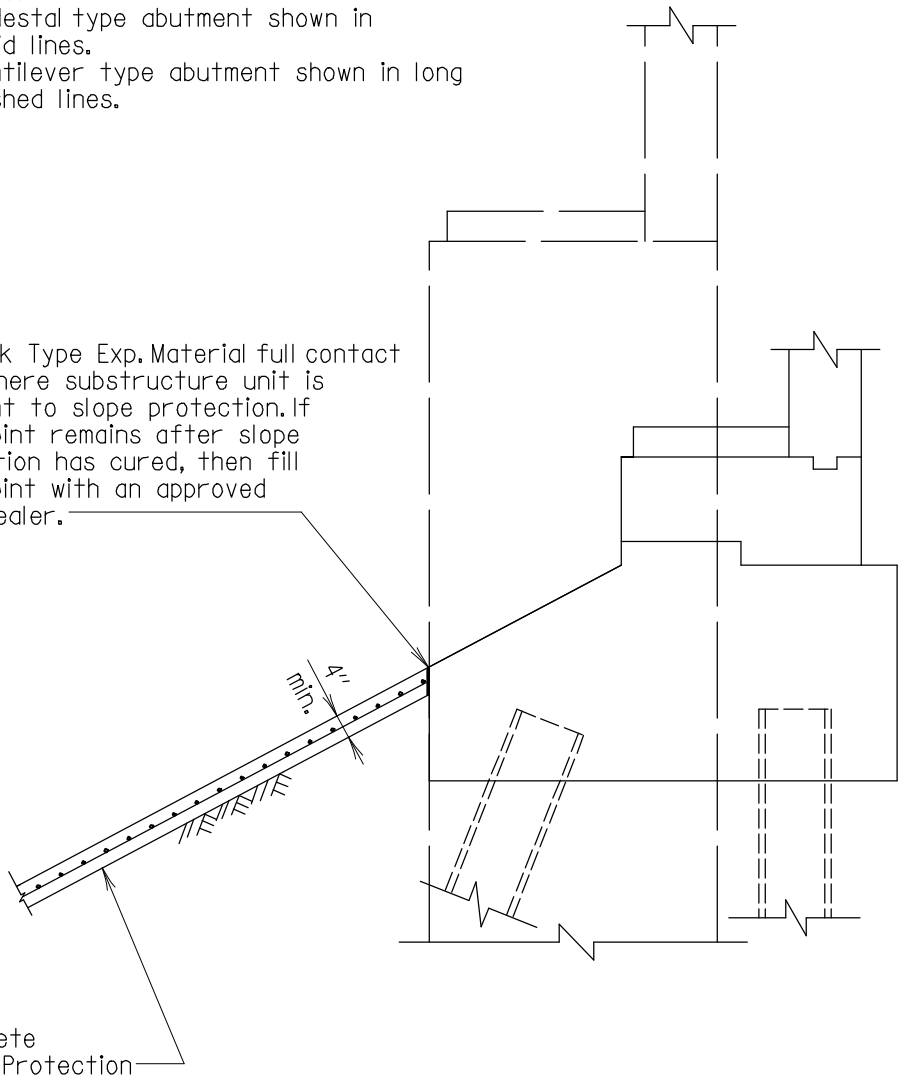
STANDARD NO. FND-SP-101

SHEET 4 OF 6

FOUNDATION - SLOPE

OLD NO. M(6.02)-78-75

Note:
Pedestal type abutment shown in solid lines.
Cantilever type abutment shown in long dashed lines.



SECTION A-A THRU ABUTMENT
Scale: ⅜" = 1'-0"

Notes:
1. Bottom cut off wall may be eliminated if slope protection can be founded in rock.
2. Refer to Section 310 for other requirements.

APPROVAL
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DATE: 3/21/89

REVISIONS	
SHA	FHWA
4-17-00	
1-22-01	
7-26-06	
9-16-11	

FHWA APPROVAL
DATE: 6-8-90

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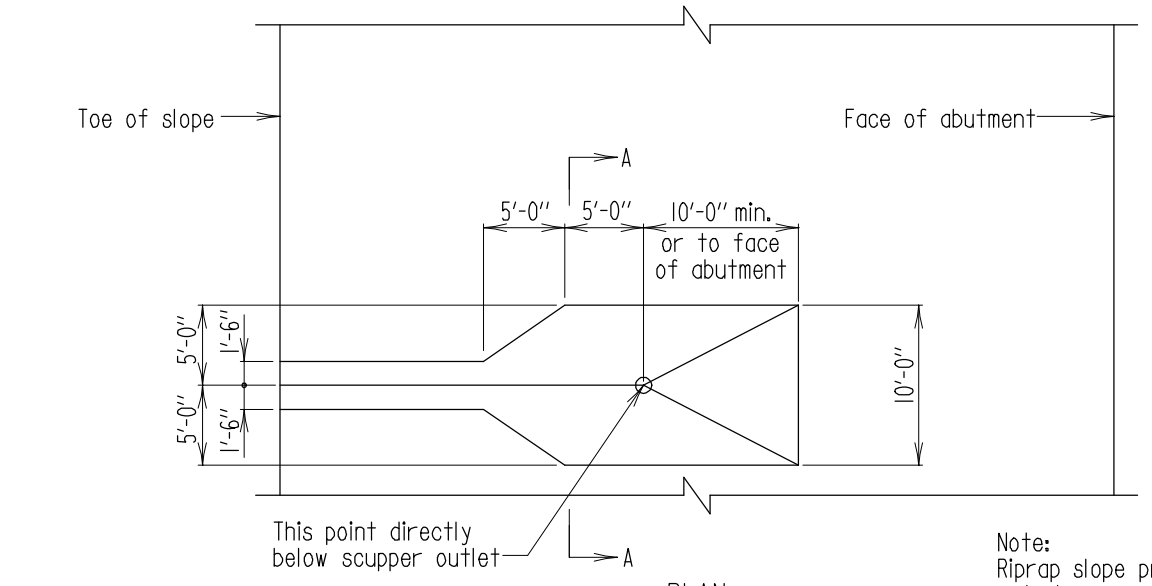
CONCRETE SLOPE PROTECTION FOR BRIDGES CARRYING ROAD OVER ROAD OR RAILROAD

STANDARD NO. FND-SP-101 SHEET 5 OF 6

FOUNDATION - SLOPE

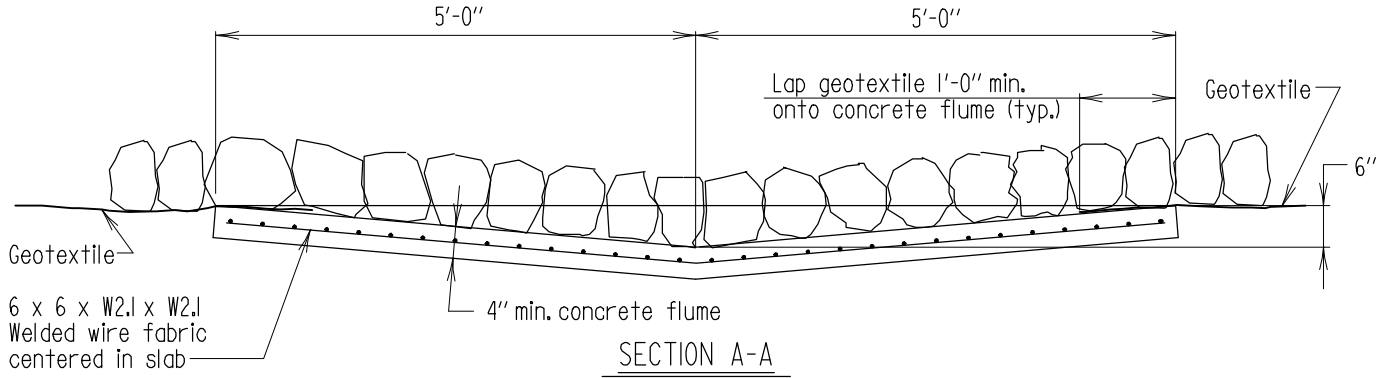
OLD NO. M(6.02)-78-75



Note:
Riprap slope protection
not shown.

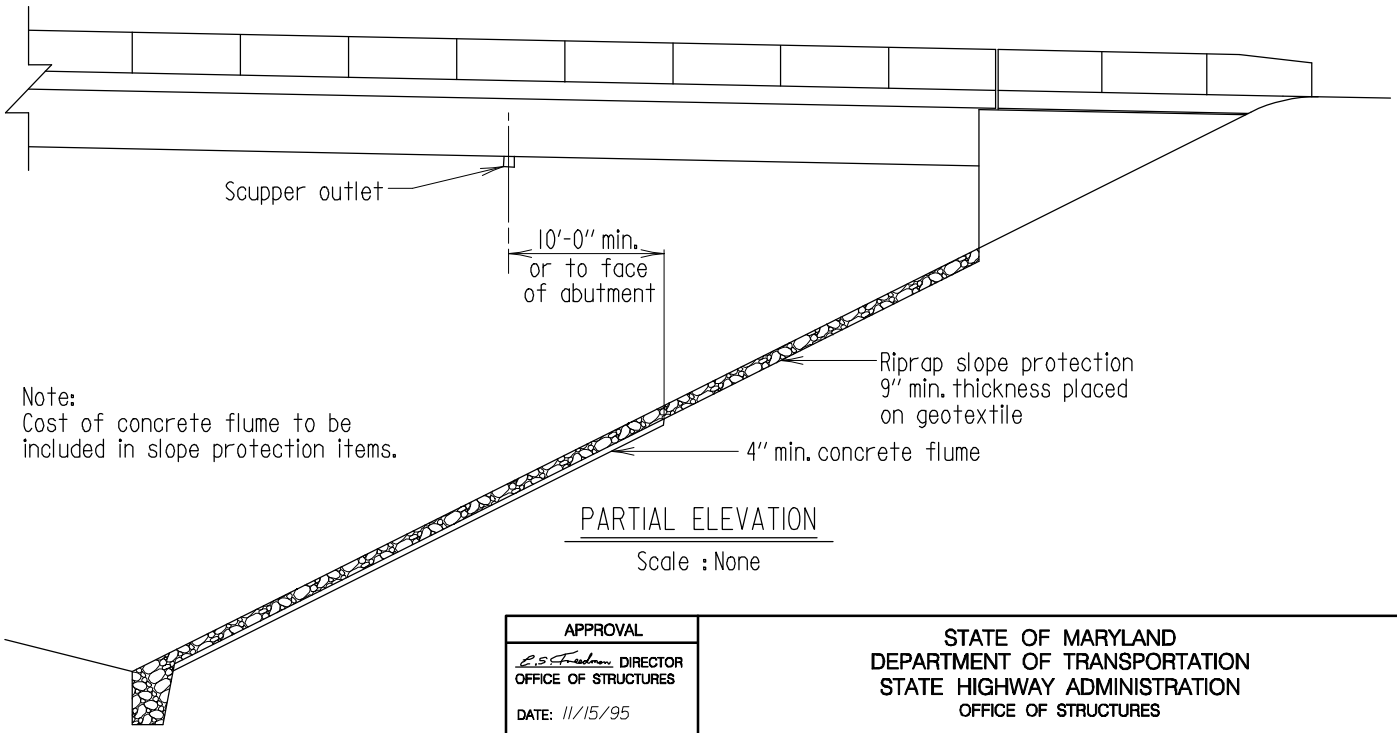
PLAN

Scale : None



SECTION A-A

Scale : 1/2" = 1'-0"



Note:
Cost of concrete flume to be
included in slope protection items.

PARTIAL ELEVATION

Scale : None

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CONCRETE SPLASH BLOCK ON END SLOPE WITH RIPRAP SLOPE PROTECTION

STANDARD NO. FND-SP-101

SHEET 6 OF 6

FOUNDATION - SLOPE

OLD NO. M(6.02)-78-75

GENERAL NOTES

SELECTION OF THE RIPRAP D50 SIZE AND BLANKET THICKNESS:

The FHWA equations from HEC-23, Bridge Scour and Stream Instability Countermeasures (Design Guideline 8, Rock Riprap at Abutments and Piers) should be used to compute the minimum required D50 size of riprap. This value is to be compared with the D50 size of riprap in the table below to select the appropriate riprap Class and blanket thickness. As noted previously, use of Class I riprap is not recommended except for certain conditions, see sheet 5 of this standard.

RIPRAP CLASS	D50 MINIMUM SIZE (INCHES)	APPROXIMATE D50 WEIGHT (POUNDS)	MINIMUM BLANKET THICKNESS (INCHES)*
I	9.5	40	19
II	16	200	32
III	23	600	46

*These dimensions apply to the upper blanket section only, not the toe section.

DESIGN OF THE TOE SECTION:

A stable riprap toe is the most important feature in the design of riprap abutment protection installations. Guidance on the design of the toe section is provided on sheet 2 of this standard The following criteria serve to establish the design for the riprap toe:

1. Design the riprap toe extend below the depth of contraction scour in the scour cross-section (see sheet 2 of this standard).
2. The riprap toe should be at least 6 feet thick. (A lesser toe thickness may be appropriate under certain field conditions as depicted on sheet 45 of this standard.
3. The top width of the riprap toe is typically 12 feet or more in order to fit the riprap geometry to the ground conditions.
4. An aggregate or geotextile filter cloth is normally used with the riprap installation.

RIPRAP SPECIFICATIONS:

The following riprap specification are set forth in the July 2008 Edition of the SHA Standard Specifications for Construction and Materials:

Construction: Section 312, Riprap Slope and Channel Protection.

Materials: Section 901.01, Aggregate ; 901.02 Stone for Riprap; 921.09 Geotextile.

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DATE:	

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF BRIDGE DEVELOPMENT

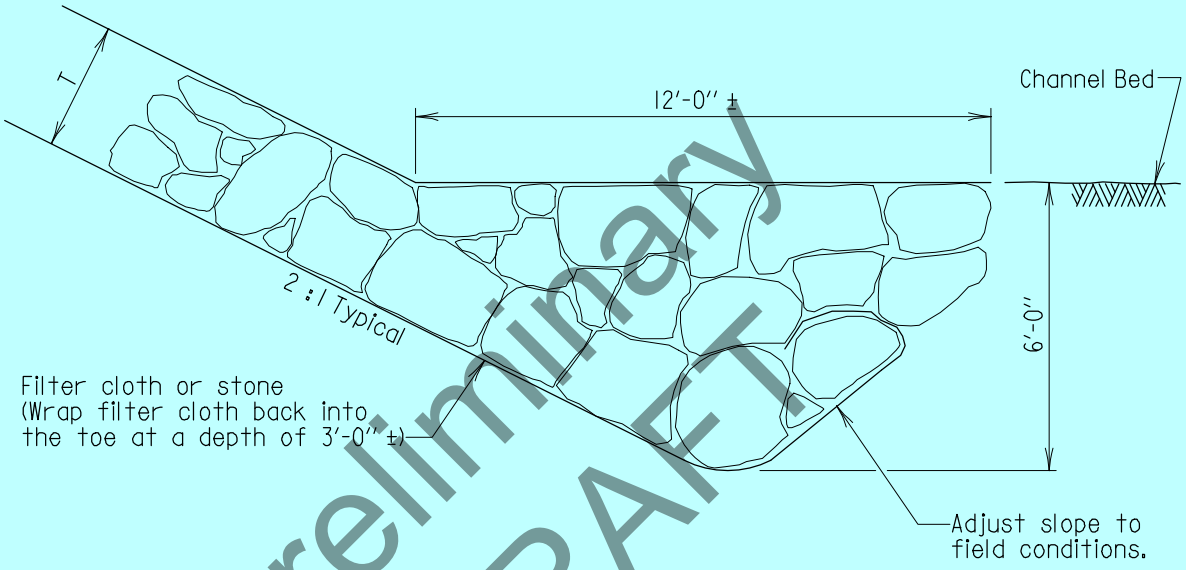
TYPICAL RIPRAP INSTALLATIONS AT PIERS AND ABUTMENTS GENERAL NOTES

NO. FND-SP-201 SHEET 1 OF 6

FOUNDATION - SOLPE

OLD NO. N/A

T = 32" (min.) Class 2
T = 46" (min.) Class 3



TYPICAL RIPRAP BLANKET AND TOE DETAIL
Scale: 1/4" = 1'-0"

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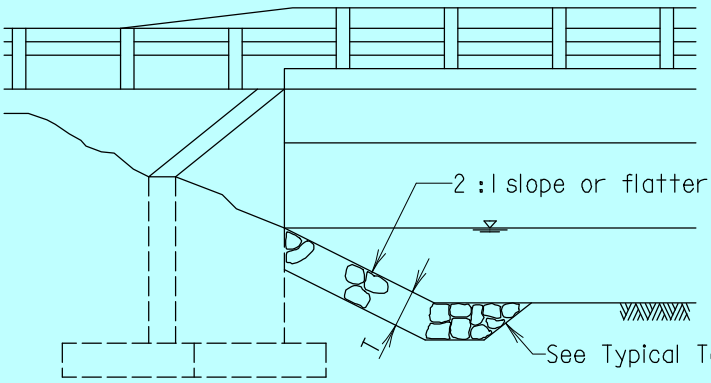
TYPICAL RIPRAP INSTALLATIONS
AT PIERS AND ABUTMENTS
DETAILS

NO. FND-SP-201 SHEET 2 OF 6

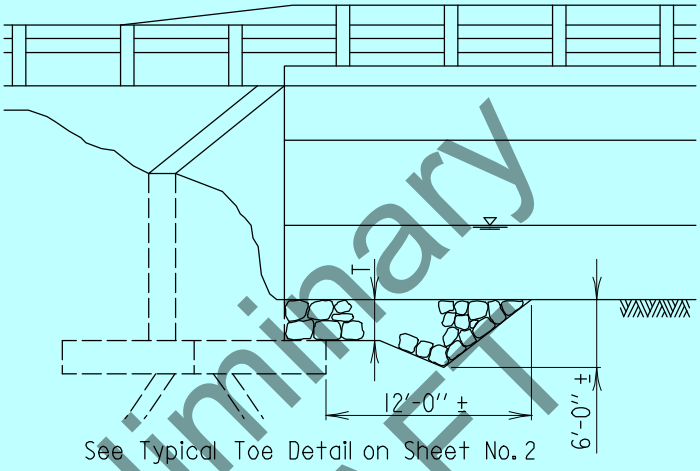
FOUNDATION - SOLPE

OLD NO. N/A

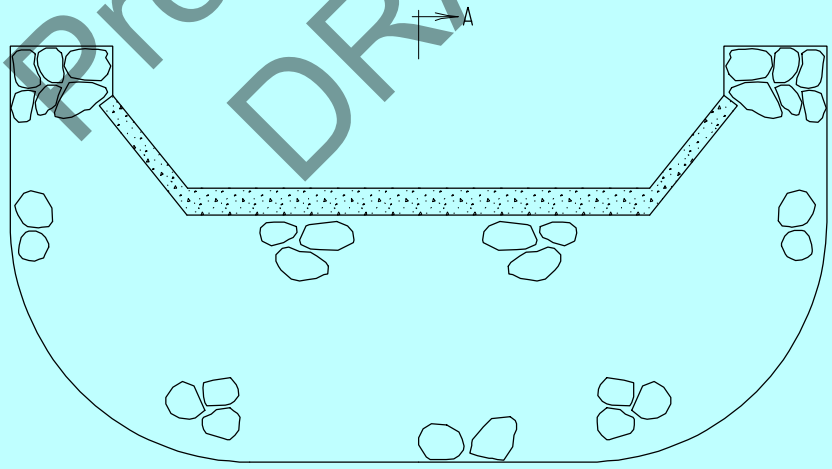


SECTION A-A
Scale: None

T = 32" (min.) Class 2
T = 46" (min.) Class 3



SECTION A-A
Scale: None



PLAN VIEW
Scale: None

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DATE: 09/01/15

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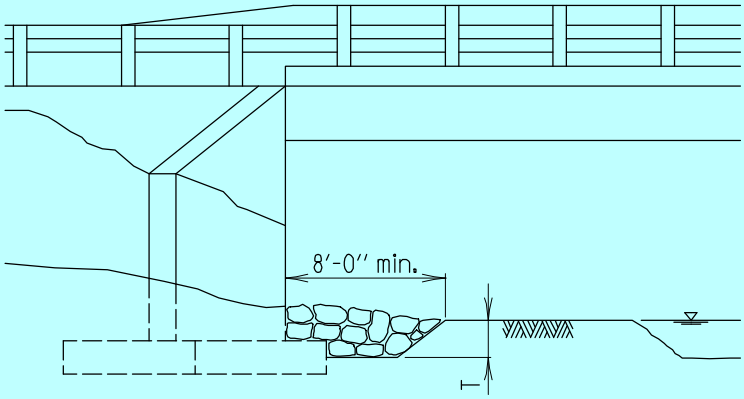
TYPICAL RIPRAP INSTALLATIONS
AT PIERS AND ABUTMENTS
ABUTMENT NEAR CHANNEL BANK

NO. FND-SP-201

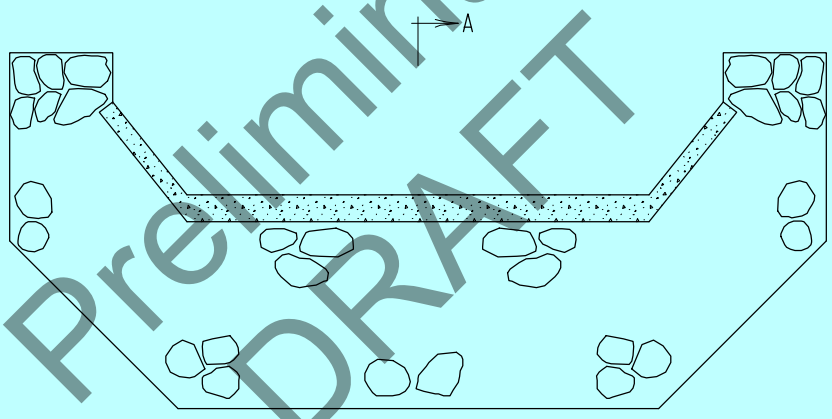
SHEET 3 OF 6

FOUNDATION - SOLPE



T = 32" (min.) Class 2
T = 46" (min.) Class 3
(Evaluate need for filter cloth)

SECTION A-A
Scale: None



PLAN VIEW
Scale: None

Note:
This detail is for use when the abutment is set well back from the channel bank with low flow depths and velocities for worst case scour conditions. The Engineer may consider use of Class I riprap for this condition.

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APPROVAL
_____ DIRECTOR OFFICE OF BRIDGE DEVEL.
DATE: 09/01/15

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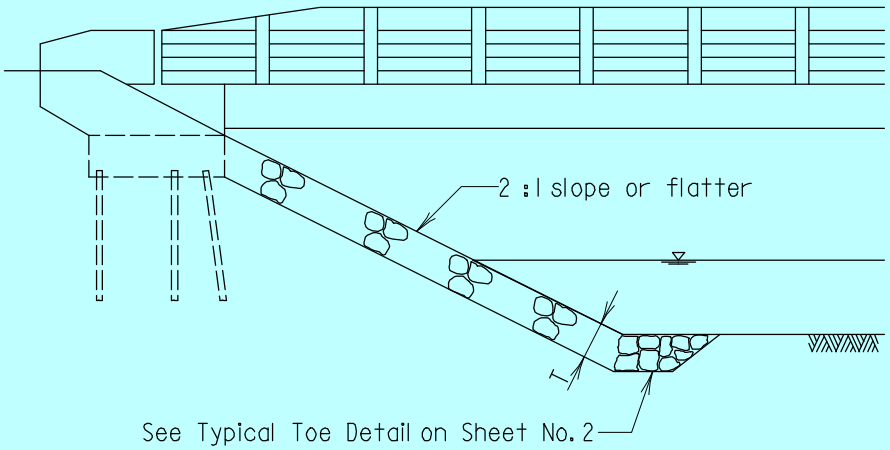
STATE HIGHWAY ADMINISTRATION
OFFICE OF BRIDGE DEVELOPMENT

TYPICAL RIPRAP INSTALLATIONS
AT PIERS AND ABUTMENTS
ABUTMENT ON FLOOD PLAIN

NO. FND-SP-201

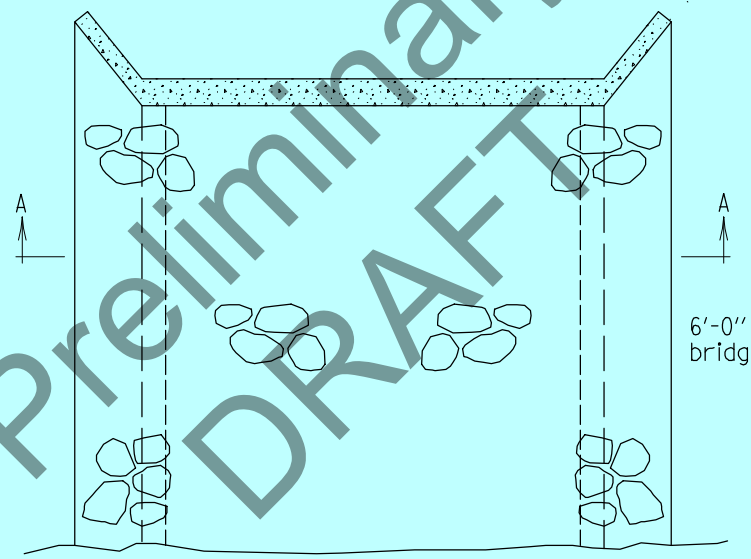
SHEET 4 OF 6

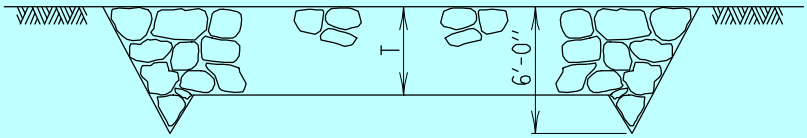
FOUNDATION - SOLPE



T = 32" (min.) Class 2
T = 46" (min.) Class 3

ELEVATION VIEW
Scale: None





SECTION A-A
Scale: None

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DATE: 09/01/15

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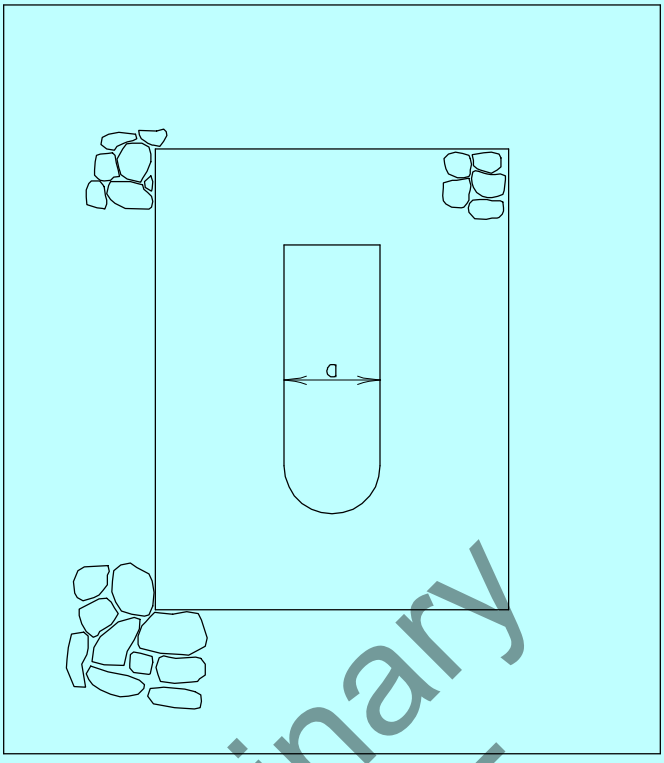
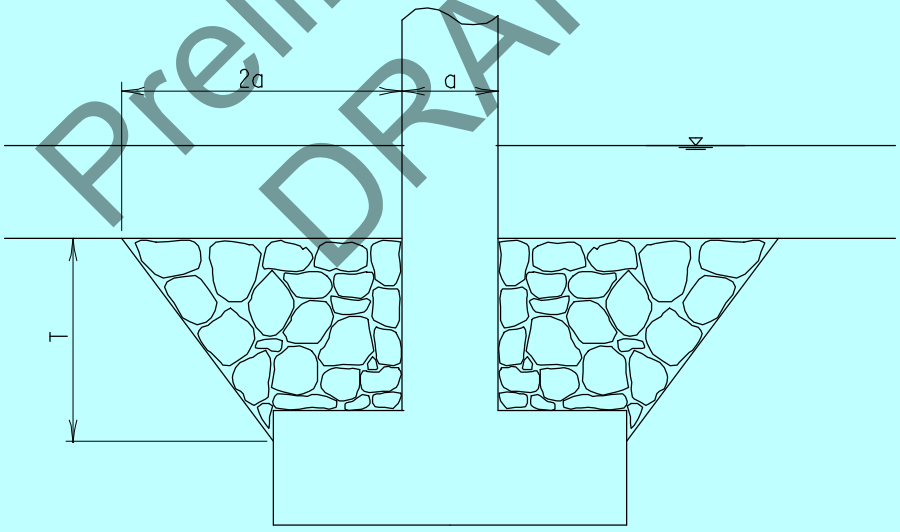
TYPICAL RIPRAP INSTALLATIONS
AT PIERS AND ABUTMENTS
ABUTMENT NEAR TOP OF HIGH CHANNEL BANK

NO. FND-SP-201 SHEET 5 OF 6

FOUNDATION - SOLPE



PLAN VIEW
Scale: None



ELEVATION VIEW
Scale: None

Note:
Piers should be designed to be stable for expected worst-case scour conditions without reliance on scour countermeasures. Where additional scour protection is desired, such protection should be related to the site conditions, but would normally be expected to fall within the limits depicted above.

* PRELIMINARY DRAFT *
FOR OFFICE USE ONLY

APPROVAL
_____ DIRECTOR OFFICE OF BRIDGE DEVEL.
DATE: 09/01/15

REVISIONS	
SHA	FHWA

FHWA APPROVAL
DATE:

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF BRIDGE DEVELOPMENT

TYPICAL RIPRAP INSTALLATIONS
AT PIERS AND ABUTMENTS
SCOUR COUNTERMEASURE AT PIER

NO. FND-SP-201 SHEET 6 OF 6

FOUNDATION - SOLPE