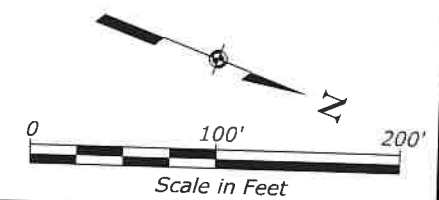
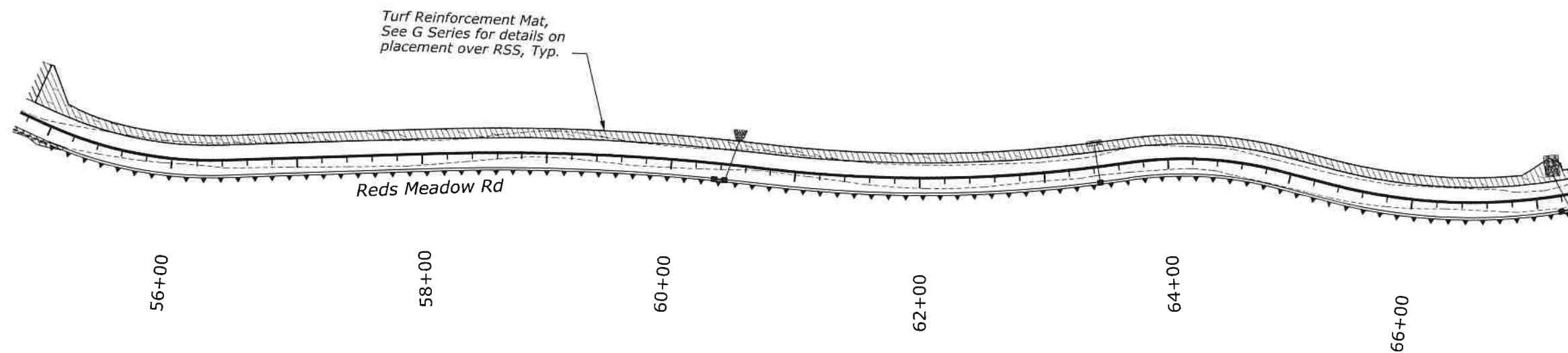
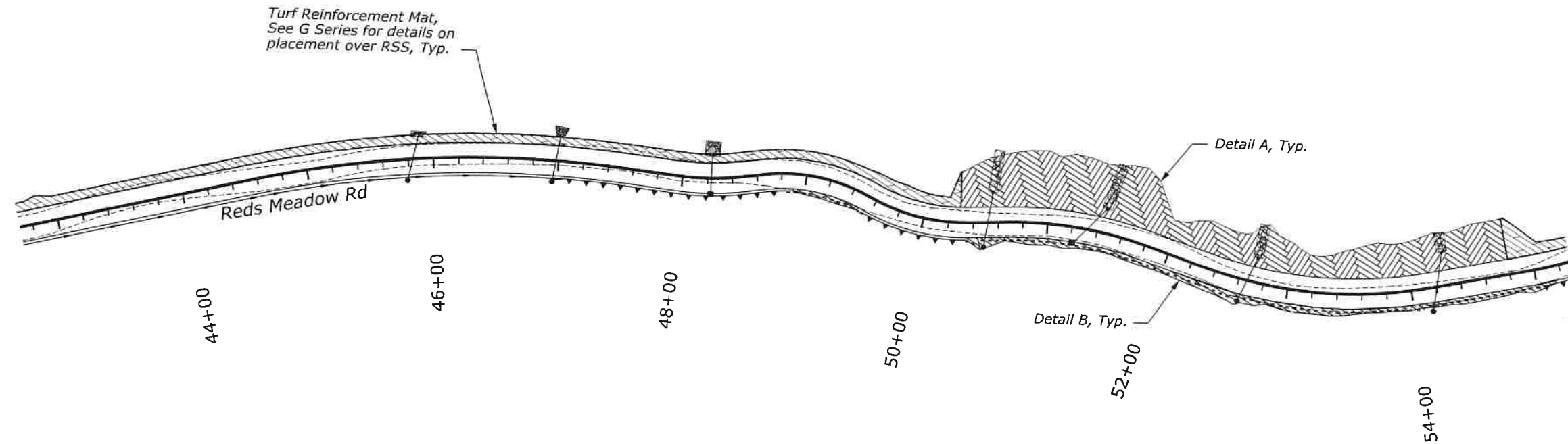


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STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	E3

NOTE:

1. See sheet E1 for notes and details.



**SCHEDULE A
PERMANENT EROSION
CONTROL PLAN
43+00.00 TO 67+00.00**

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3/25/2021

User: DENPWP03\$

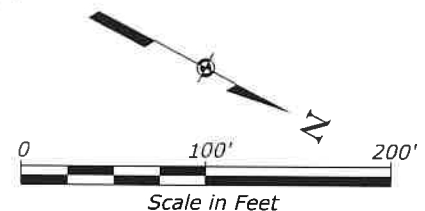
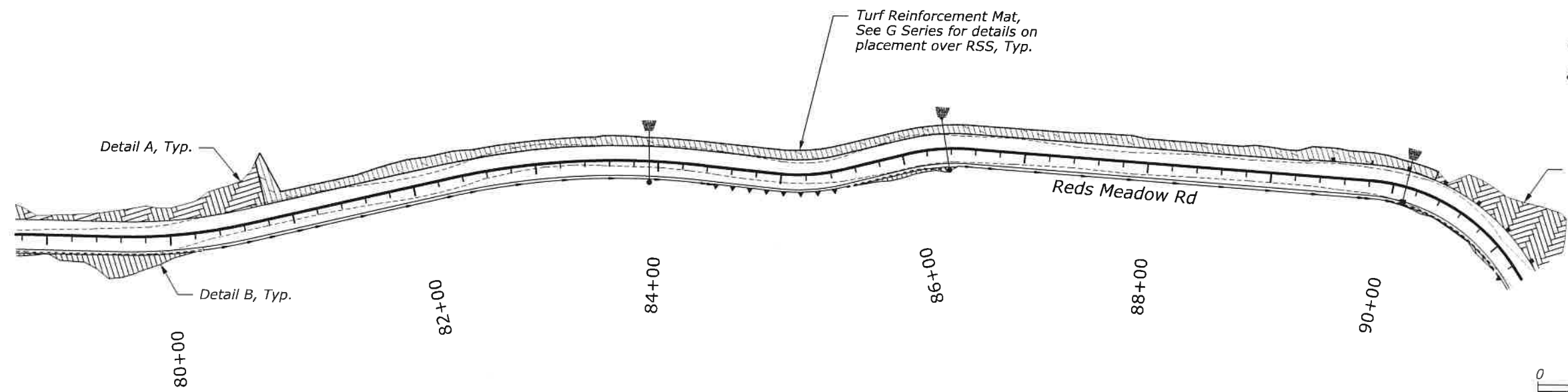
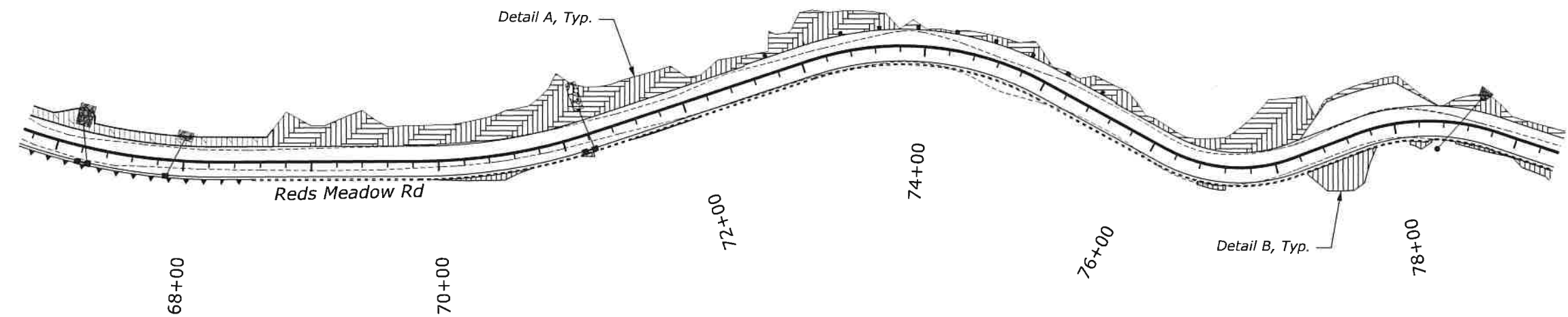
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3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	E4

NOTE:

1. See sheet E1 for notes and details.



**SCHEDULE A
PERMANENT EROSION
CONTROL PLAN
67+00.00 TO 91+00.00**

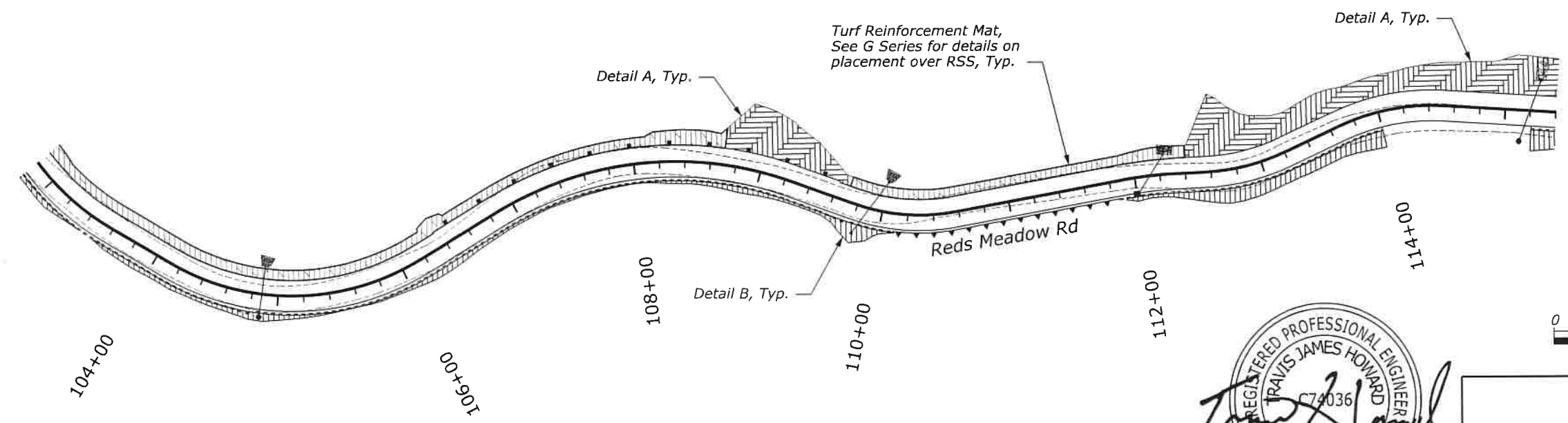
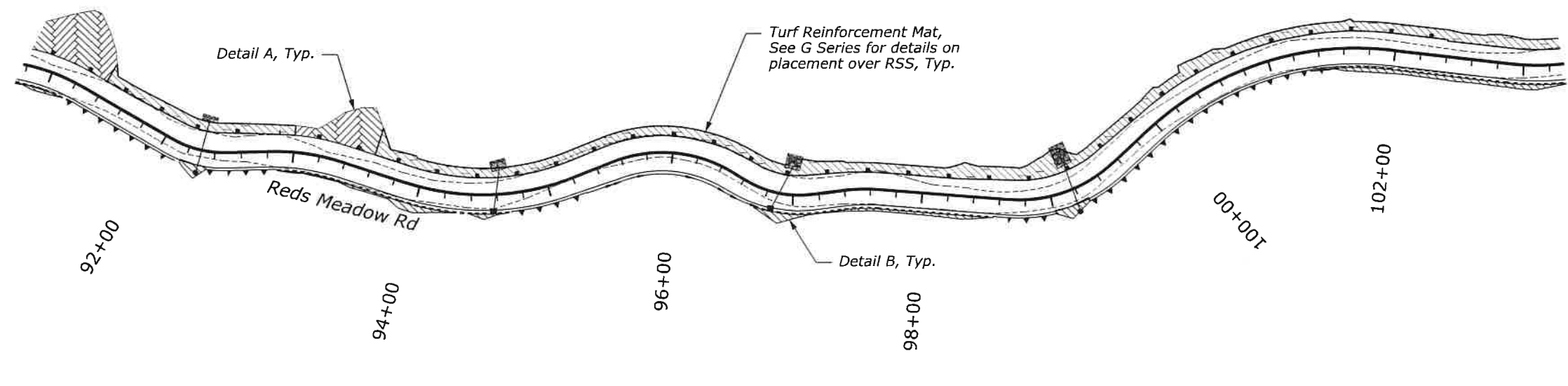
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3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	E5

NOTE:
1. See sheet E1 for notes and details.



03/26/2021

**SCHEDULE A
PERMANENT EROSION
CONTROL PLAN
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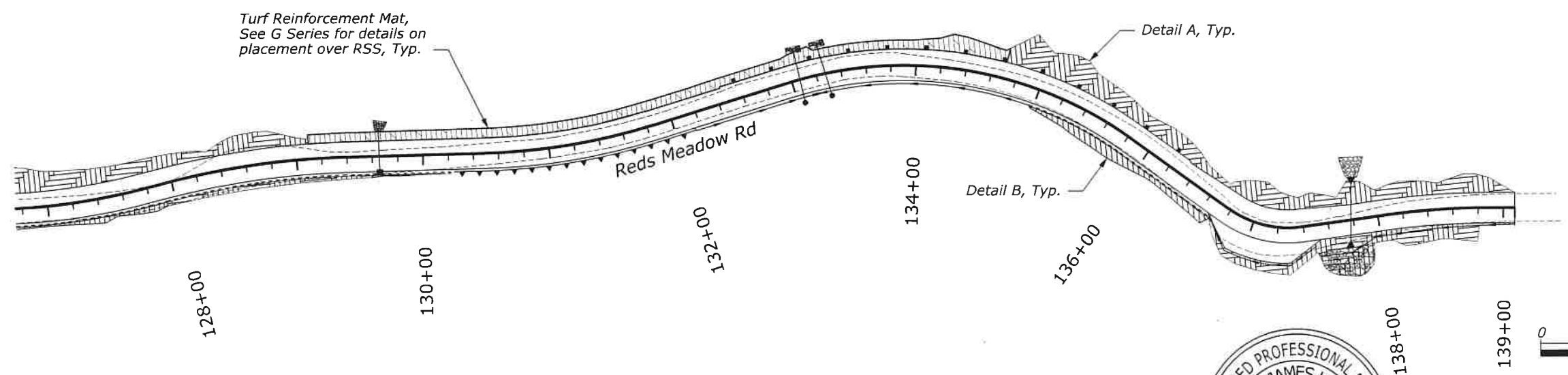
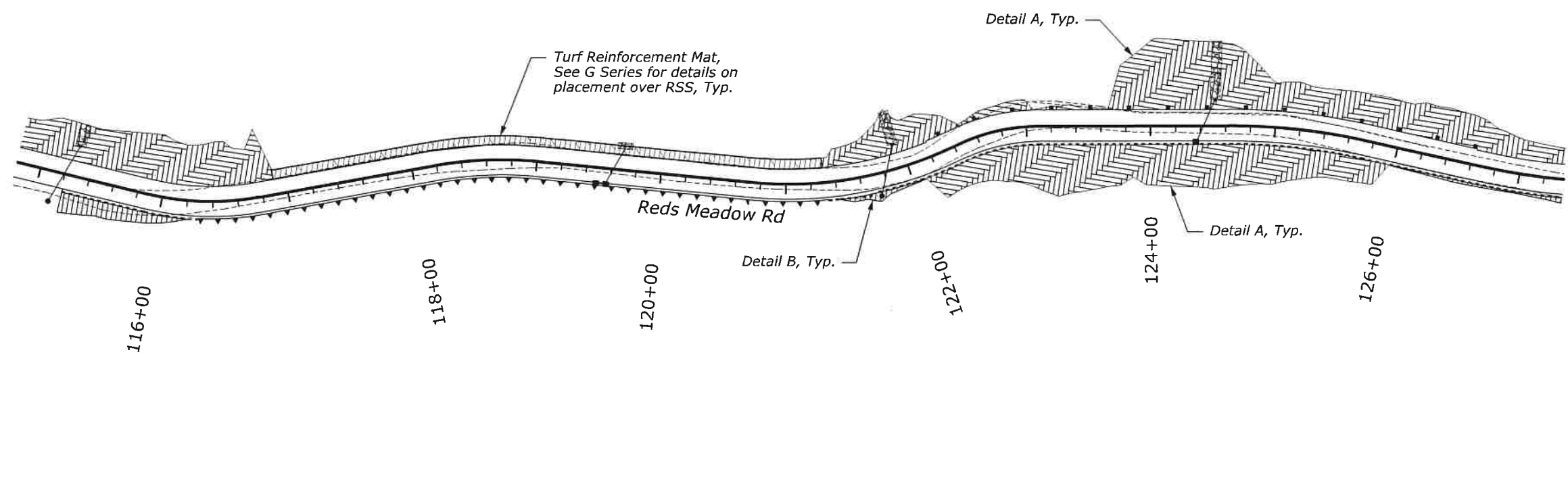
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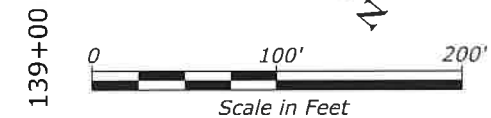
3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	E6

NOTE:
1. See sheet E1 for notes and details.



03/26/2021



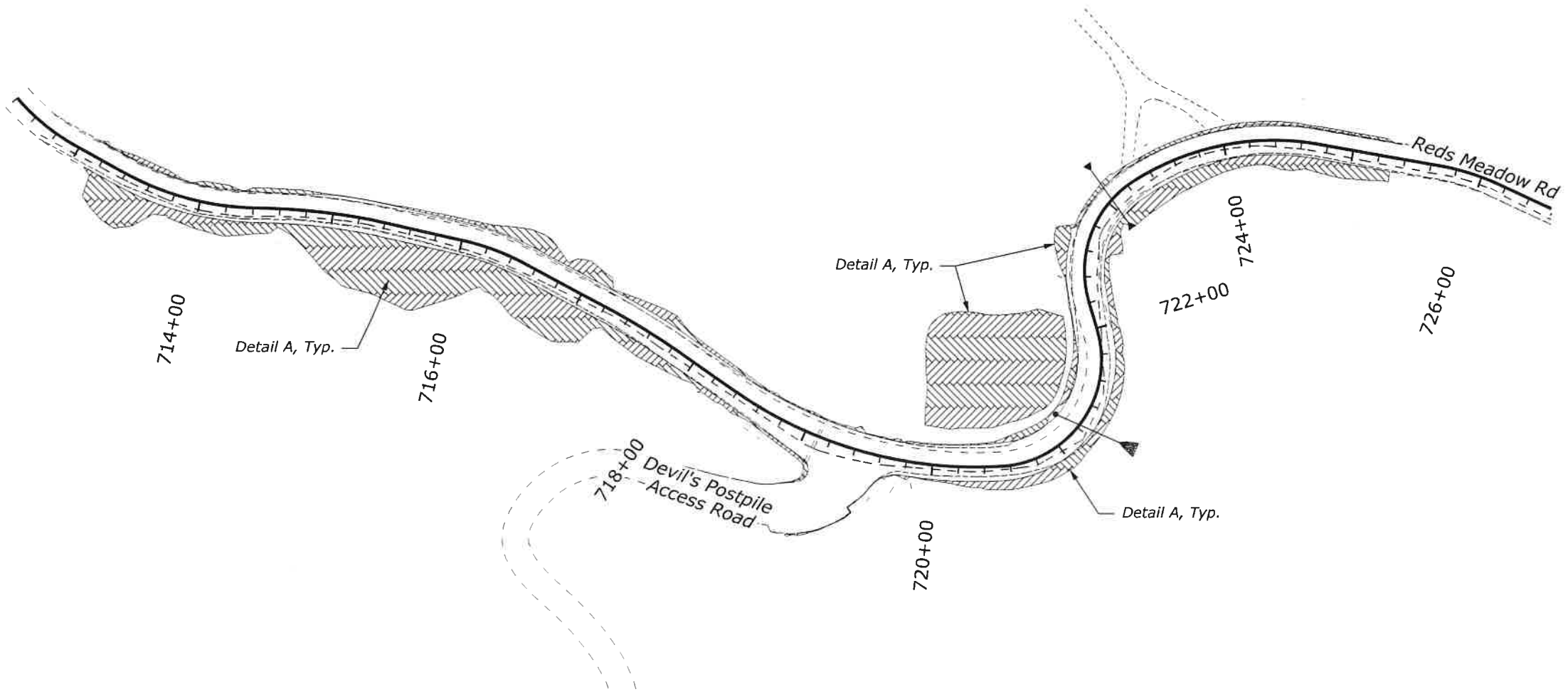
**SCHEDULE A
PERMANENT EROSION
CONTROL PLAN
115+00.00 TO 139+09.15**

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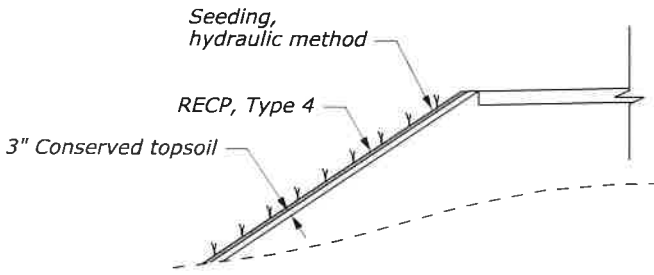
3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	E7

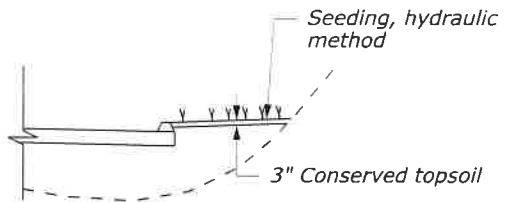


NOTES:

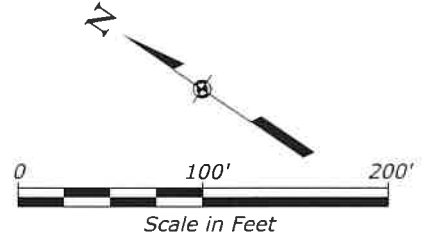
1. Erosion and sediment control devices not to scale. Refer to the Conventional Plan Symbols and Abbreviations sheet for erosion and sediment control symbols.
2. Seeding and RECP as shown on the plans are considered permanent erosion control items and are paid for under 62510-2000 Seeding, Hydraulic Method, and 62901-1100 Rolled Erosion Control Product, Type 4 respectively.
3. Include seeding for areas shown as bonded fiber matrix mulching and RECP. See Detail A and B.
4. Apply Upland/Dry Sites seed mix on all new cut and fill slopes. Apply Riparian/Wet Sites seed mix on all disturbed ground in the vicinity of culvert inlets, outlets, and adjacent to any riparian areas. Coordinate seed mix selection for specific locations with the CO. Seeding is paid for under 62510-2000 Seeding, Hydraulic Method, regardless of seed mix utilized.



**CUT/FILL AT 1:2
DETAIL A**



**CUT/FILL FLATTER THAN 1:2
DETAIL B**



**OPTION X
EROSION CONTROL PLAN
713+00.00 TO 725+00.00**

03/26/2021

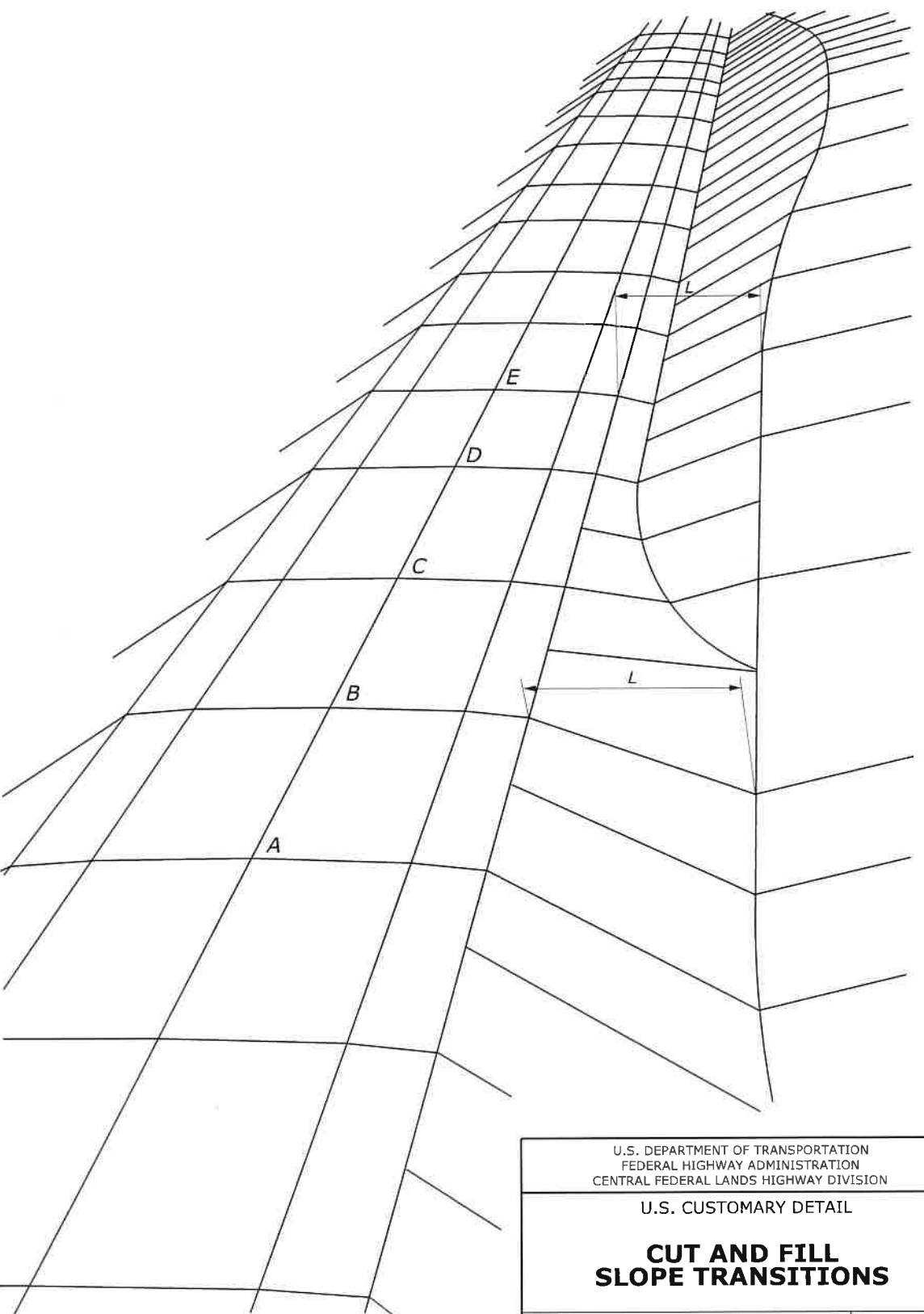
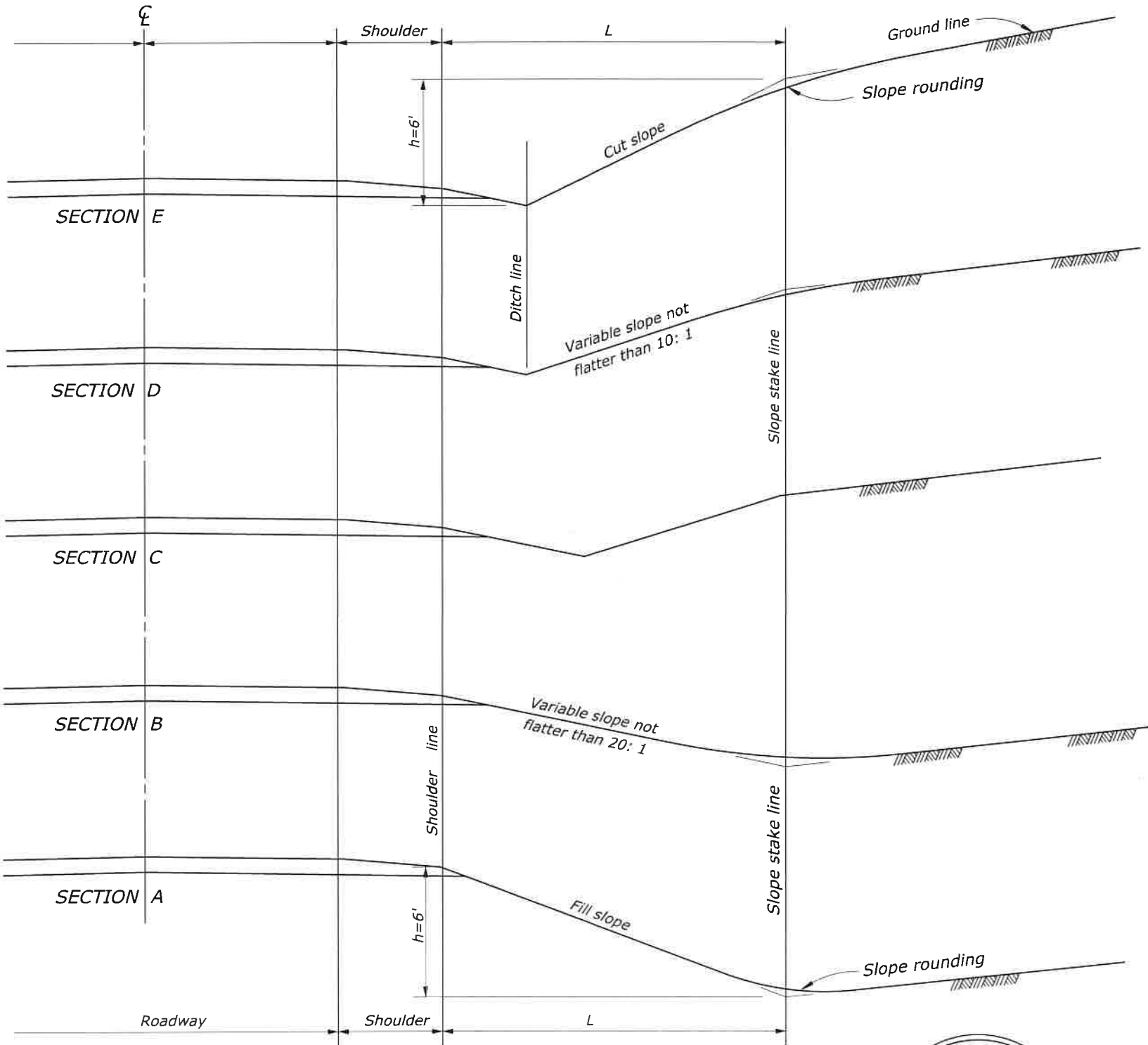
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3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	F1

Note :
1. Distance L is to be maintained as the distance to slope stakes to establish the blend of cut and fill slopes into the original ground.



REGISTERED PROFESSIONAL ENGINEER
TRAVIS JAMES HOWARD
C74036
CIVIL
STATE OF CALIFORNIA

03/26/2021

FOR SELECTION ONLY

NOT TO SCALE

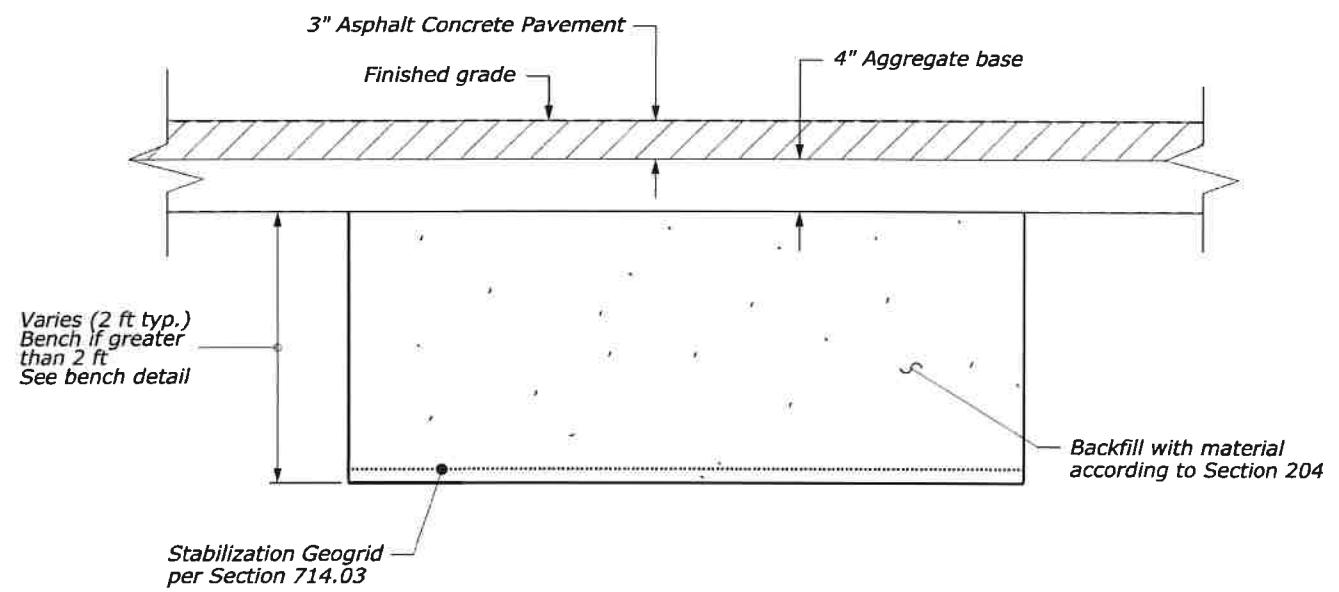
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U.S. CUSTOMARY DETAIL	
CUT AND FILL SLOPE TRANSITIONS	
DETAIL APPROVED FOR USE	DETAIL
APPROVED : MAY 2011	E204-01

11:40:31 AM pw:\\Project\\seamer\\jacobson\\DEN001\\Documents\\663395 - FHWA-TO 27 REDS MEADOW PEL\\Work In Progress\\Reds Meadow Road WIP\\Roadway\\CADD\\Sheets\\F-200\\F204\\04-Subexcavation.dgn 8/19/2022

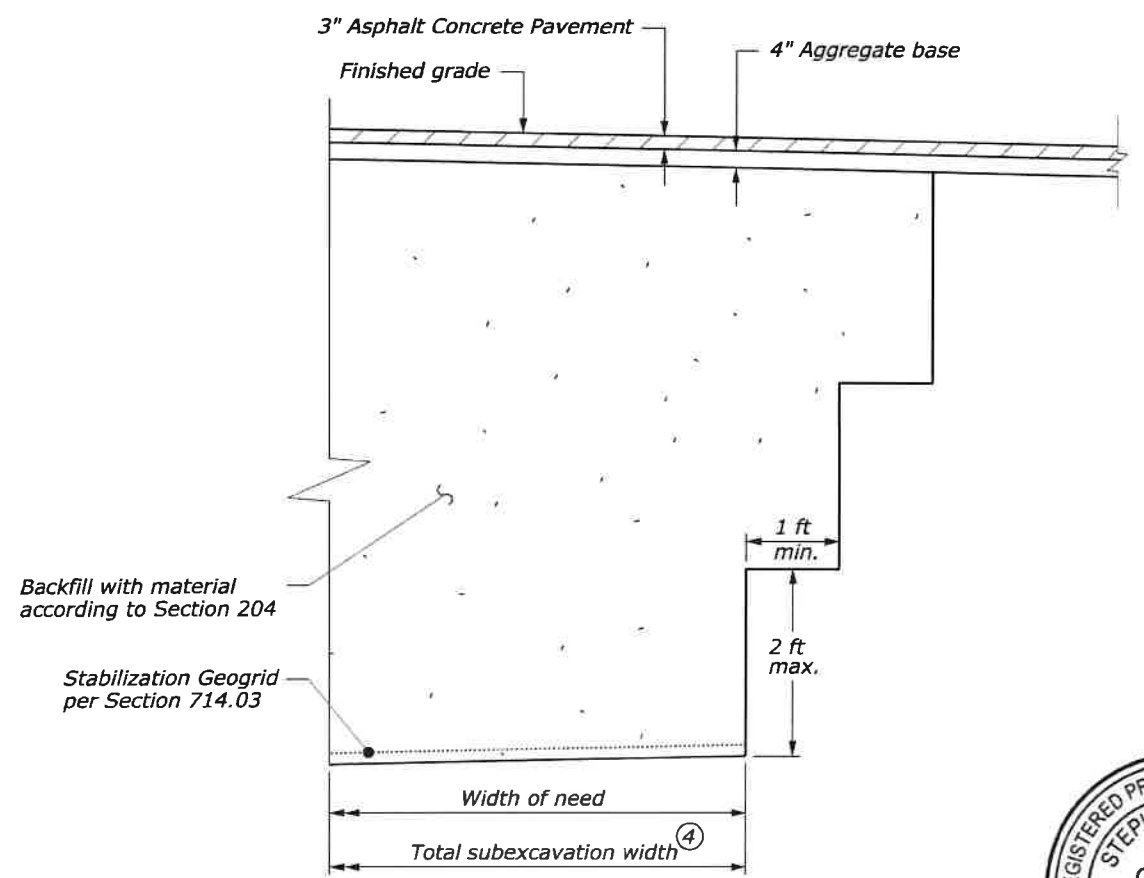
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	F2

NOTE:

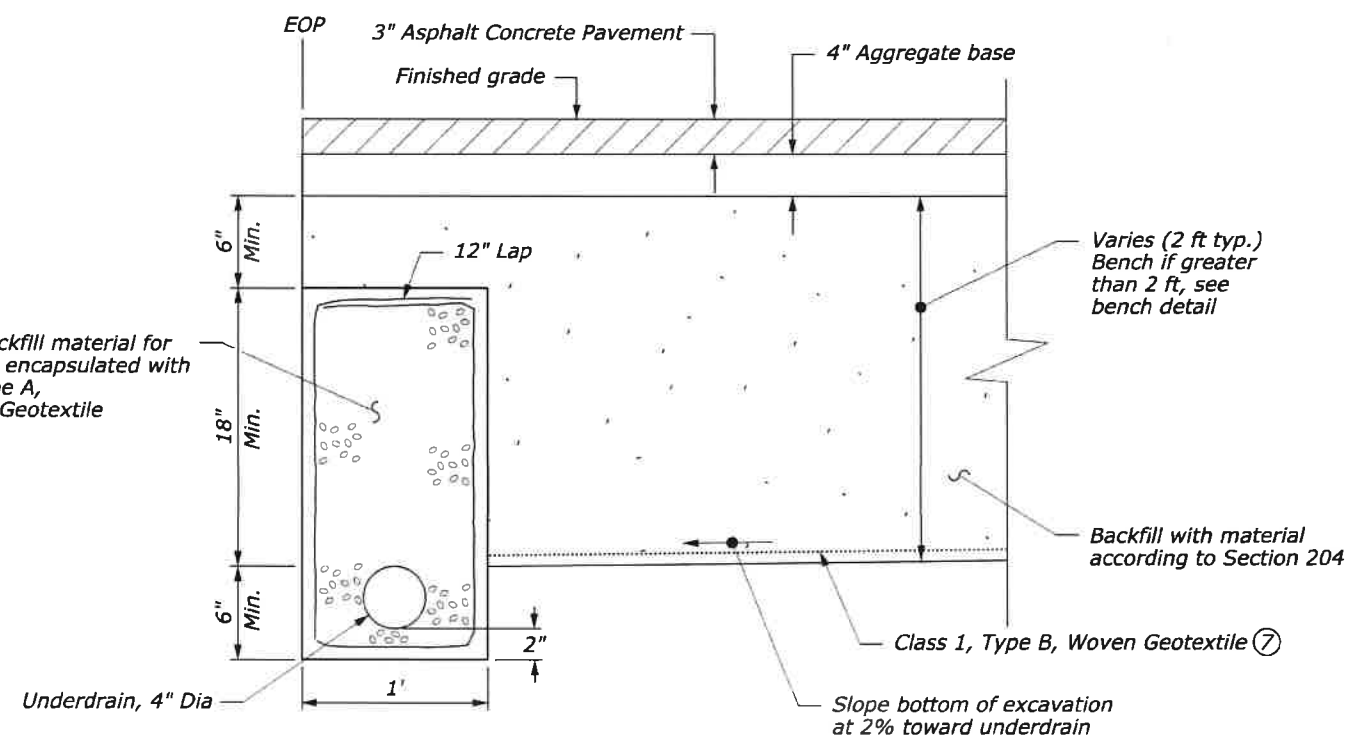
- 1. Replace unsuitable material according to Subsection 204.07 unless otherwise specified.
- 2. Minimum subexcavation dimensions are 6 ft wide x 6 ft long.
- 3. Do not place backfill material within the structural section.
- ④ Widen top of subexcavation area to allow for bench width in bottom layers. Provide a 1 ft min. bench width for every 2 ft of subexcavation depth.
- 5. Daylight to drain when the excavation is within 4 ft of the subgrade hinge point. Slope the excavation bottom 2% toward the daylight for drainage, or match the existing roadway cross slope when steeper than 2%.
- 6. At daylight locations, match the existing fill slope or make slope adjustments to match the subgrade hinge point. Do not construct slopes steeper than 1:2 unless approved by the CO.
- ⑦ At locations where evidence of subsurface water is observed during construction, use a Class 1, Type B, Woven Geotextile and daylight to drain.
- 8. See C-Sheets for locations where subexcavation is required. Additional locations to be determined during construction by the CO.



SUBEXCAVATION
TYPICAL SECTION



BENCH DETAIL

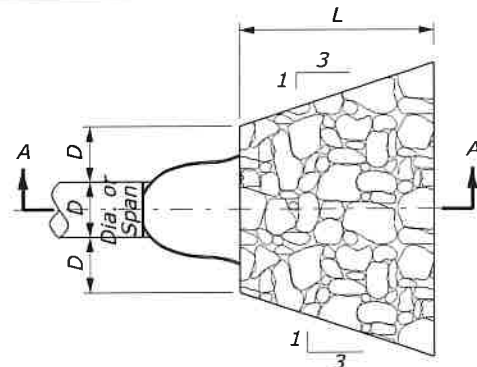


SUBEXCAVATION WITH UNDERDRAIN
TYPICAL SECTION



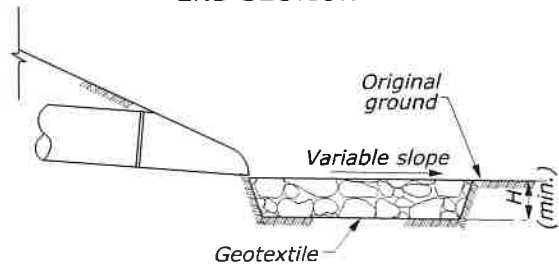
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY SPECIAL	
SUBEXCAVATION	
	SPECIAL 204-A

NO SCALE



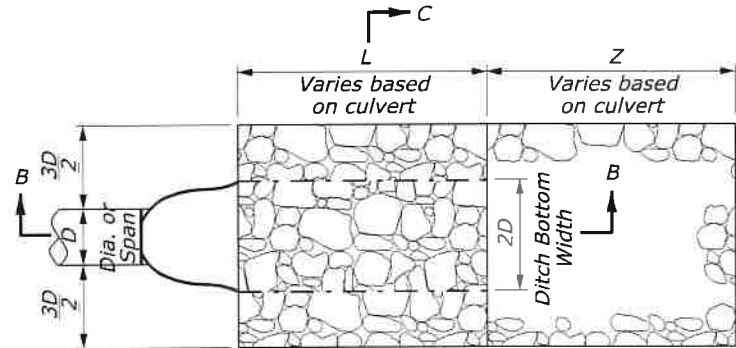
PLAN VIEW

CULVERT WITH STANDARD
END SECTION



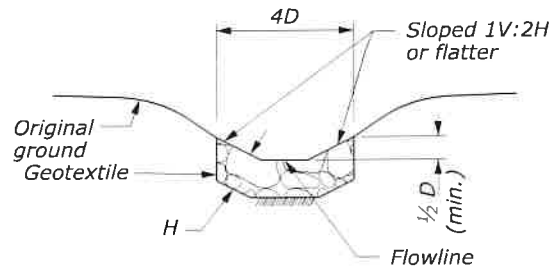
SECTION A-A

**DETAIL A: PROTECTIVE APRON AT CULVERT OUTLET
WITHOUT DITCH**

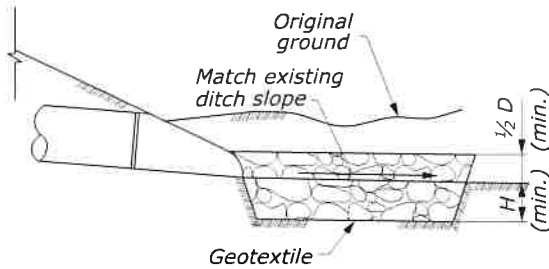


PLAN VIEW

CULVERT WITH STANDARD
END SECTION



SECTION C-C



SECTION B-B

**DETAIL B: PROTECTIVE APRON AT CULVERT OUTLET
WITH DITCH**

OUTLET PROTECTIVE APRON DIMENSIONS							
CULVERT LOCATION	RIPRAP DETAIL	RIPRAP CLASS	CULVERT SIZE D (INCHES)	LENGTH OF APRON L (FEET)	LENGTH OF APRON Z (FEET)	DEPTH OF APRON H (FEET)	ROWS OF GABIONS (EACH)
11+42	A	2	24	10.00	-	1.50	-
16+49	D	-	-	-	-	-	9
27+82	D	-	-	-	-	-	7
29+31	A	2	24	8.00	-	1.50	-
33+69	D	-	-	-	-	-	8
38+04	A	2	24	10.00	-	1.50	-
40+45	A	2	24	8.00	-	1.50	-
45+84	D	-	-	-	-	-	3
47+98	A	2	24	10.00	-	1.50	-
48+23	D	-	-	-	-	-	11
50+52	B	2	24	8.00	29.27	1.50	-
51+32	B	2	24	8.00	33.82	1.50	-
52+67	B	2	24	8.00	21.91	1.50	-
54+20	B	2	24	8.00	9.30	1.50	-
60+47	A	2	24	8.00	-	1.50	-
63+43	D	-	-	-	-	-	3
67+22	D	-	-	-	-	-	16
67+92	D	-	-	-	-	-	6
71+21	B	2	24	8.00	16.84	1.50	-
78+53	A	2	24	8.00	-	1.50	-
83+92	A	2	24	10.00	-	1.50	-
86+36	A	2	24	8.00	-	1.50	-
90+10	A	2	24	10.00	-	1.50	-
92+30	D	-	-	-	-	-	3
94+59	D	-	-	-	-	-	7
96+89	D	-	-	-	-	-	10
99+18	D	-	-	-	-	-	16
104+87	A	2	24	10.00	-	1.50	-
109+90	A	2	24	10.00	-	1.50	-
112+12	D	-	-	-	-	-	6
115+20	B	2	24	8.00	11.56	1.50	-
119+62	D	-	-	-	-	-	4
121+82	B	2	24	8.00	21.86	1.50	-
124+42	B	2	24	8.00	43.55	1.50	-
129+67	A	2	24	10.00	-	1.50	-
133+04	D	-	-	-	-	-	4
133+27	D	-	-	-	-	-	4
137+78	A	3	36	16.00	-	2.00	-
598+70	A	3	36	16.00	-	2.00	-
604+00	A	2	24	8.00	-	1.50	-
700+50	B	2	12	4.00	-	1.50	-
704+00	A	2	12	4.00	-	1.50	-
705+60	A	2	24	8.00	-	1.50	-
721+23	A	2	18	6.00	-	1.50	-
755+85	B	2	12	4.00	-	1.50	-
760+50	B	2	12	4.00	-	1.50	-
761+80	B	2	12	4.00	-	1.50	-
763+50	A	2	12	4.00	-	1.50	-
795+60	A	2	24	8.00	-	1.50	-

NOTES:

1. Furnish Class 2, Type A, non-woven geotextile conforming to Subsection 714.01(a).
2. Excavation for placement of riprap will not be measured for payment.
3. See Sheet G2 for Details C and D.

NO SCALE

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G1



07/29/2022

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL
**PLACED RIPRAP
AT CULVERT OUTLETS**

Sheet 1 of 2

SPECIAL
251-A

User: DENPWP02\$

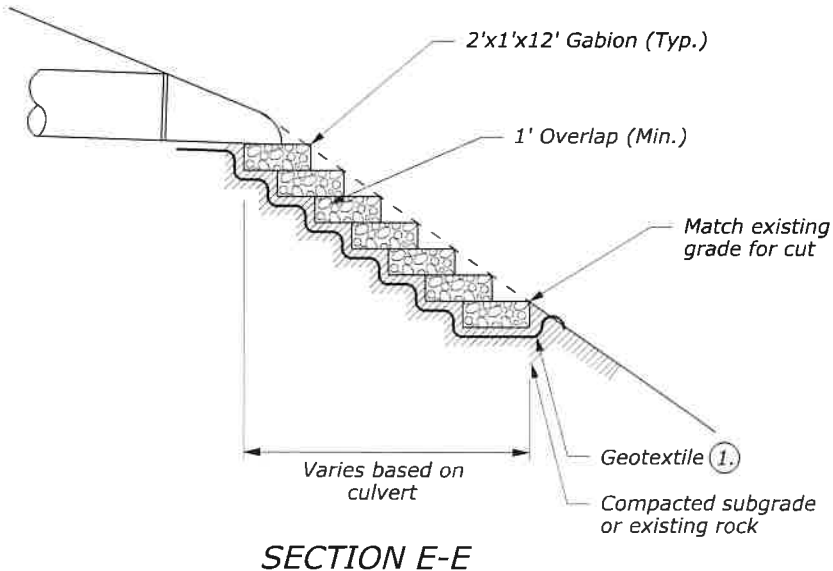
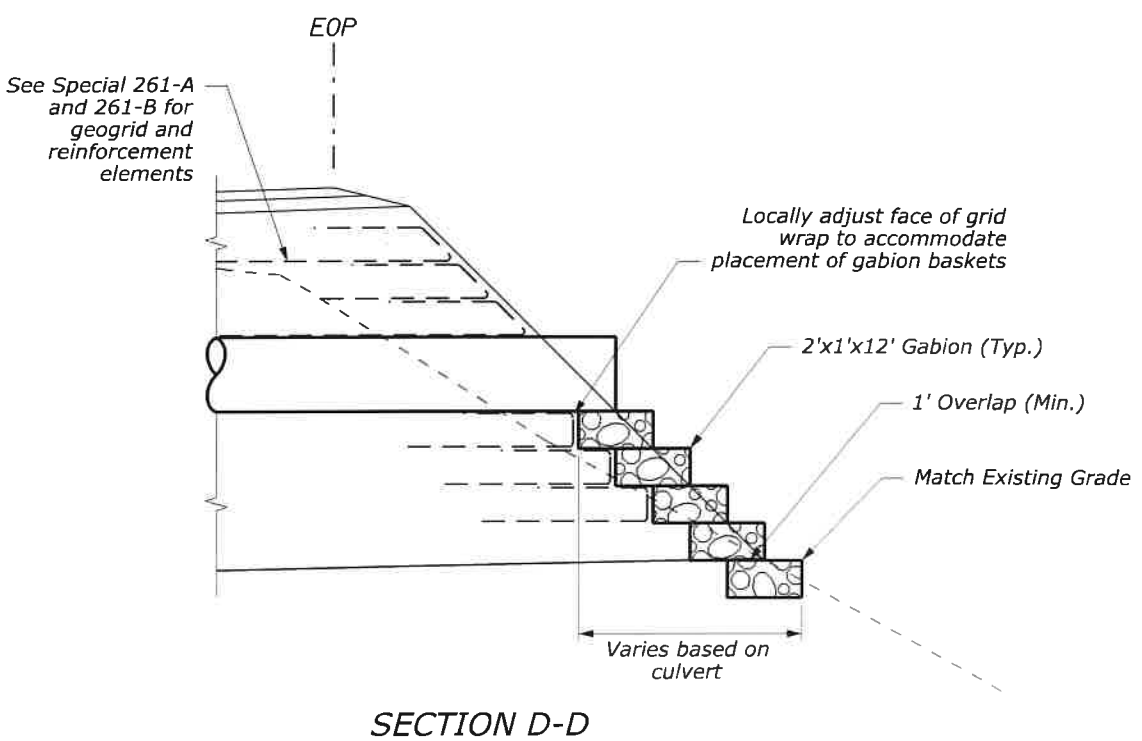
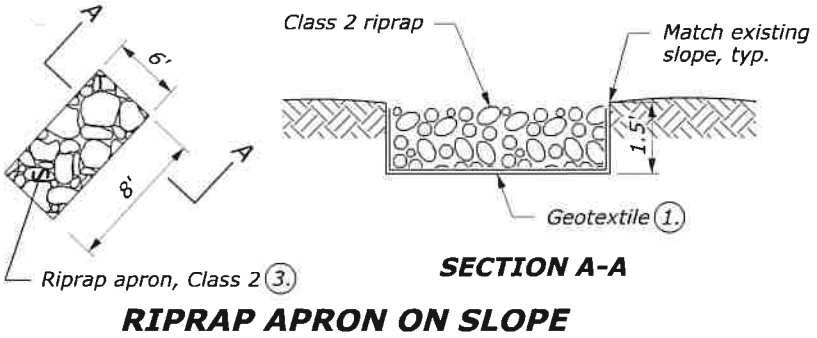
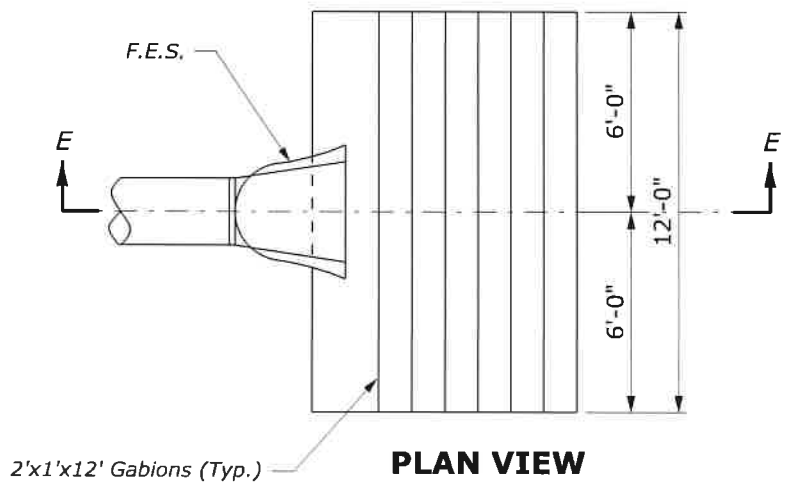
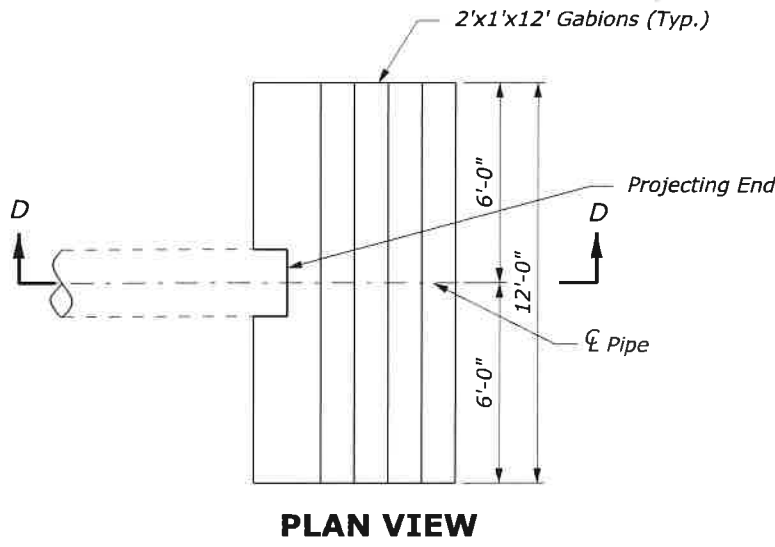
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3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G2

NOTE:

- 1) Furnish Class 2, Type A, non-woven geotextile conforming to Subsection 714.01(a).
- 2. Excavation for placement of gabions will not be measured for payment.
- 3) Adjust location and shape of riprap apron to conform to slope as needed. Coordinate final limits with CO in the field. Dimensions shown are approximate and subject to adjustment during construction.



DETAIL C: GABION PROTECTIVE APRON ON REINFORCED SOIL SLOPE

DETAIL D: GABION PROTECTIVE APRON ON NON-REINFORCED SLOPE

NO SCALE

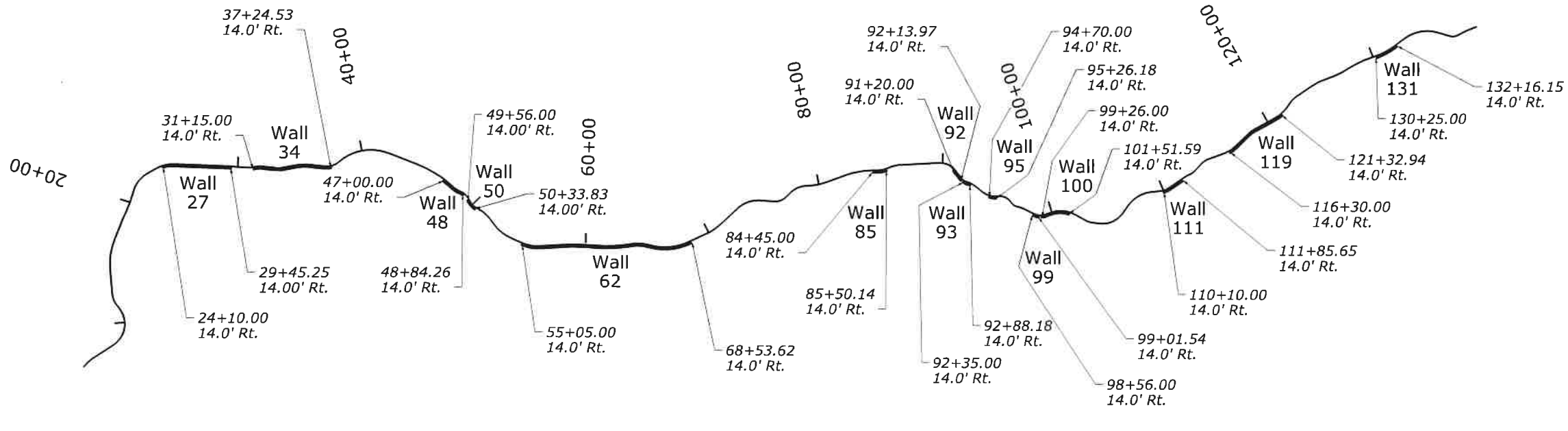
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY SPECIAL PLACED RIPRAP AT CULVERT OUTLETS AND ON SLOPES Sheet 2 of 2	
	SPECIAL 251-A

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3/24/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G3



Retaining Wall Sheet Index

Sheet No.	Sheet Title
G3	Wall Site Plan and General Notes
G4	Soil Nail Wall 27 Layout 10+00.00 to 15+30.00
G5	Soil Nail Wall 34 Layout 10+00.00 to 16+10.00
G6	Soil Nail Wall 48 Layout 10+00.00 to 11+85.00
G7	Soil Nail Wall 50 Layout 10+00.00 to 10+85.00
G8	Soil Nail Wall 62 Layout 10+00.00 to 15+00.00
G9	Soil Nail Wall 62 Layout 15+00.00 to 20+00.00
G10	Soil Nail Wall 62 Layout 20+00.00 to 23+60.00
G11	Soil Nail Wall 85 Layout 10+00.00 to 11+10.00
G12	Soil Nail Wall 92 Layout 10+00.00 to 10+95.00
G13	Soil Nail Wall 93 Layout 10+00.00 to 10+55.00
G14	Soil Nail Wall 95 Layout 10+00.00 to 10+60.00
G15	Soil Nail Wall 99 Layout 10+00.00 to 10+50.00
G16	Soil Nail Wall 100 Layout 10+00.00 to 12+20.00
G17	Soil Nail Wall 111 Layout 10+00.00 to 11+80.00
G18	Soil Nail Wall 119 Layout 10+00.00 to 15+05.00
G19	Soil Nail Wall 131 Layout 10+00.00 to 11+95.00
G20	Soil Nail Wall Typical Section
G21	Soil Nail Wall General Notes & Details No. 1
G22	Soil Nail Wall Details No. 2
G23	Reinforced Soil Slope - Sheet 1 of 2
G24	Reinforced Soil Slope - Sheet 2 of 2
G25	Drainage Pipe Through RSS

Wall Design Schedule

Wall Name	Mainline Station (Layout Line)		Wall Station (Layout Line)		Side of Road	Wall Type	Max Design Wall Height, H _{max} (ft)	Length of Wall (Along Wall Layout Line) (ft)	Area of Design Wall Face (sf)
	Begin	End	Begin	End					
Wall 27	24+10.00	29+45.25	10+00.00	15+30.00	Right	Soil Nail	9	530.00	3,628
Wall 34	31+15.00	37+24.53	10+00.00	16+10.00	Right	Soil Nail	10	610.00	5,022
Wall 48	47+00.00	48+84.26	10+00.00	11+85.00	Right	Soil Nail	9	185.00	1,408
Wall 50	49+56.00	50+33.83	10+00.00	10+85.00	Right	Soil Nail	7	85.00	455
Wall 62	55+05.00	68+53.62	10+00.00	23+60.00	Right	Soil Nail	11	1,360.00	9,053
Wall 85	84+45.00	85+50.14	10+00.00	11+10.00	Right	Soil Nail	10	110.00	827
Wall 92	91+20.00	92+13.97	10+00.00	10+95.00	Right	Soil Nail	9	95.00	672
Wall 93	92+35.00	92+88.18	10+00.00	10+55.00	Right	Soil Nail	7	55.00	287
Wall 95	94+70.00	95+26.18	10+00.00	10+60.00	Right	Soil Nail	12	60.00	515
Wall 99	98+56.00	99+01.54	10+00.00	10+50.00	Right	Soil Nail	6	50.00	248
Wall 100	99+26.00	101+51.59	10+00.00	12+20.00	Right	Soil Nail	10	220.00	1,732
Wall 111	110+10.00	111+85.65	10+00.00	11+80.00	Right	Soil Nail	9	180.00	1,134
Wall 119	116+30.00	121+32.94	10+00.00	15+05.00	Right	Soil Nail	10	505.00	3,871
Wall 131	130+25.00	132+16.15	10+00.00	11+95.00	Right	Soil Nail	8	195.00	1,245

NOTES:
1. See sheet G20 for Soil Nail Wall Typical Section.

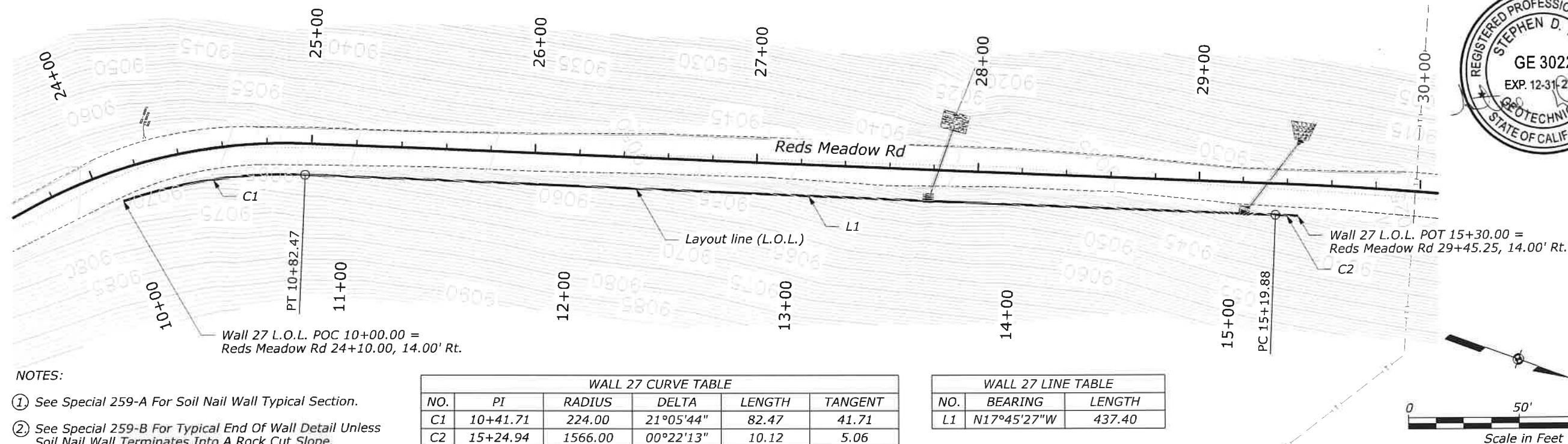


03/26/2021

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

WALL SITE PLAN AND GENERAL NOTES

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G4

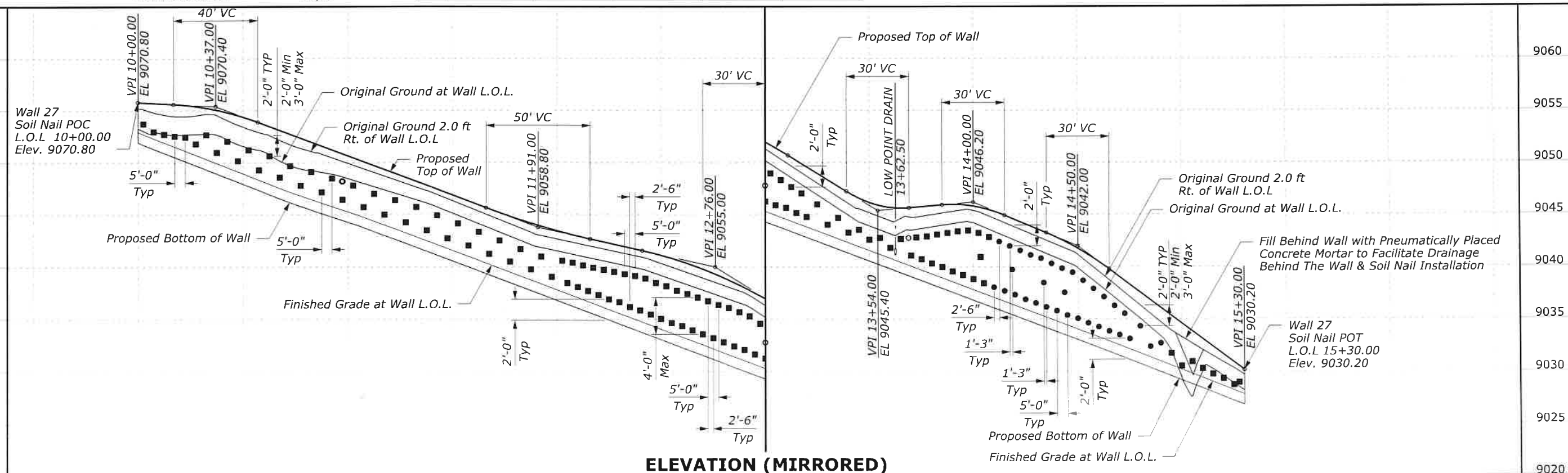


NOTES:

- See Special 259-A For Soil Nail Wall Typical Section.
- See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A Rock Cut Slope.

WALL 27 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+41.71	224.00	21°05'44"	82.47	41.71
C2	15+24.94	1566.00	00°22'13"	10.12	5.06

WALL 27 LINE TABLE		
NO.	BEARING	LENGTH
L1	N17°45'27"W	437.40



ELEVATION (MIRRORED)

Layout Line (L.O.L.)	10+00	11+00	12+00	13+00	14+00	15+00
Mainline Station	10+00	25+00	26+00	27+00	28+00	29+00

NOTE:

- Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

LEGEND

- 10 Foot Long Nail
- 15 Foot Long Nail
- 17 Foot Long Nail
- 20 Foot Long Nail
- 25 Foot Long Nail
- Verification Test Nail

SOIL NAIL WALL 27 LAYOUT 10+00 TO 15+30

User: DENPWP035

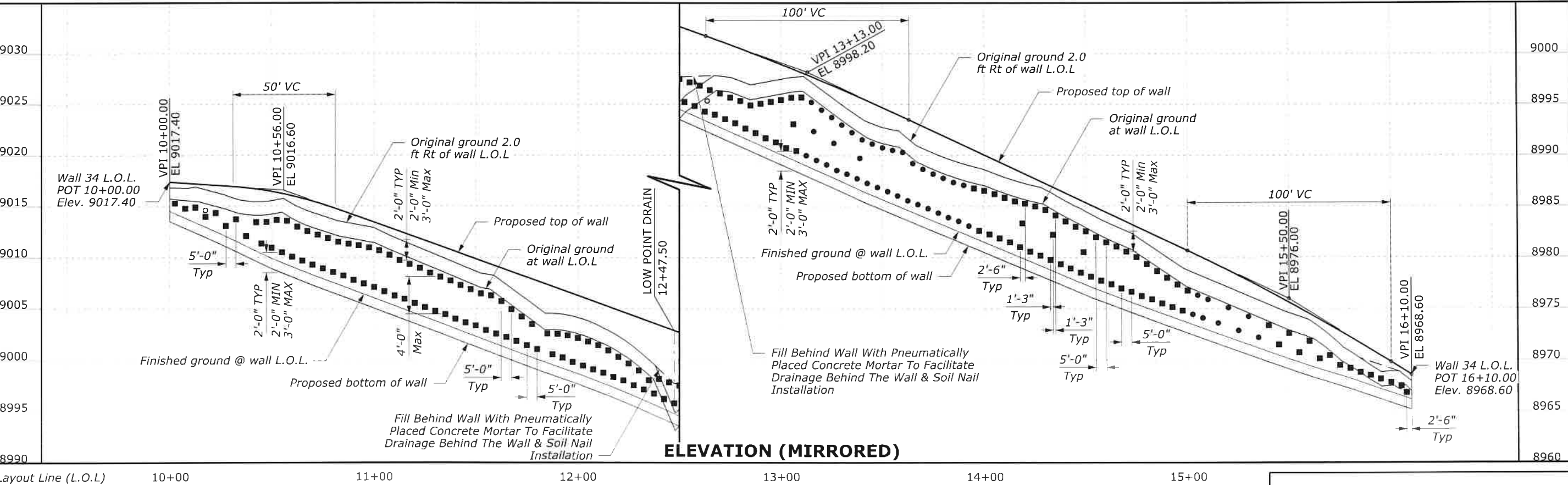
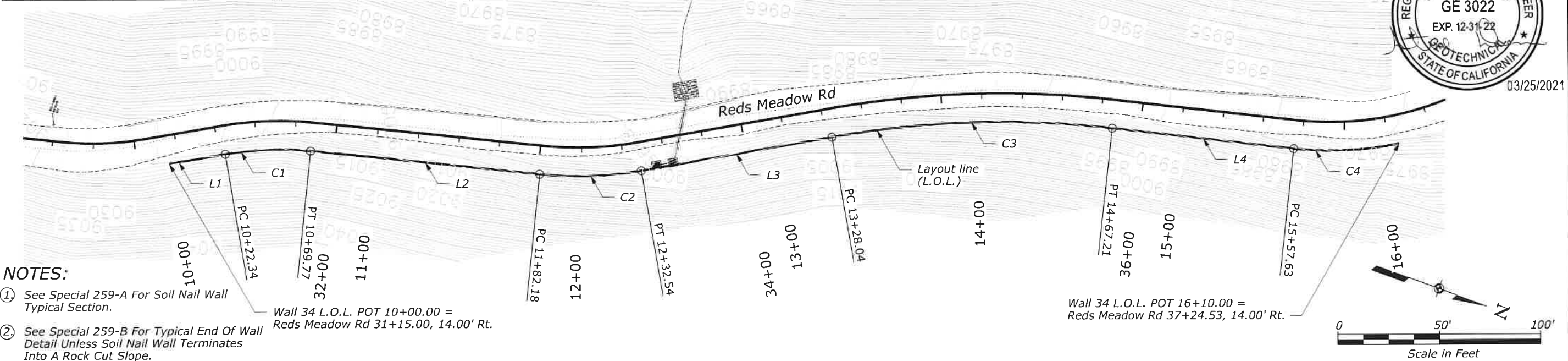
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3/23/2021

WALL 34 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+48.99	155.00	15°27'09"	41.80	21.03
C2	12+07.52	183.00	15°46'00"	50.36	25.34
C3	13+98.11	484.00	16°28'27"	139.16	70.07
C4	15+84.04	166.00	18°04'28"	52.37	26.40

WALL 34 LINE TABLE		
NO.	BEARING	LENGTH
L1	N29°51'23"W	27.96
L2	N14°24'14"W	112.41
L3	N30°10'14"W	95.50
L4	N13°41'47"W	90.43

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G5



NOTE:
1. Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

- LEGEND**
- 10 Foot Long Nail
 - 15 Foot Long Nail
 - 17 Foot Long Nail
 - 20 Foot Long Nail
 - 25 Foot Long Nail
 - Verification Test Nail

**SOIL NAIL WALL 34 LAYOUT
10+00 TO 16+10**

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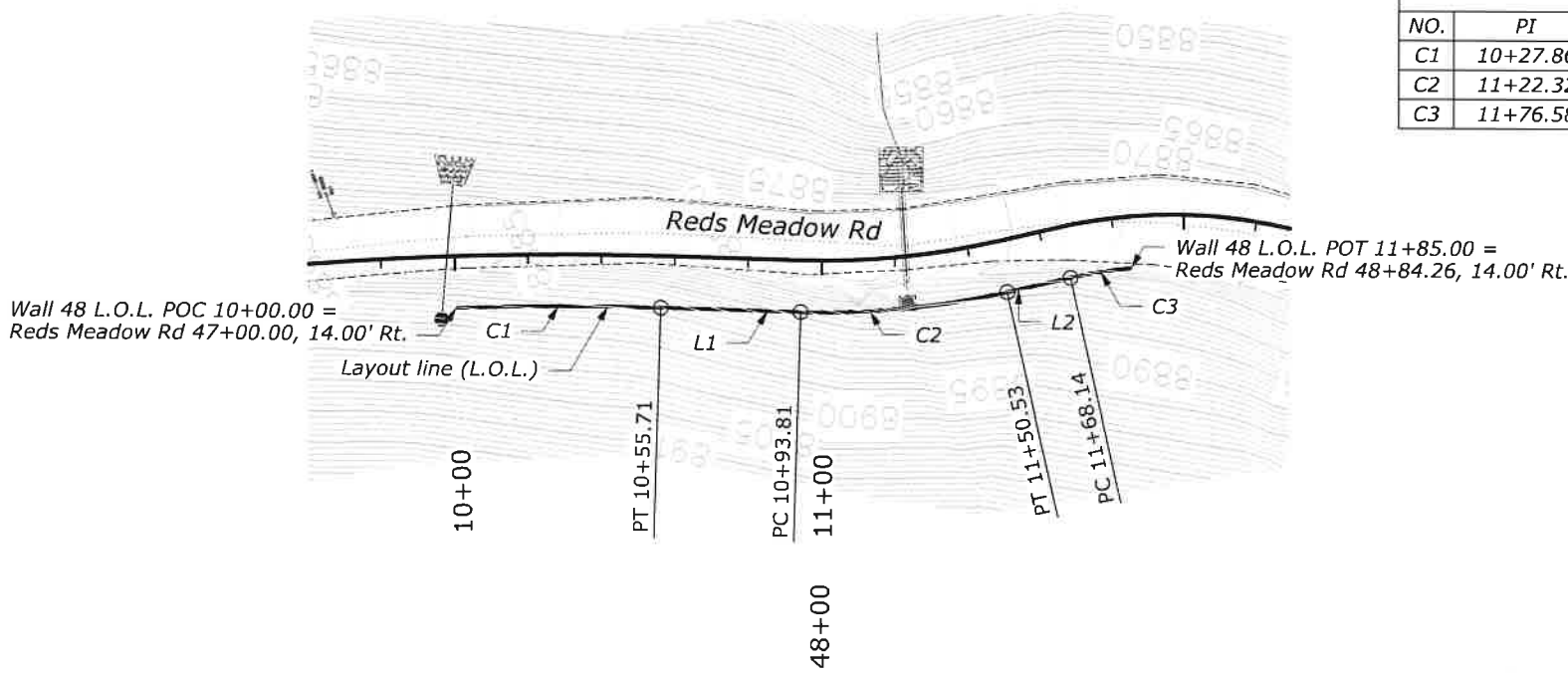
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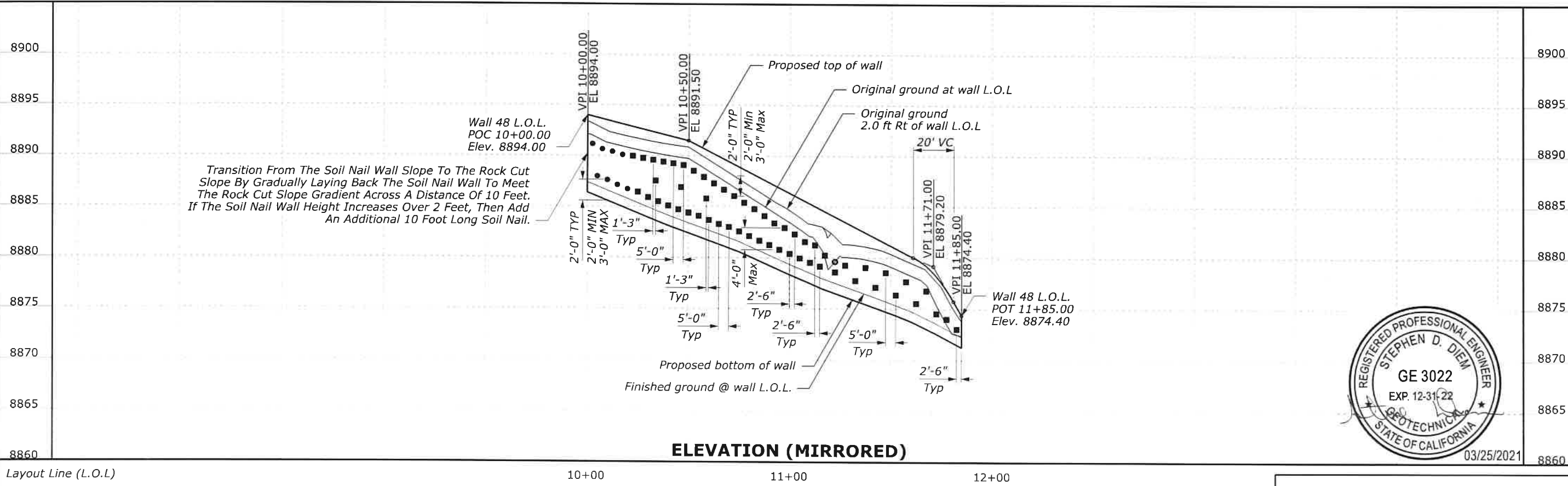
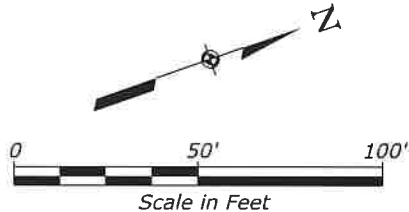
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G6

WALL 48 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+27.86	870.00	03°40'07"	55.71	27.86
C2	11+22.32	226.00	14°22'49"	56.72	28.51
C3	11+76.58	126.00	07°40'06"	16.86	8.44

WALL 48 LINE TABLE		
NO.	BEARING	LENGTH
L1	N20°33'37"E	38.10
L2	N06°10'47"E	17.61



- NOTES:**
- See Special 259-A For Soil Nail Wall Typical Section.
 - See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



NOTE:

- Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

- LEGEND**
- 10 Foot Long Nail
 - 15 Foot Long Nail
 - 17 Foot Long Nail
 - 20 Foot Long Nail
 - 25 Foot Long Nail
 - Verification Test Nail

**SOIL NAIL WALL 48 LAYOUT
10+00 TO 11+85**

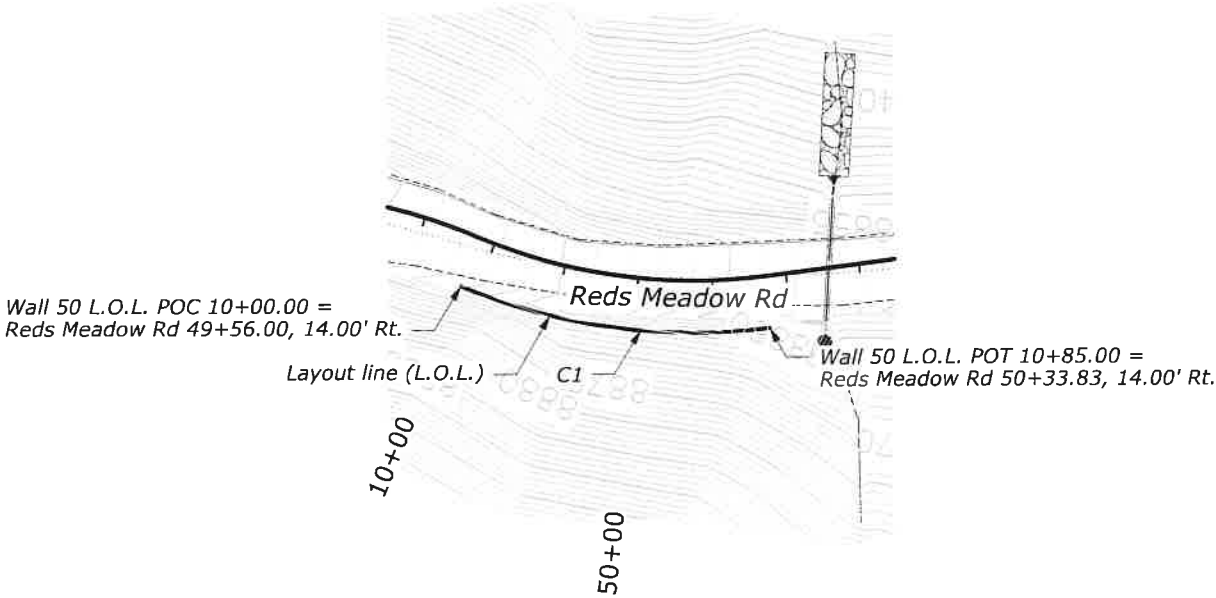
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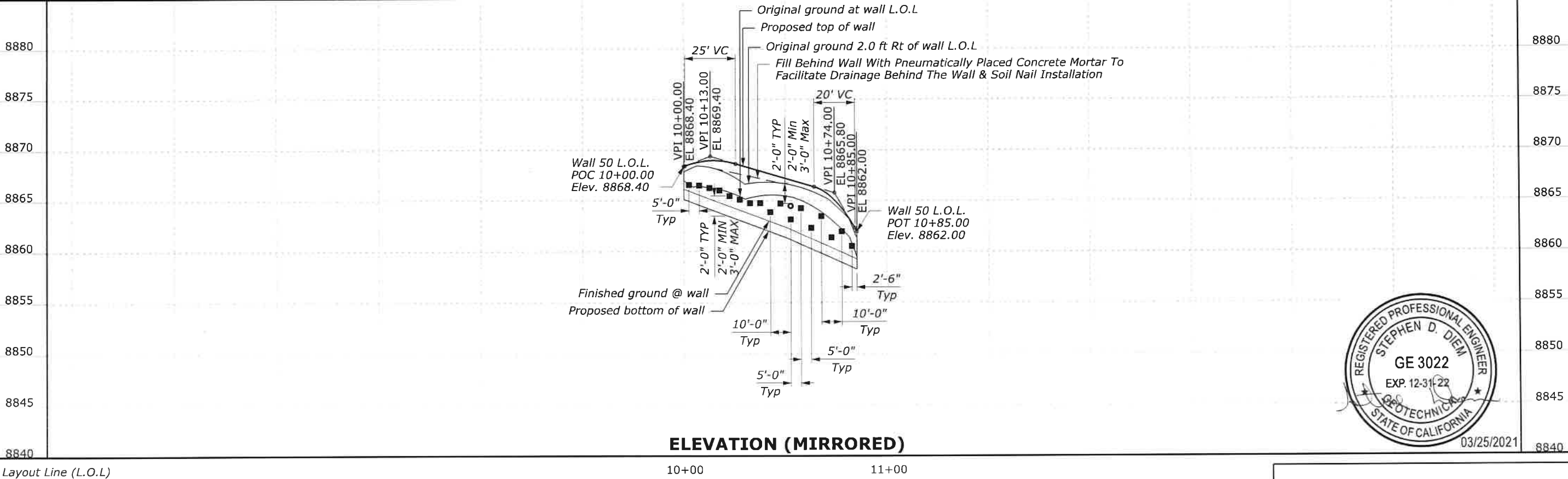
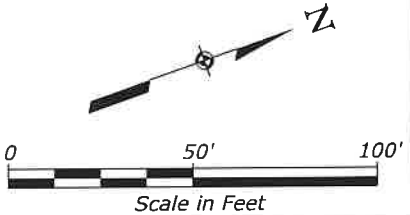
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G7

WALL 50 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+43.45	166.00	29°20'18"	85.00	43.45



NOTES:

- ① See Special 259-A For Soil Nail Wall Typical Section.
- ② See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



03/25/2021

Layout Line (L.O.L.)

ELEVATION (MIRRORED)

10+00 11+00

LEGEND

- 10 Foot Long Nail
- 15 Foot Long Nail
- 17 Foot Long Nail
- 20 Foot Long Nail
- 25 Foot Long Nail
- Verification Test Nail

**SOIL NAIL WALL 50 LAYOUT
10+00 TO 10+85**

NOTE:

1. Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

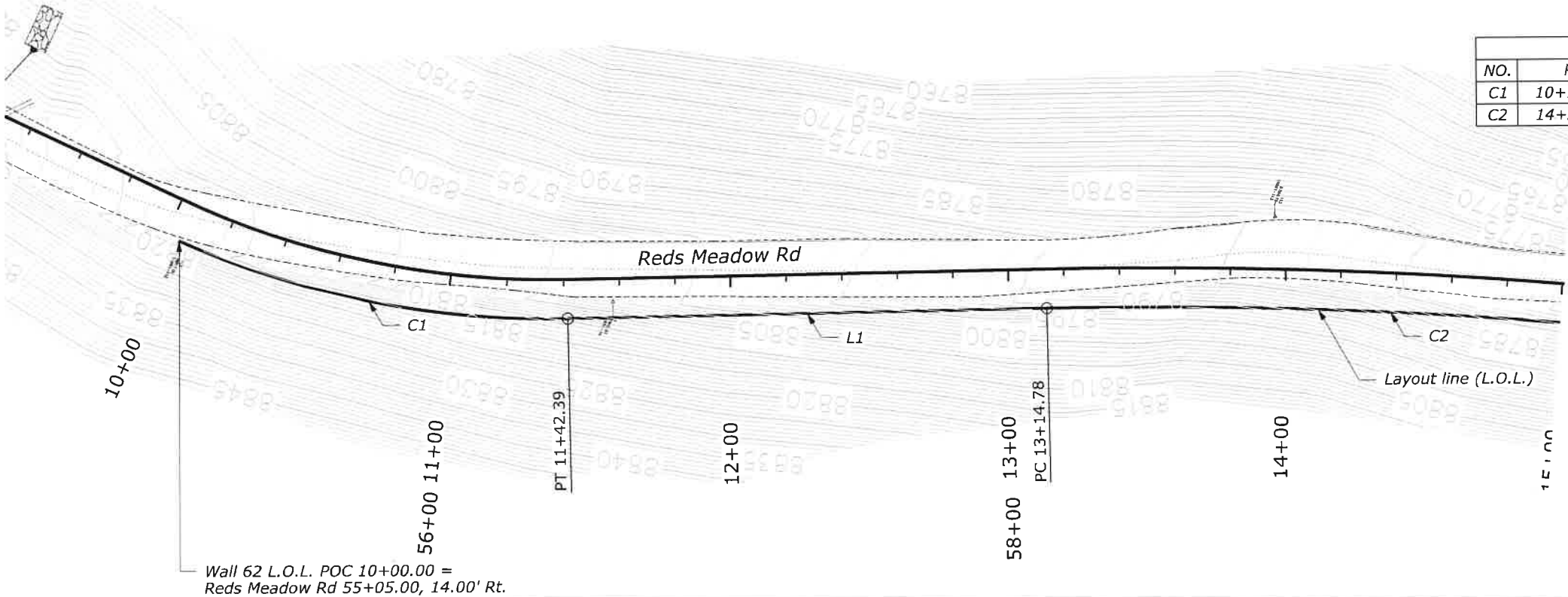
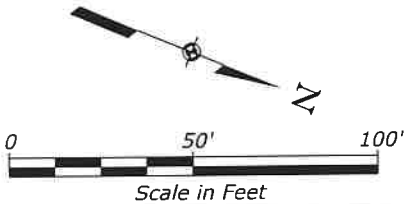
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G8

WALL 62 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+72.37	323.00	25°15'27"	142.39	72.37
C2	14+38.83	1786.00	07°56'49"	247.71	104.06

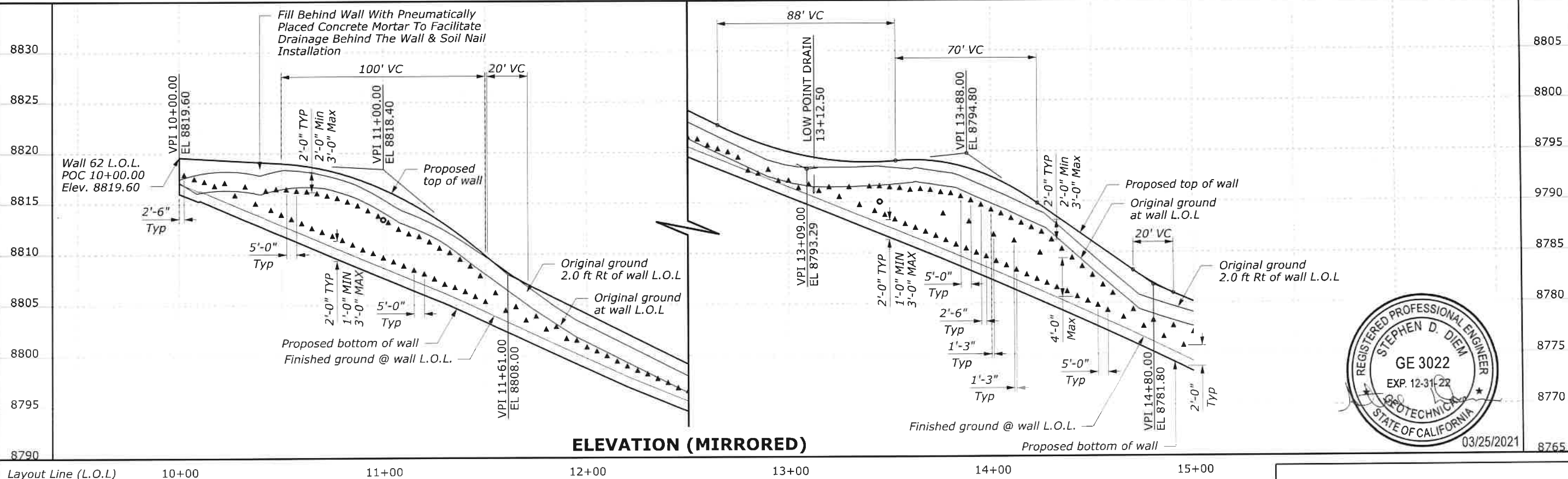
WALL 62 LINE TABLE		
NO.	BEARING	LENGTH
L1	N23°31'13"W	172.39

NOTES:

- ① See Special 259-A For Soil Nail Wall Typical Section.
- ② See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



Wall 62 L.O.L. POC 10+00.00 =
Reds Meadow Rd 55+05.00, 14.00' Rt.



03/25/2021

NOTE:

1. Proof test a minimum of 5% of all soil nails.
Locations to be determined by the COR.
See specification for proof testing requirements.

LEGEND

- 10 Foot Long Nail
- 15 Foot Long Nail
- 17 Foot Long Nail
- 20 Foot Long Nail
- 25 Foot Long Nail
- Verification Test Nail

SOIL NAIL WALL 62 LAYOUT
10+00 TO 15+00

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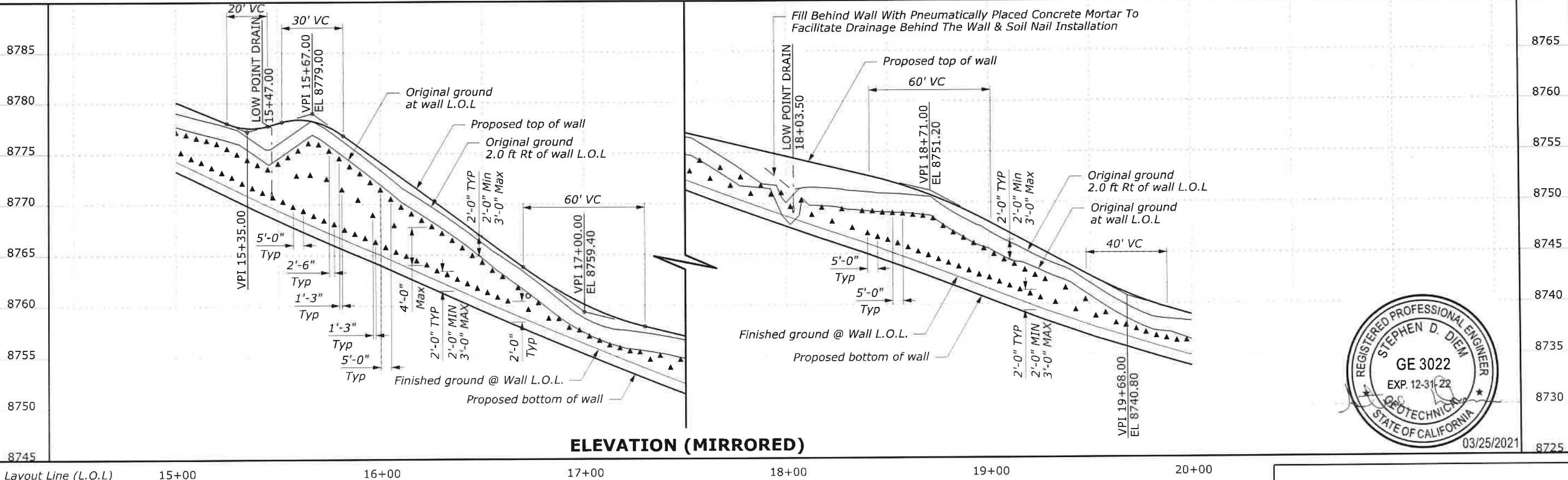
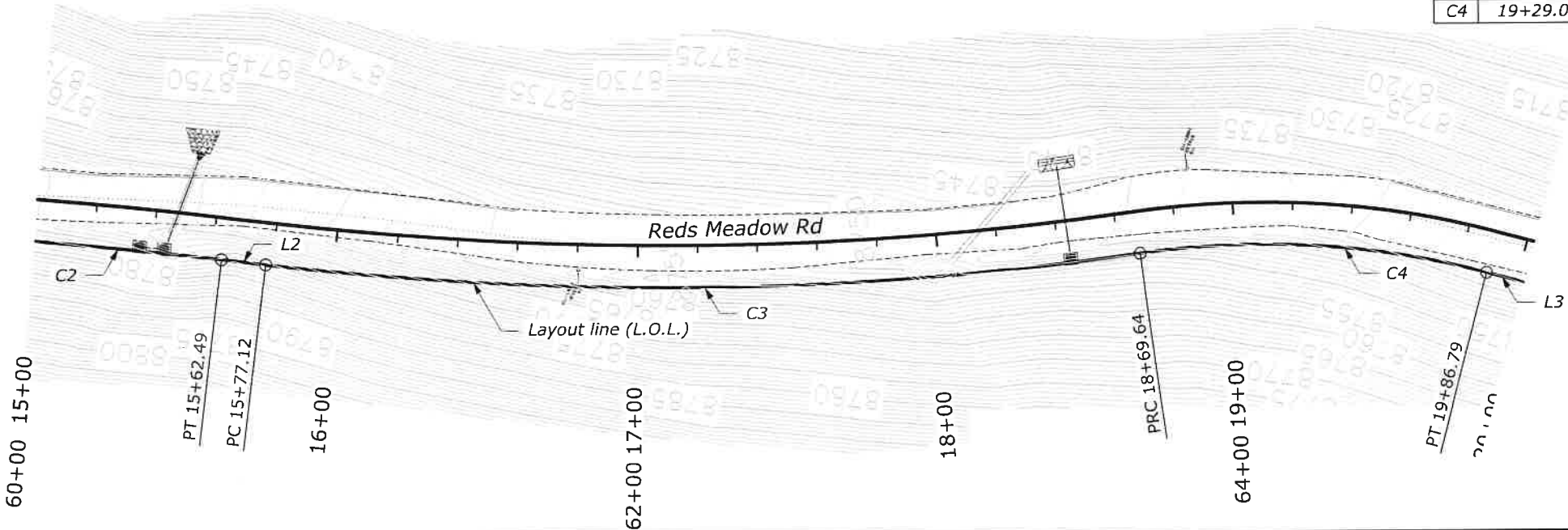
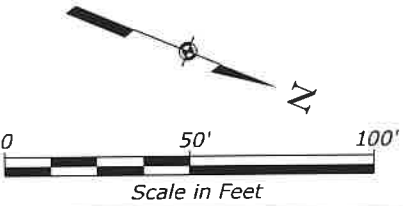
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STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G9

WALL 62 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C2	14+38.83	1786.00	07°56'49"	247.71	124.06
C3	17+24.20	1134.00	14°46'48"	292.53	147.08
C4	19+29.05	295.00	22°43'59"	117.05	59.30

WALL 62 LINE TABLE		
NO.	BEARING	LENGTH
L2	N15°34'24"W	14.62
L3	N07°37'14"W	47.18

- NOTES:
- See Special 259-A For Soil Nail Wall Typical Section.
 - See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



NOTE:

- Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

LEGEND

- 10 Foot Long Nail
- 15 Foot Long Nail
- 17 Foot Long Nail
- 20 Foot Long Nail
- 25 Foot Long Nail
- Verification Test Nail

SOIL NAIL WALL 62 LAYOUT
15+00 TO 20+00

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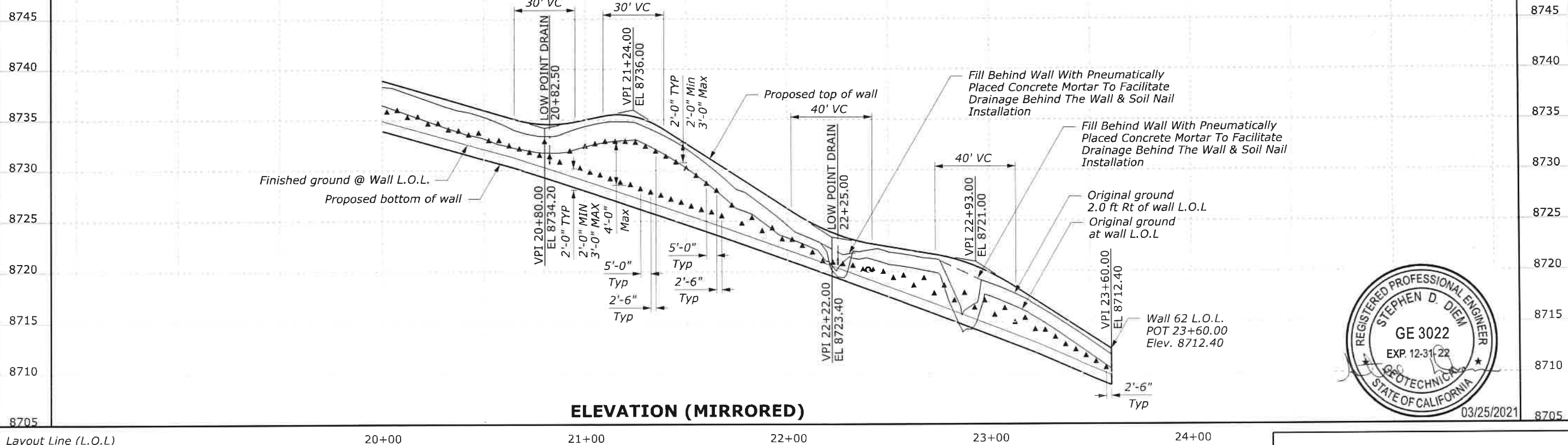
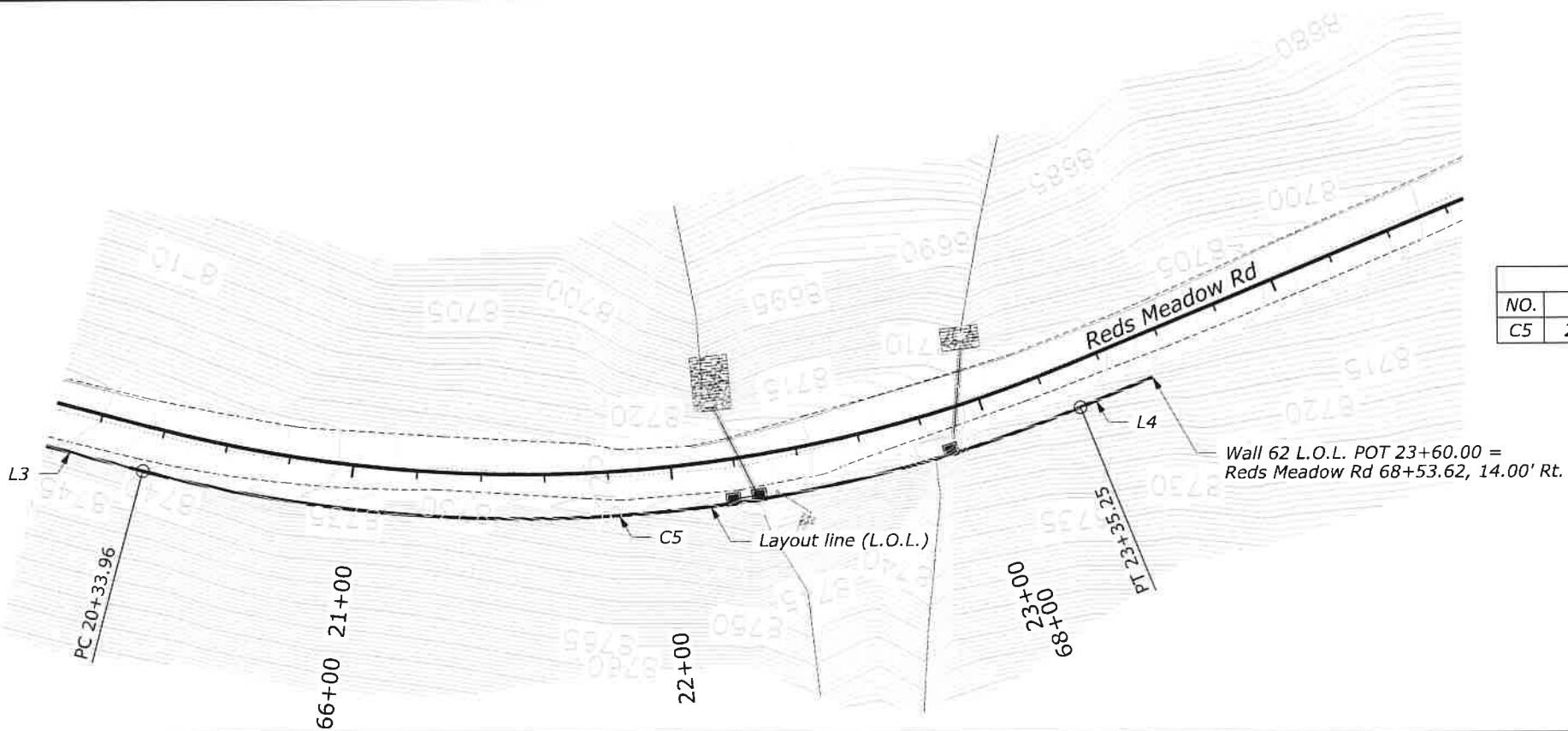
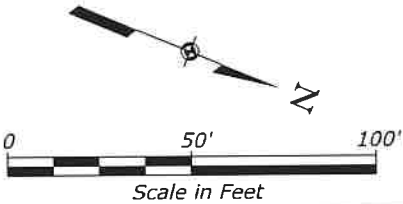
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G10

WALL 62 LINE TABLE		
NO.	BEARING	LENGTH
L3	N07°37'14"W	47.18
L4	N44°30'51"W	33.37

WALL 62 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C5	21+90.13	464.00	37°12'13"	301.29	156.17

NOTES:

- ① See Special 259-A For Soil Nail Wall Typical Section.
- ② See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



NOTE:

1. Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

LEGEND

- 10 Foot Long Nail
- 15 Foot Long Nail
- 17 Foot Long Nail
- 20 Foot Long Nail
- 25 Foot Long Nail
- Verification Test Nail

SOIL NAIL WALL 62 LAYOUT
20+00 TO 23+60

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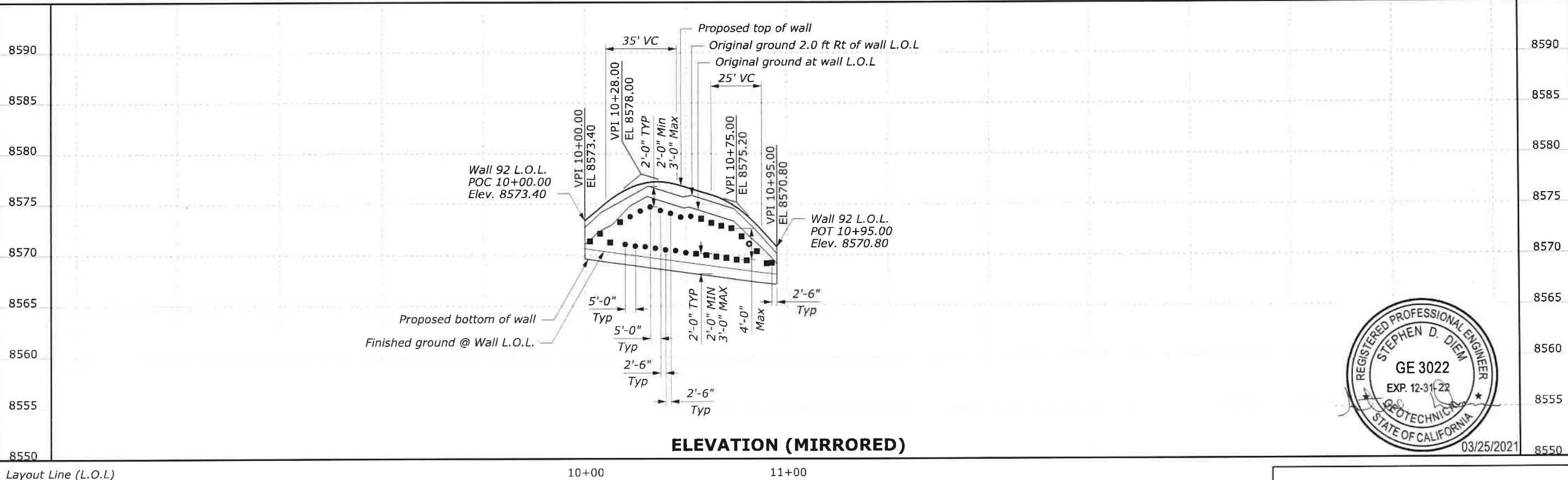
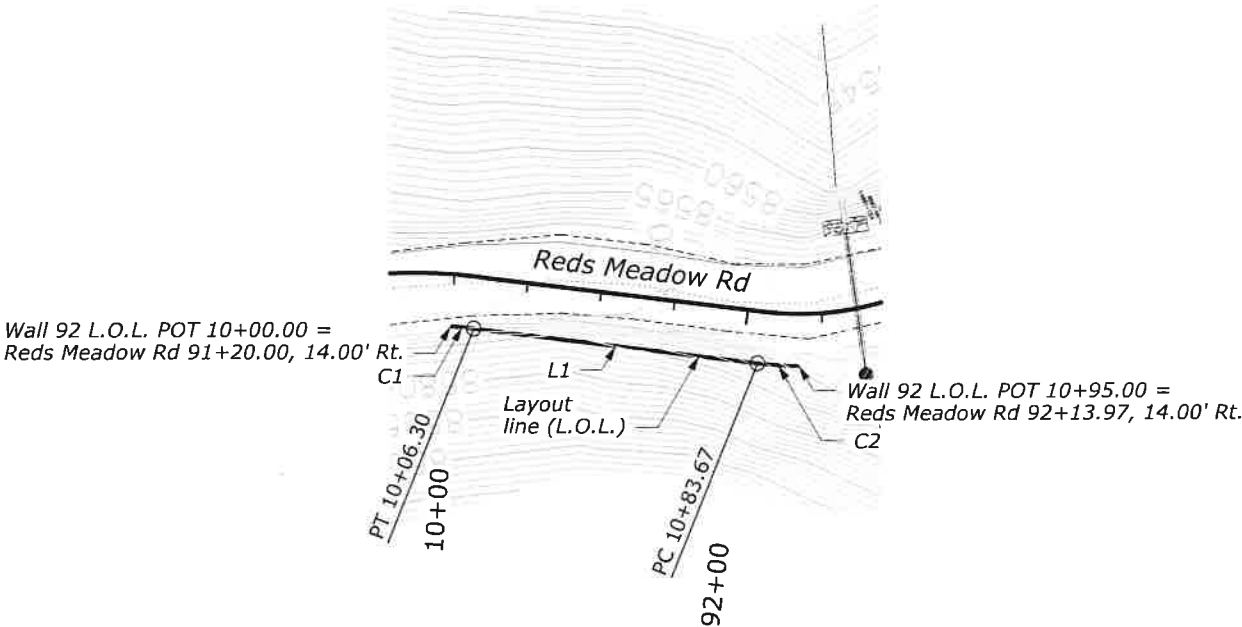
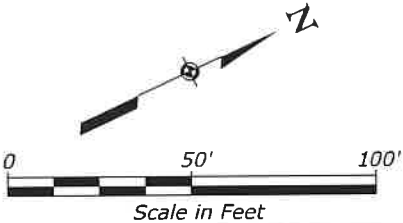
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03511(1)	G12

WALL 92 LINE TABLE		
NO.	BEARING	LENGTH
L1	N31°42'27"E	77.36

WALL 92 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+03.15	138.00	02°36'58"	6.30	3.15
C2	10+89.34	95.00	06°50'10"	11.33	5.67

NOTES:

- ① See Special 259-A For Soil Nail Wall Typical Section.
- ② See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



03/25/2021

NOTE:

1. Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

LEGEND

- 10 Foot Long Nail
- 15 Foot Long Nail
- 17 Foot Long Nail
- 20 Foot Long Nail
- 25 Foot Long Nail
- Verification Test Nail

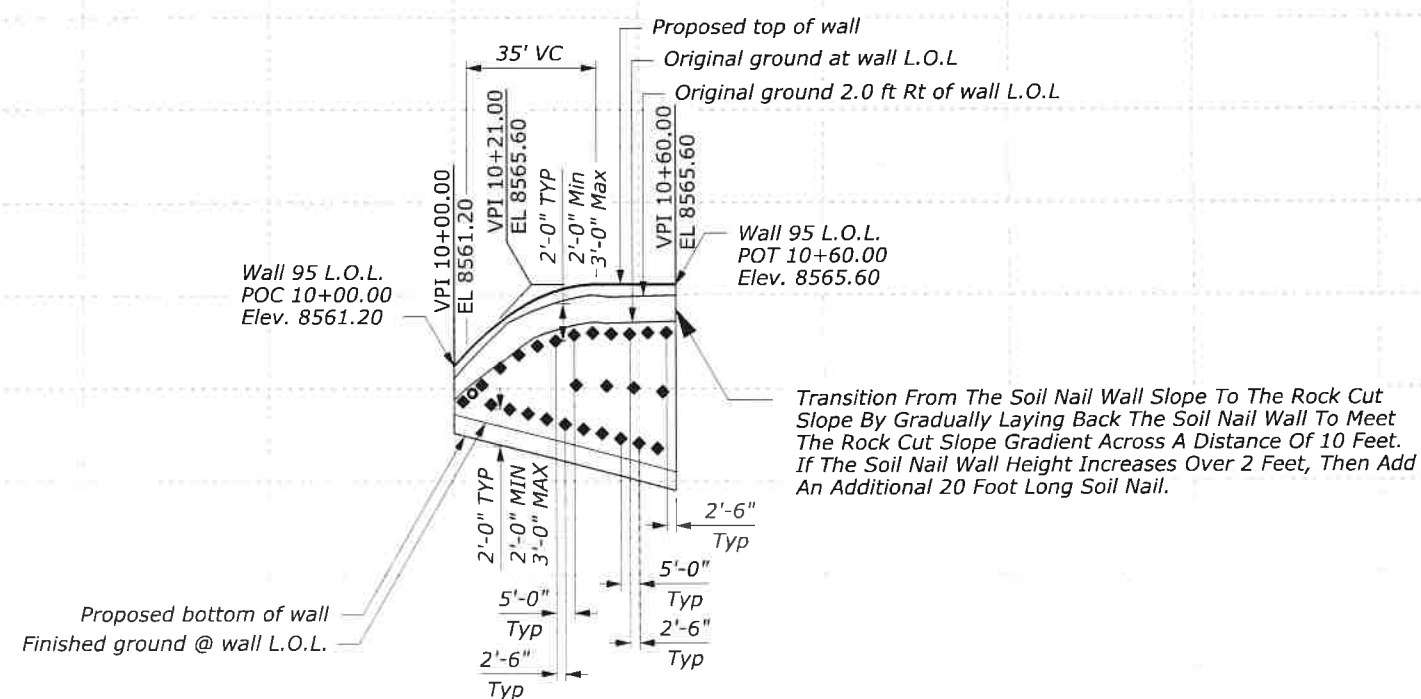
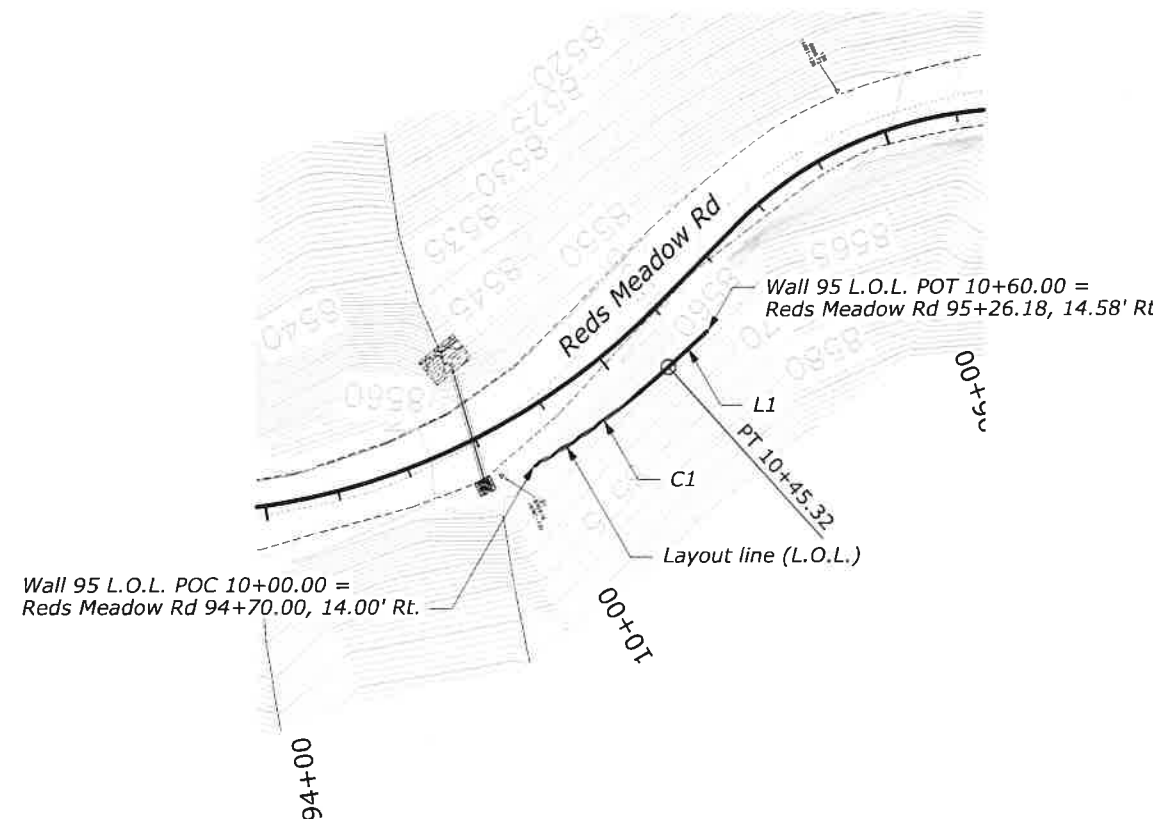
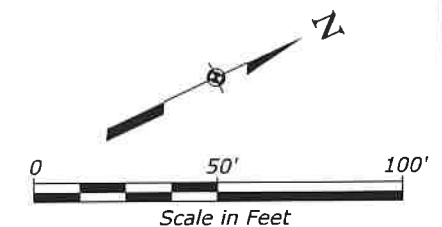
SOIL NAIL WALL 92 LAYOUT
10+00 TO 10+95

WALL 95 LINE TABLE		
NO.	BEARING	LENGTH
L1	N17°25'52"W	14.68

WALL 95 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+22.76	203.00	12°47'30"	45.32	22.76

NOTES:

- ①. See Special 259-A For Soil Nail Wall Typical Section.
- ②. See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.

**ELEVATION (MIRRORED)**

Layout Line (L.O.L)

NOTE:

1. Proof test a minimum of 5% of all soil nails.
Locations to be determined by the COR.
See specification for proof testing requirements.

LEGEND

- 10 Foot Long Nail
- ◆ 20 Foot Long Nail
- 15 Foot Long Nail
- 25 Foot Long Nail
- ▲ 17 Foot Long Nail
- Verification Test Nail



**SOIL NAIL WALL 95 LAYOUT
10+00 TO 10+60**

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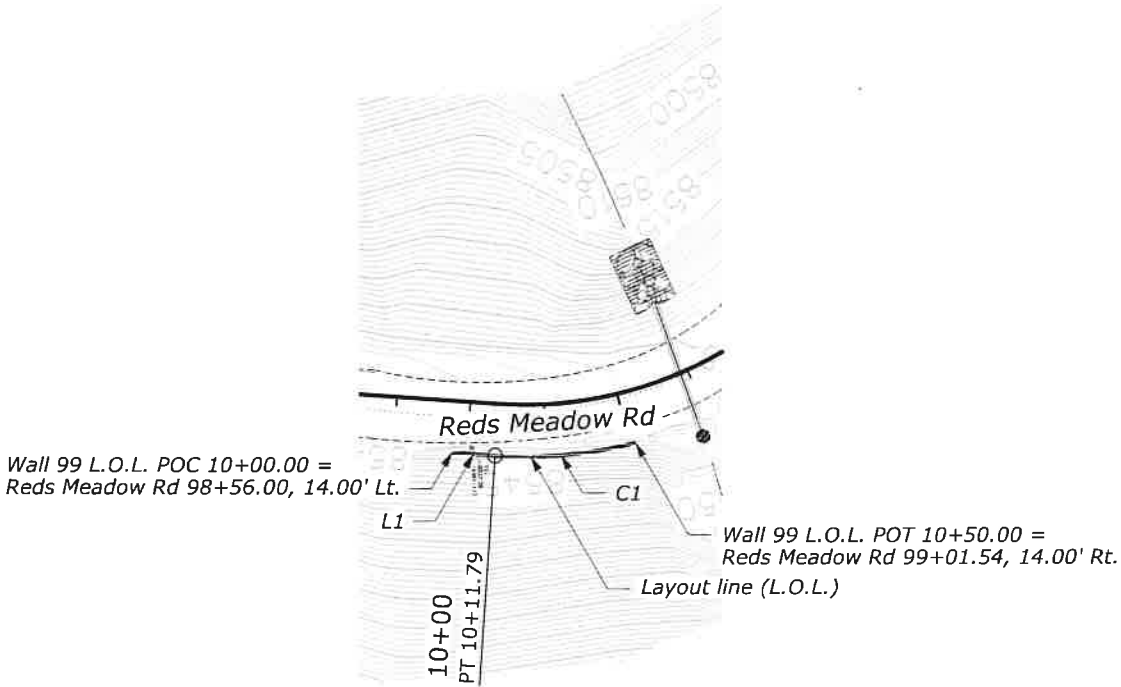
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STATE	PROJECT	SHEET NUMBER
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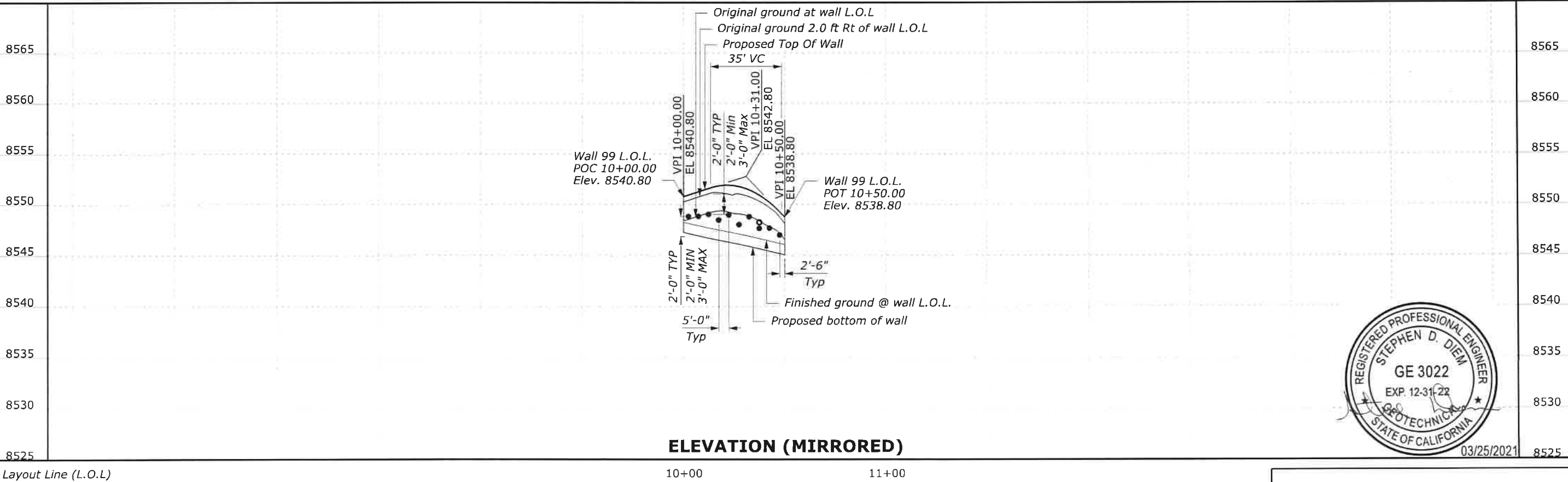
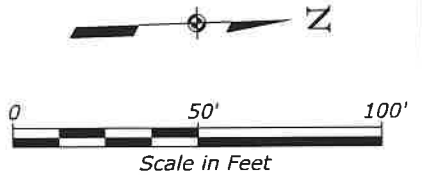
WALL 99 LINE TABLE		
NO.	BEARING	LENGTH
L1	N05°44'16"E	11.79

WALL 99 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+11.79	120.00	18°14'46"	38.21	19.27



NOTES:

- See Special 259-A For Soil Nail Wall Typical Section.
- See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



Layout Line (L.O.L.)

10+00 11+00

NOTE:

- Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

LEGEND

- 10 Foot Long Nail
- 15 Foot Long Nail
- 17 Foot Long Nail
- 20 Foot Long Nail
- 25 Foot Long Nail
- Verification Test Nail

SOIL NAIL WALL 99 LAYOUT
10+00 TO 10+50

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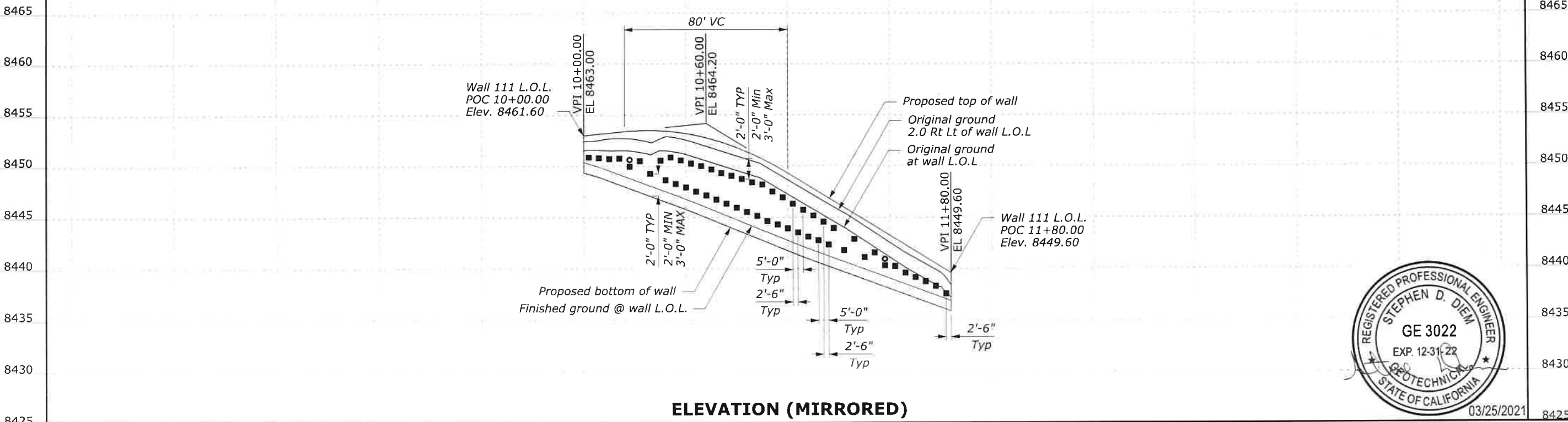
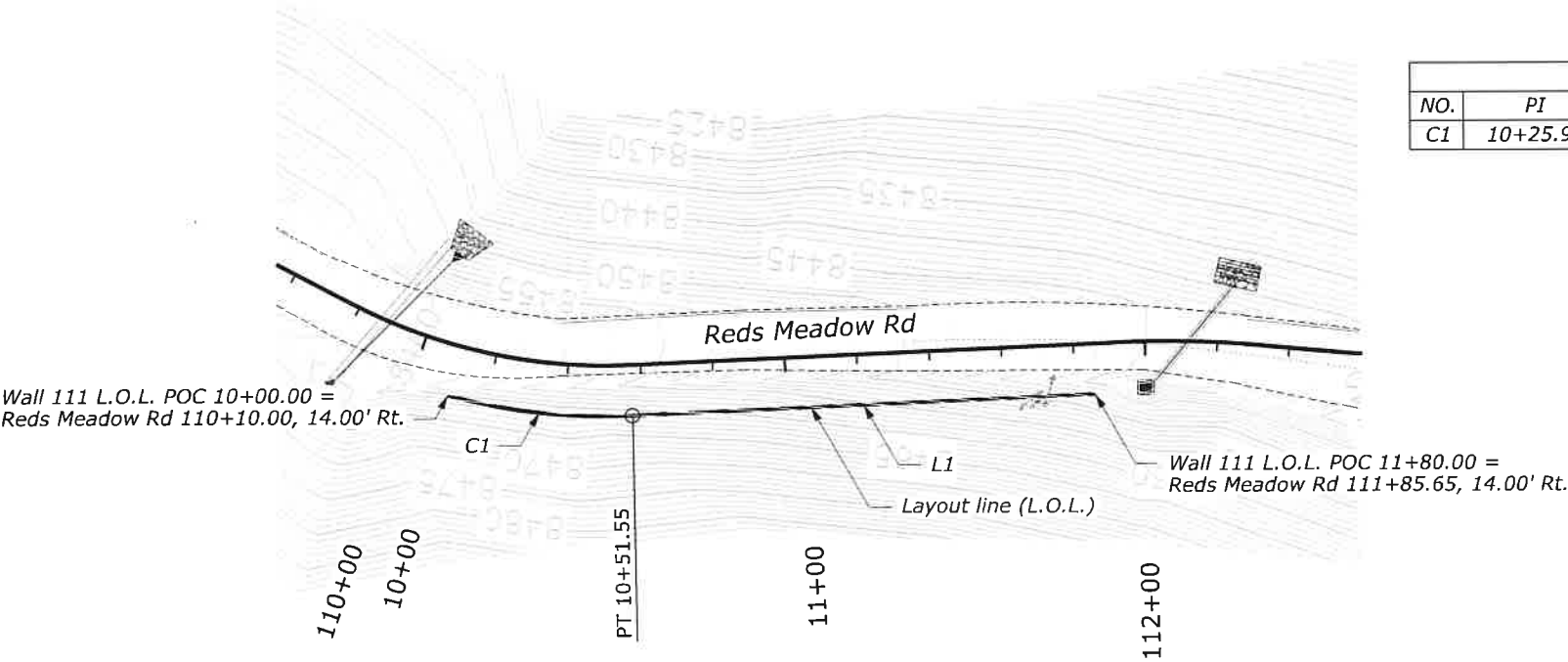
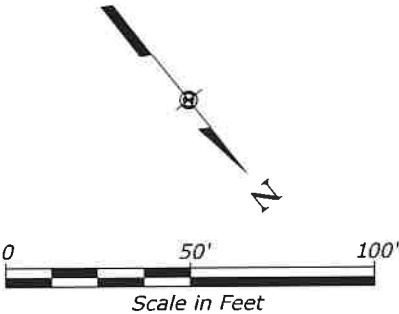
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G17

WALL 111 LINE TABLE		
NO.	BEARING	LENGTH
L1	N52°12'10"W	128.45

WALL 111 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+25.98	166.00	17°47'35"	51.55	25.98

NOTES:

- ① See Special 259-A For Soil Nail Wall Typical Section.
- ② See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



03/25/2021

Layout Line (L.O.L.)

10+00

11+00

12+00

ELEVATION (MIRRORED)

LEGEND

- 10 Foot Long Nail
- 15 Foot Long Nail
- 17 Foot Long Nail
- 20 Foot Long Nail
- 25 Foot Long Nail
- Verification Test Nail

SOIL NAIL WALL 111 LAYOUT
10+00 TO 11+80

NOTE:

1. Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

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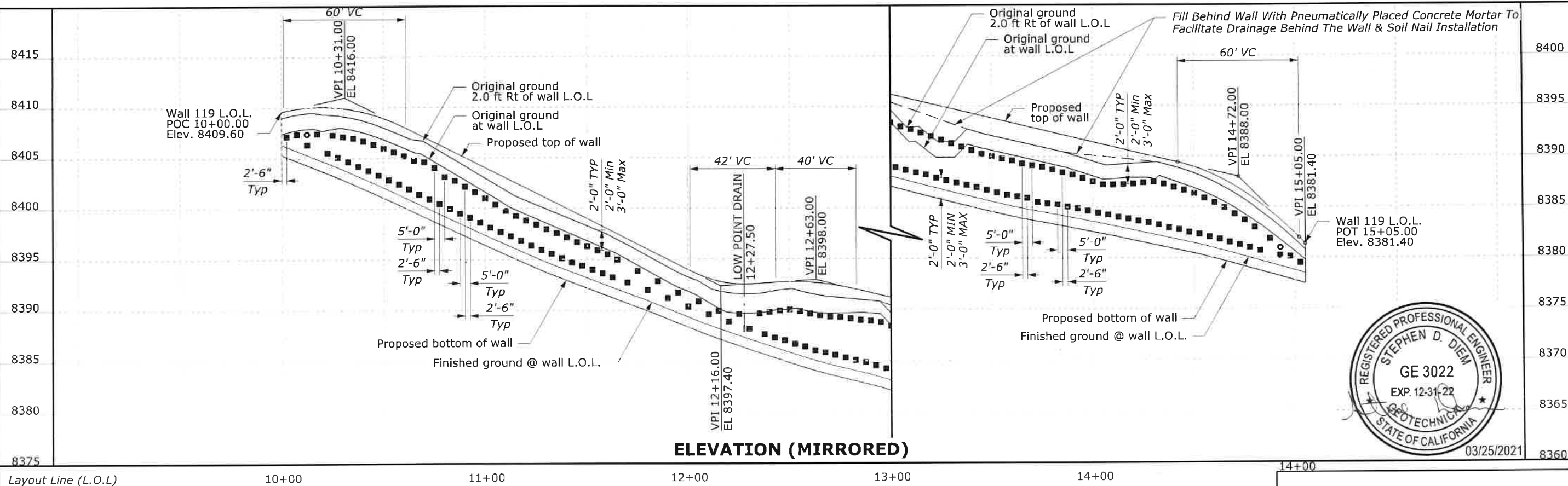
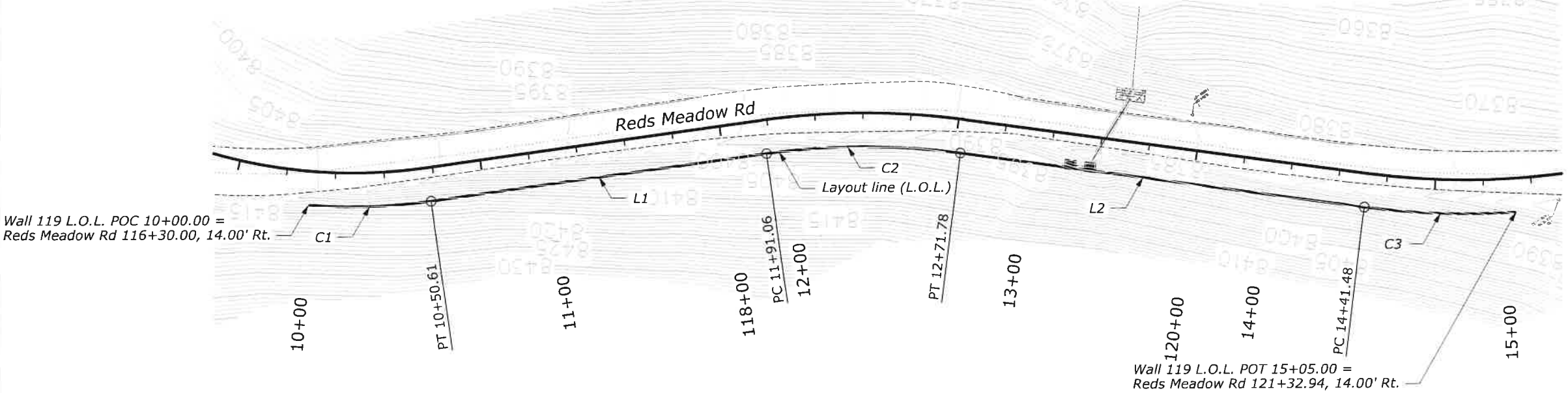
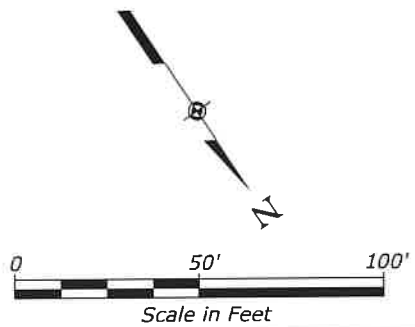
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03511(1)	G18

WALL 119 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+25.41	226.00	12°49'47"	50.61	25.41
C2	12+31.67	295.00	15°40'37"	80.72	40.61
C2	14+73.34	323.00	11°16'01"	63.52	31.86

WALL 119 LINE TABLE		
NO.	BEARING	LENGTH
L1	N64°13'14"W	140.46
L2	N48°32'38"W	169.70

NOTES:

- ① See Special 259-A For Soil Nail Wall Typical Section.
- ② See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



03/25/2021

NOTE:

1. Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

LEGEND

- 10 Foot Long Nail
- 15 Foot Long Nail
- 17 Foot Long Nail
- 20 Foot Long Nail
- 25 Foot Long Nail
- Verification Test Nail

SOIL NAIL WALL 119 LAYOUT
10+00 TO 15+05

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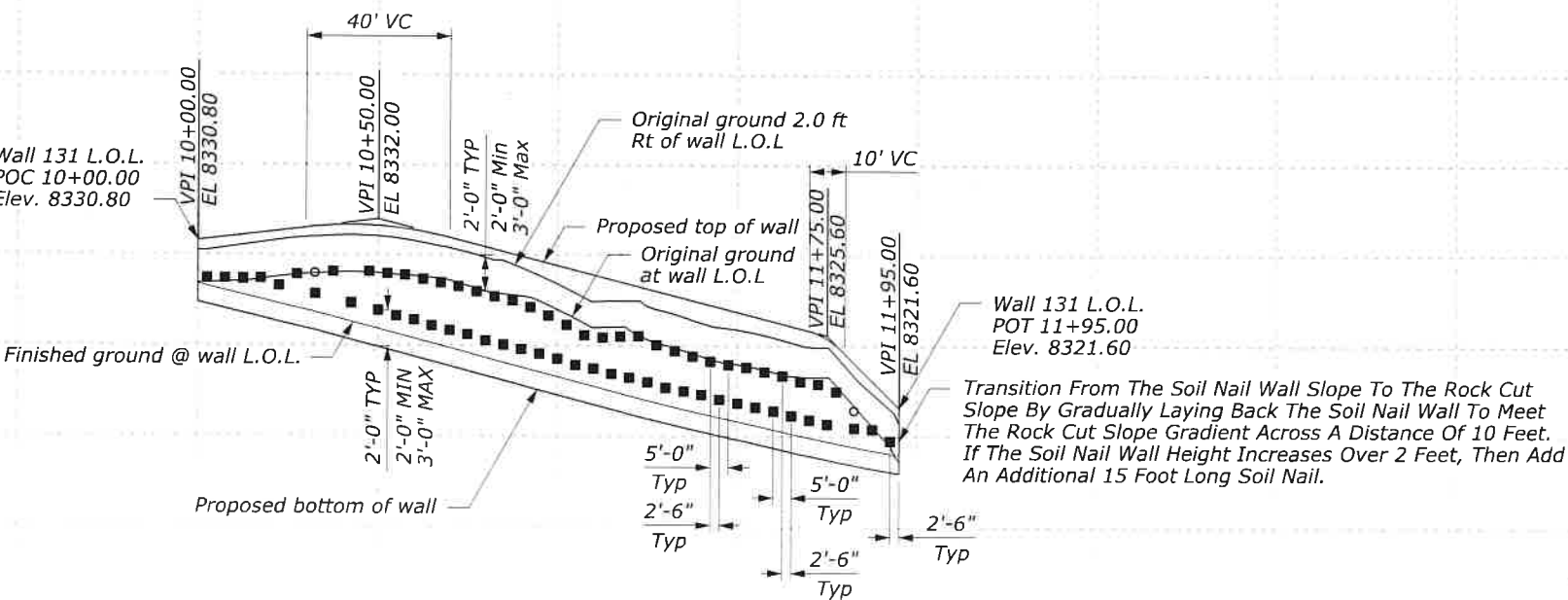
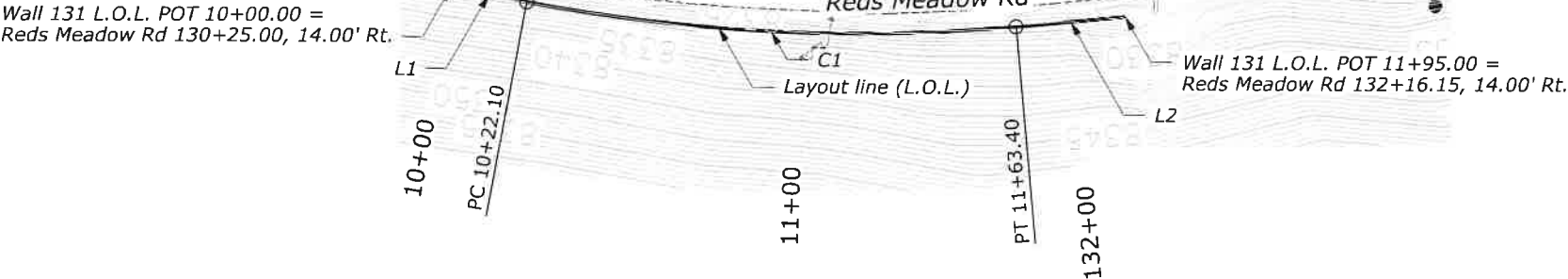
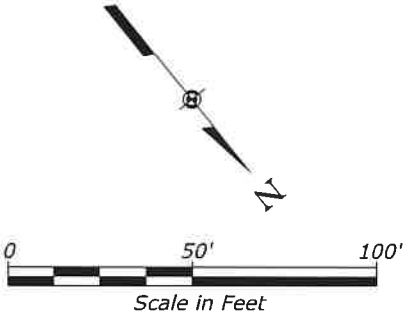
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G19

WALL 131 LINE TABLE		
NO.	BEARING	LENGTH
L1	N40°36'24"W	22.10
L2	N40°36'24"W	22.10

WALL 131 CURVE TABLE					
NO.	PI	RADIUS	DELTA	LENGTH	TANGENT
C1	10+93.20	514.00	15°45'04"	141.30	39.46

NOTES:

- ① See Special 259-A For Soil Nail Wall Typical Section.
- ② See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



03/25/2021

ELEVATION (MIRRORED)

Layout Line (L.O.L.)

10+00 11+00 12+00

NOTE:

1. Proof test a minimum of 5% of all soil nails. Locations to be determined by the COR. See specification for proof testing requirements.

LEGEND

- 10 Foot Long Nail
- 15 Foot Long Nail
- 17 Foot Long Nail
- 20 Foot Long Nail
- 25 Foot Long Nail
- Verification Test Nail

SOIL NAIL WALL 131 LAYOUT
10+00 TO 11+95

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G20

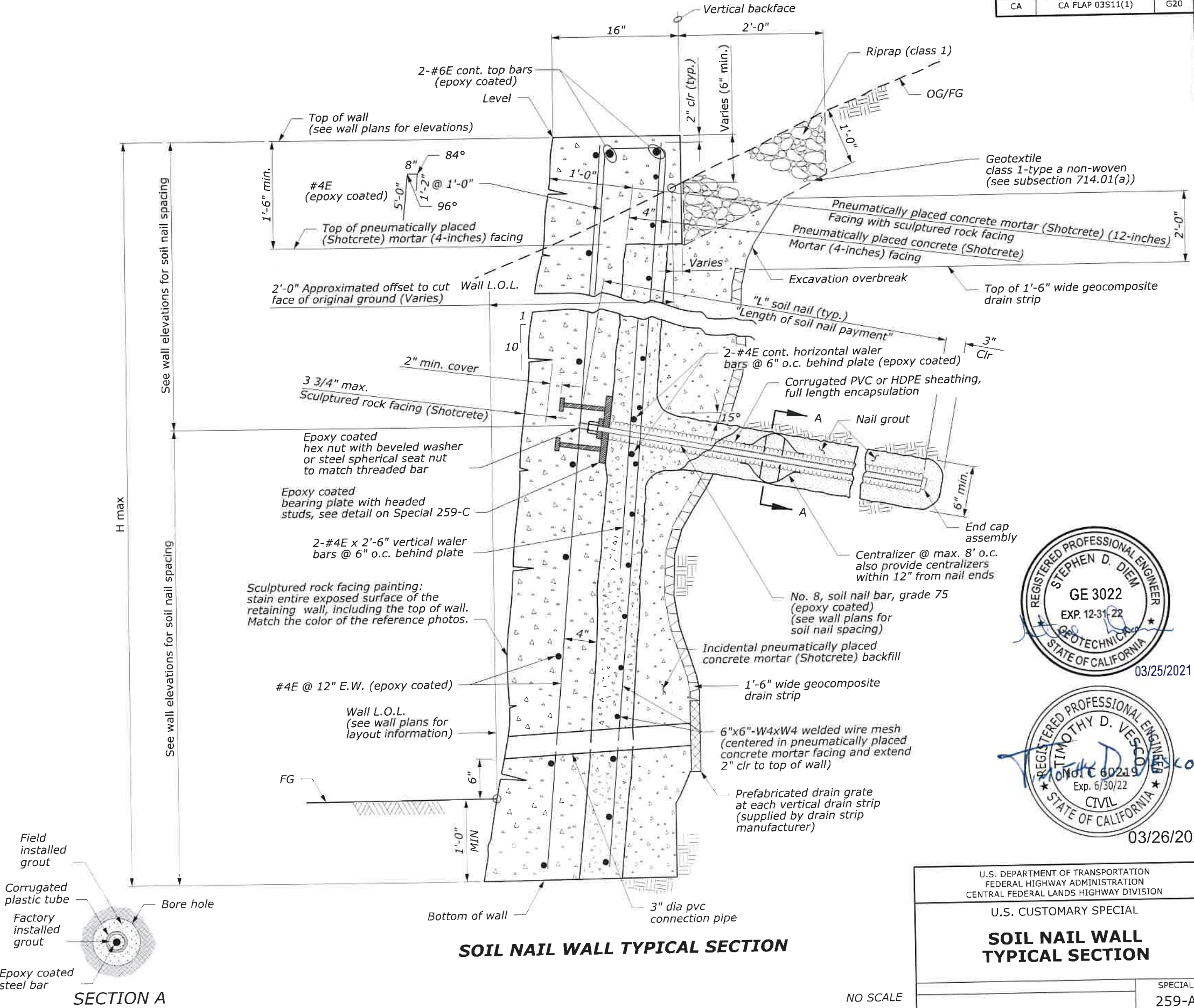
NOTES:

- Conform to the specifications for architectural surface treatment of rock sculpted shotcrete surfaces.
- Prepare the architectural surface treatment to resemble in appearance the texture, pattern, surface relief, strata line detail, and multi-color staining of the existing geology shown in the photos below.
- The photos below will serve as criteria for determining final approval of the test panel and acceptance of final wall sculpting and staining.



NOTE:

- See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A Rock Cut Slope.



03/25/2021



03/26/2021

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

**SOIL NAIL WALL
TYPICAL SECTION**

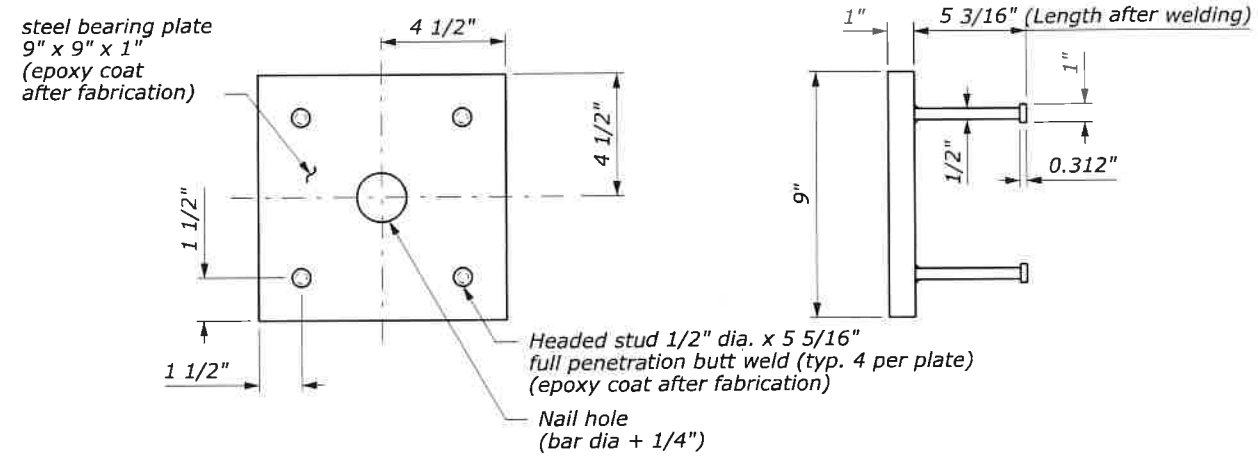
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259-A

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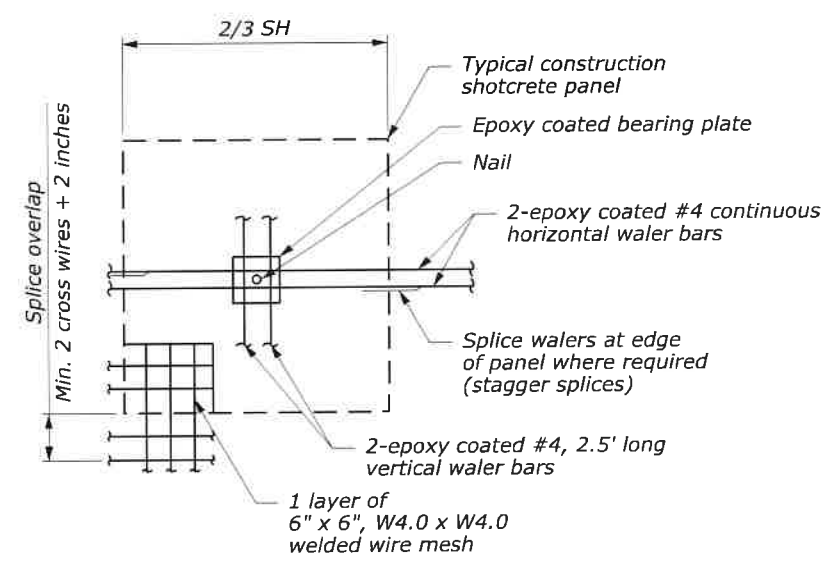
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3/24/2021

STATE	PROJECT	SHEET NUMBER
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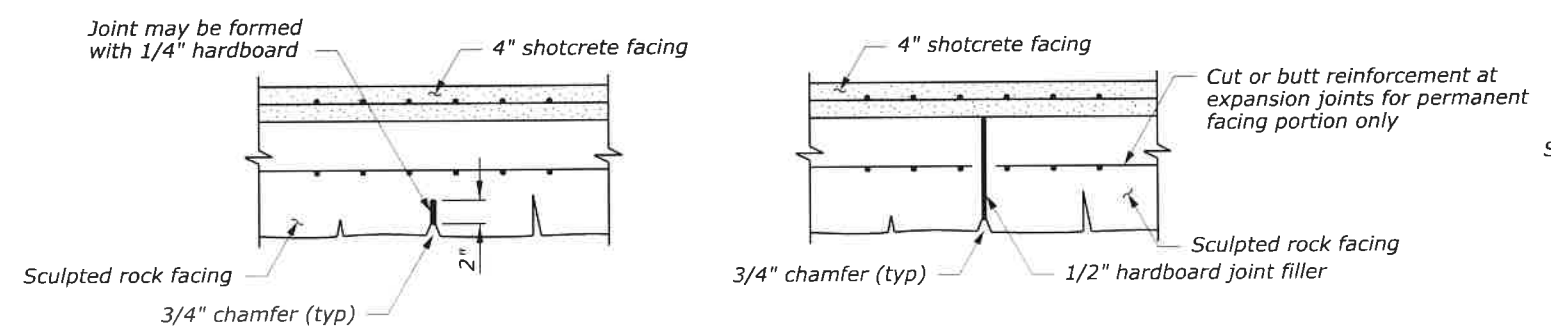


SOIL NAIL BEARING PLATE DETAIL



TYPICAL 4-INCH SHOTCRETE REINFORCEMENT

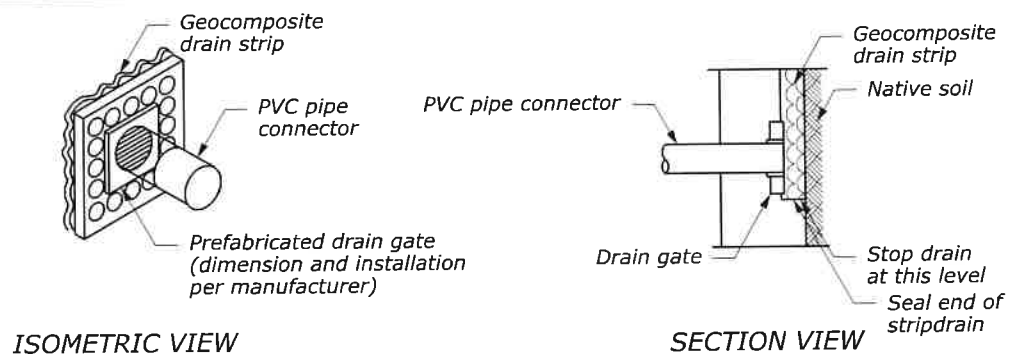
- 4-INCH SHOTCRETE NOTES:
1. Install reinforcement for temporary shotcrete throughout the entire shotcrete facing.
 2. SH = horizontal soil nail spacing.



TYPICAL CONTRACTION JOINT

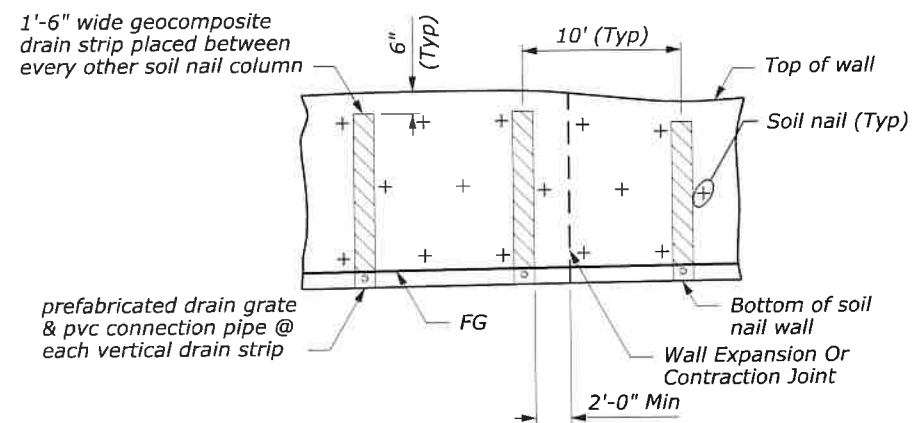
TYPICAL EXPANSION JOINT

- CONTRACTION/EXPANSION JOINT NOTES:
1. Place contraction joints for the full height of the wall at 30-foot intervals. Place expansion joints at every third joint, at wall bends, no less than 2 feet and no more than 10 feet from ends of wall.
 2. Incorporate expansion and contraction joints with the sculpted shotcrete finish in a manner that minimizes the visual contrast between the joints and the finished shotcrete.

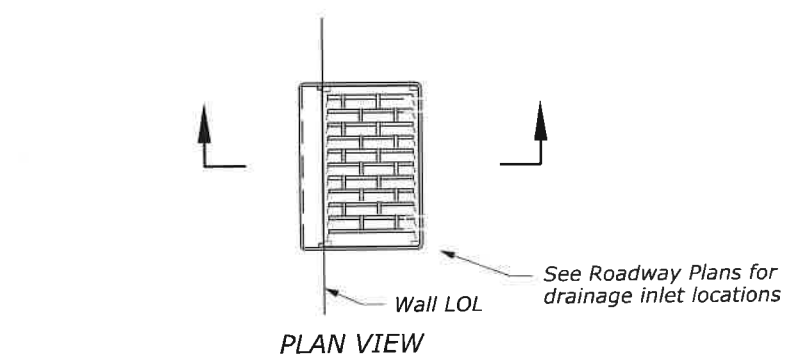


WEEP HOLE DRAIN DETAILS

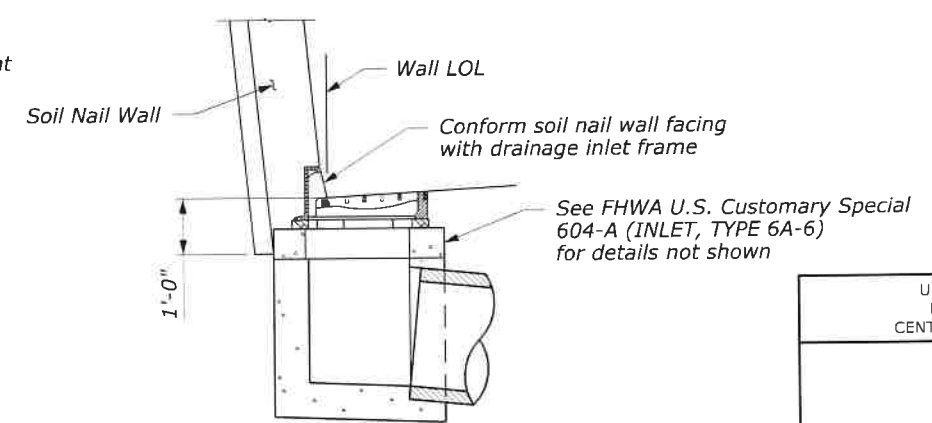
Note: Install drain gate without disrupting the geocomposite drain strip.



ELEVATION OF GEOCOMPPOSITE DRAIN STRIPS



PLAN VIEW



SECTION VIEW

DRAINAGE INLET @ SOIL NAIL WALL

NO SCALE

GEOCOMPOSITE DRAIN STRIP NOTES:

1. Splice of the drain strips are made with a minimum of 1'-3" overlap or per manufacturer's specifications.
2. Seal top and bottom of drain strips to prevent soil from entering drain.

NOTES:

1. See Special 259-A For Soil Nail Wall Typical Section.
2. See Special 259-B For Typical End Of Wall Detail Unless Soil Nail Wall Terminates Into A rock Cut Slope.



03/26/2021

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY SPECIAL	
SOIL NAIL WALL DETAILS NO. 2	
	SPECIAL 259-C

User: USLASO-APP363\$

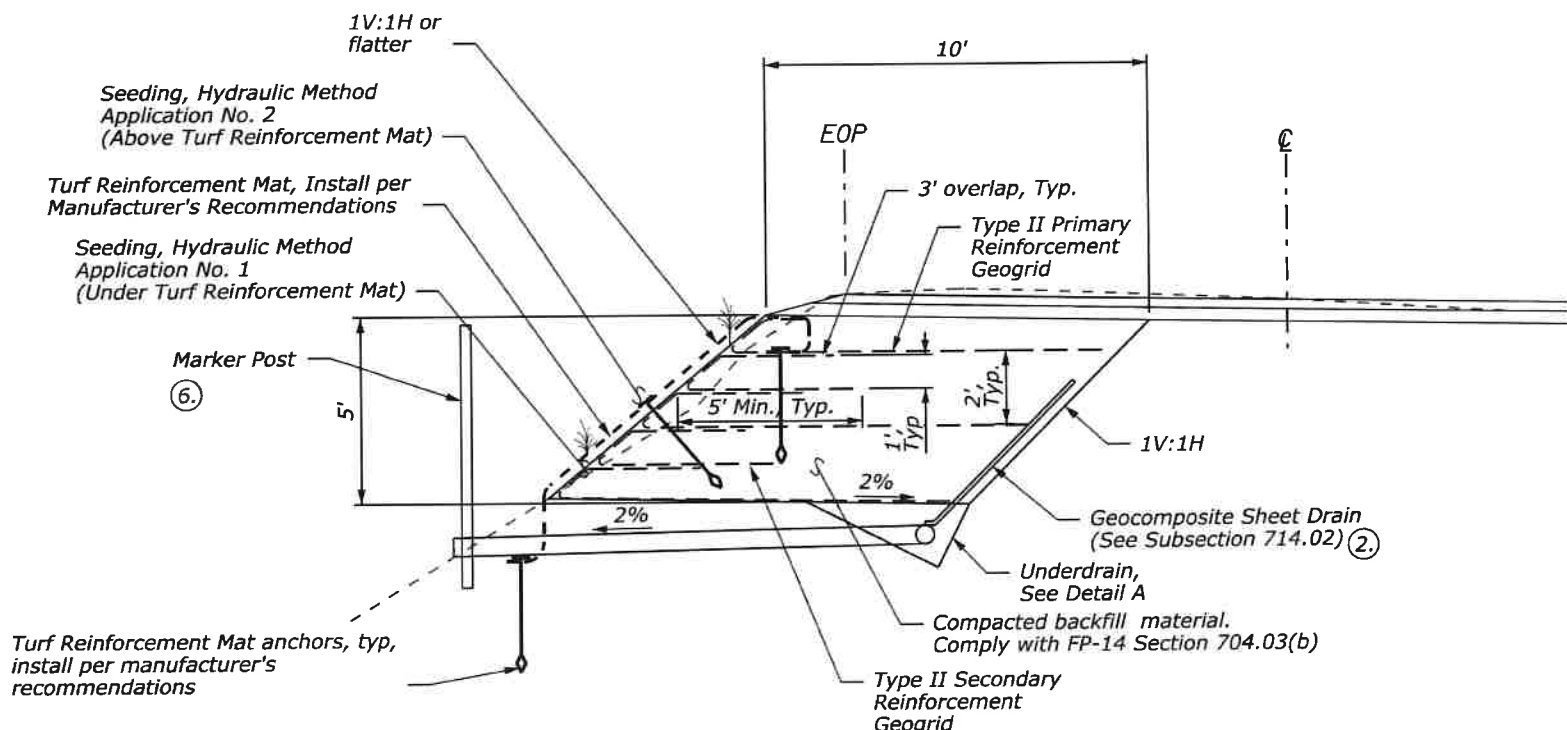
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8/16/2022

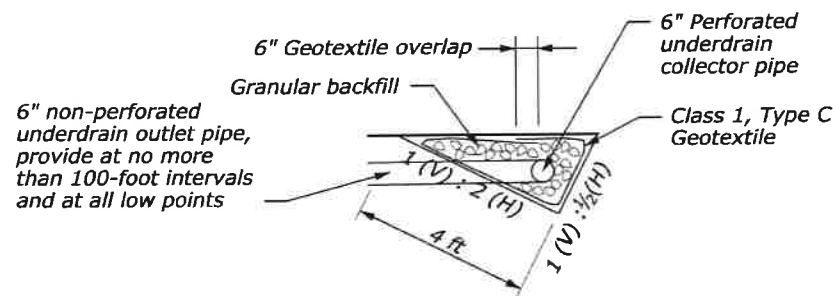
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G23

NOTE:

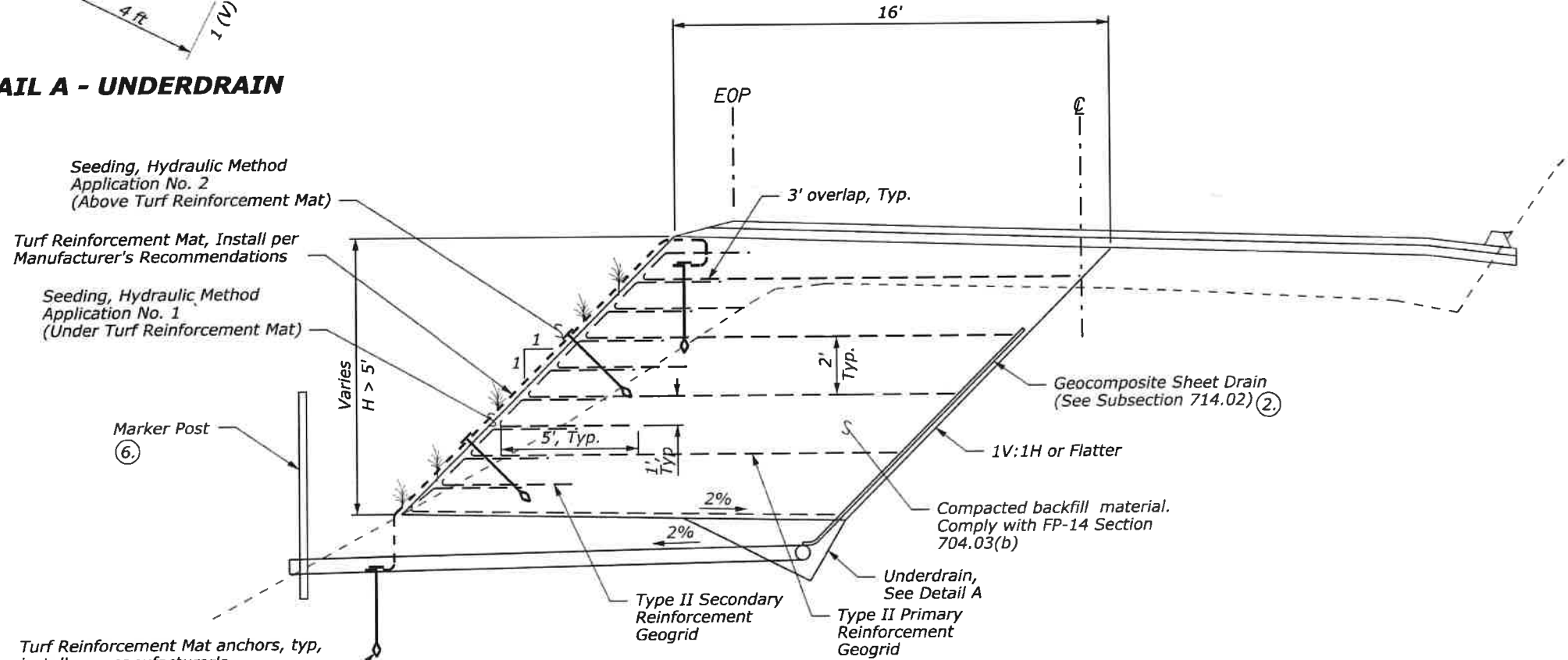
1. If bedrock is encountered within the back cut, the excavation can follow the rock surface and reinforcement length reduced. In no case shall the reinforcement length be less than 0.6H.
2. Only install on back cut where water or evidence of water is observed during construction.
3. Place geocomposite sheet drains in 3' (min.) wide strips with a spacing to achieve 30% \pm 5% coverage area on excavation backslope to 2/3H.
4. Connect collector pipes to outlet pipes using a t-connector and outlet at low points and at 100' (max.) spacing. Furnish collector pipe, and fittings meeting the requirements of subsection 708.04.
5. Cover the end of the outlet pipe with screen according to subsection 605.03. Hold the screen securely in place with standard coupling bands or by other approved means with securing screws.
6. Mark the outlet of the outlet pipe with a 4' long post or other suitable marker. Place post within 12" of the end of the pipe.



REINFORCED SOIL SLOPE (RSS)
DETAIL NO. 1 (H=5')



DETAIL A - UNDERDRAIN



REINFORCED SOIL SLOPE (RSS)
DETAIL NO. 2



NO SCALE

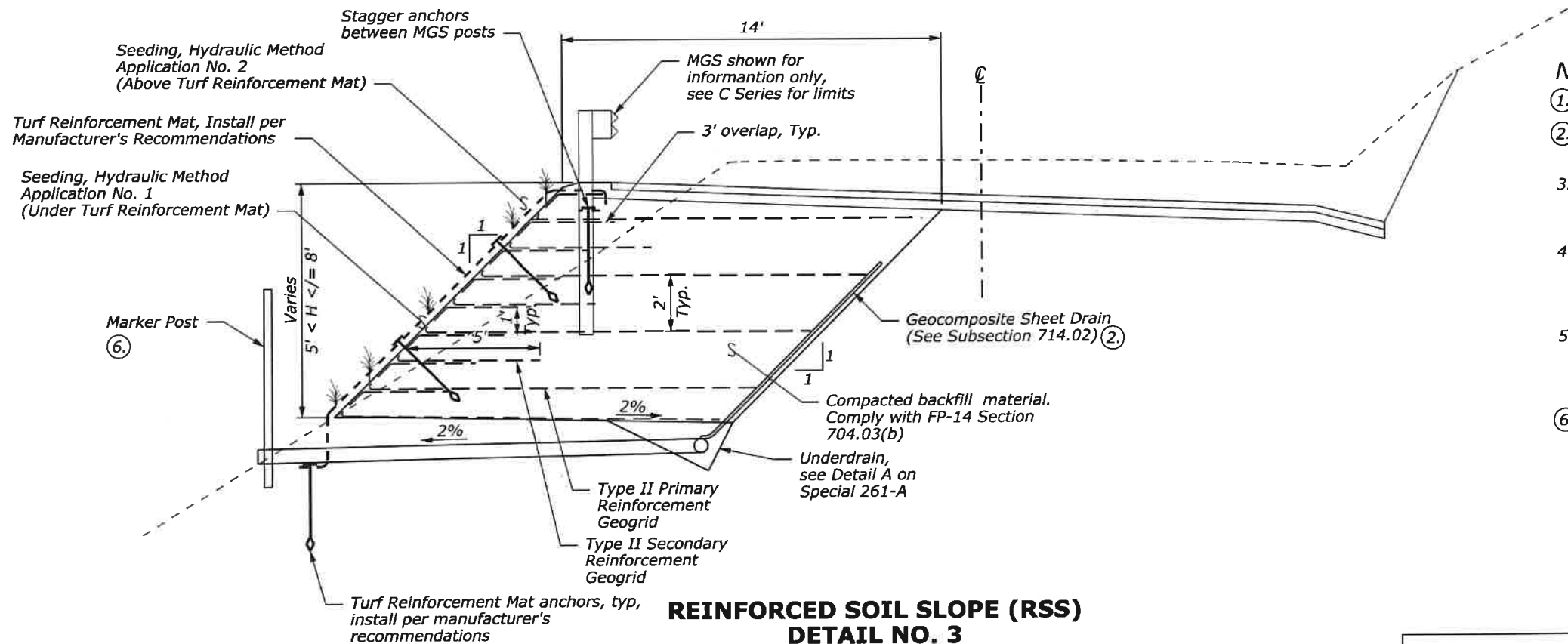
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY SPECIAL	
REINFORCED SOIL SLOPE	
Sheet 1 of 2	
	SPECIAL 261-A

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8/16/2022

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G24



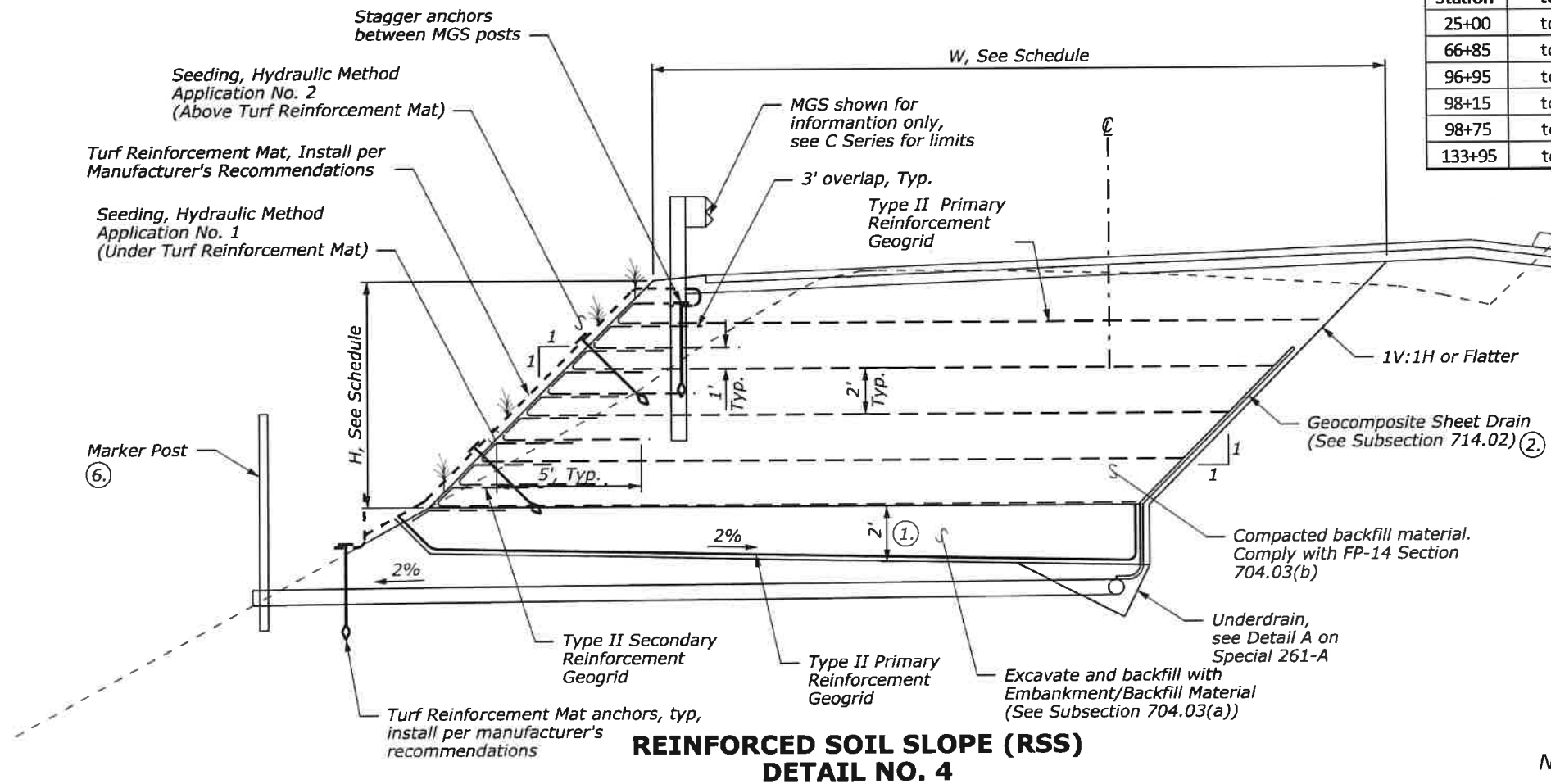
NOTE:

1. Excavate 2' or to top of bedrock, whichever is less.
2. Only install on back cut where water or evidence of water is observed during construction.
3. Place geocomposite sheet drains in 3' (min.) wide strips with a spacing to achieve 30% \pm 5% coverage area on excavation backslope to 2/3H.
4. Connect collector pipes to outlet pipes using a t-connector and outlet at low points and at 100' (max.) spacing. Furnish collector pipe, and fittings meeting the requirements of subsection 708.04.
5. Cover the end of the outlet pipe with screen according to subsection 605.03. Hold the screen securely in place with standard coupling bands or by other approved means with securing screws.
6. Mark the outlet of the outlet pipe with a 4' long post or other suitable marker. Place post within 12" of the end of the pipe.

**REINFORCED SOIL SLOPE (RSS)
DETAIL NO. 3**

DETAIL NO. 4 SCHEDULE

Station	to	Station	Length	H (Max Height, Ft)	W (Grid Width, Ft)
25+00	to	25+60	60	12	16
66+85	to	67+25	40	16	24
96+95	to	97+25	30	12	22
98+15	to	98+40	25	12	18
98+75	to	99+35	60	18	22
133+95	to	134+70	75	12	20



**REINFORCED SOIL SLOPE (RSS)
DETAIL NO. 4**



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

REINFORCED SOIL SLOPE

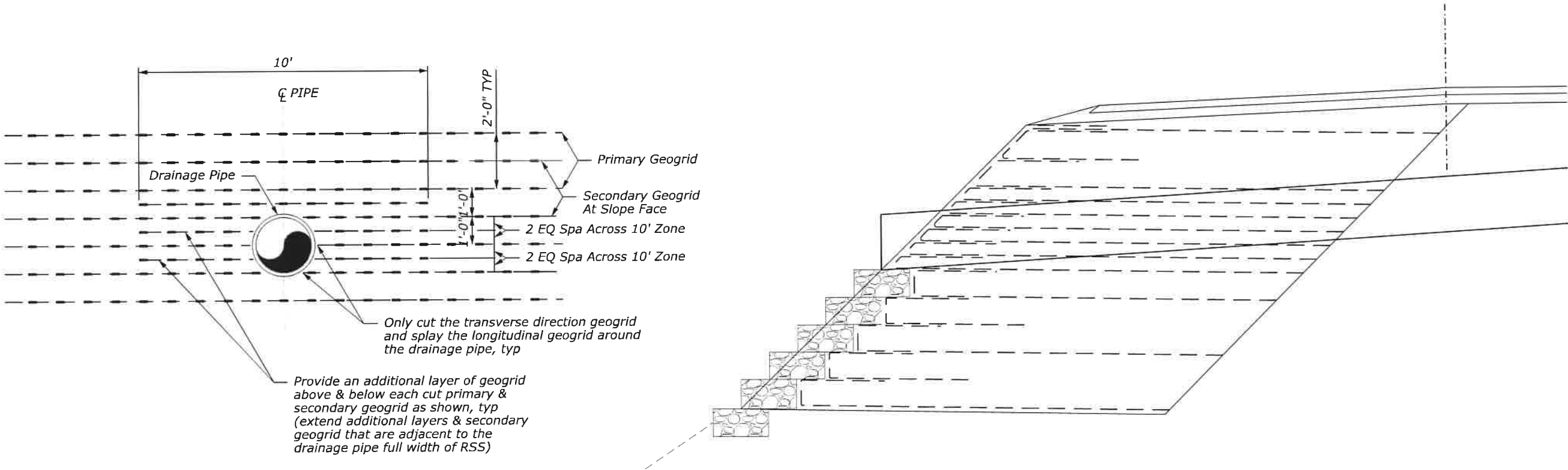
Sheet 2 of 2

NO SCALE

SPECIAL
261-B

3/23/2021 7:39:59 PM pw:\projectwise.ch2m.com\DEN001\Documents\663395 - FHWA-TO 27 REDS MEADOW PEL\Work in Progress\Reds Meadow Road WIP\Roadway\CADD_Sheets\G-250\G261-04_splst:G261-04

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	G25



DRAINAGE PIPE THROUGH RSS

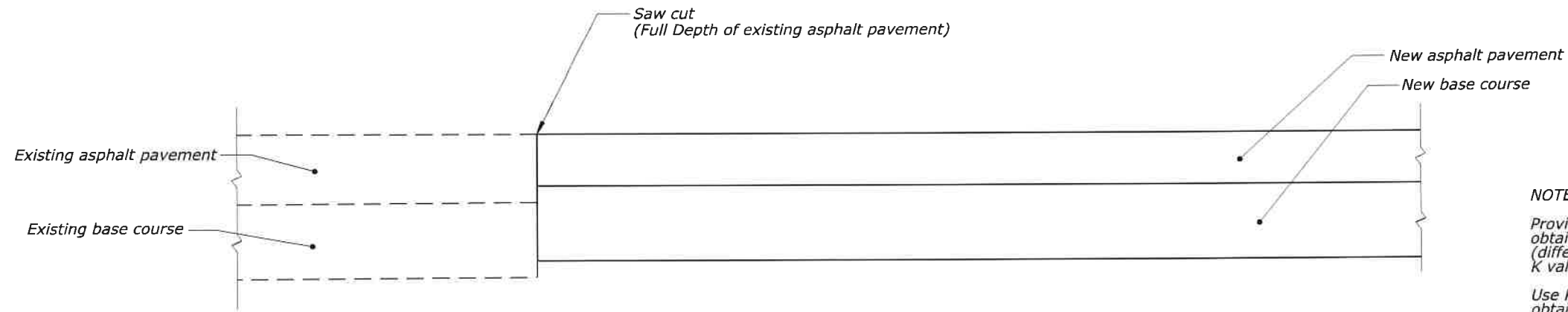


03/25/2021

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY SPECIAL	
DRAINAGE PIPE THROUGH RSS	
	SPECIAL
	261-C

NO SCALE

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	K1

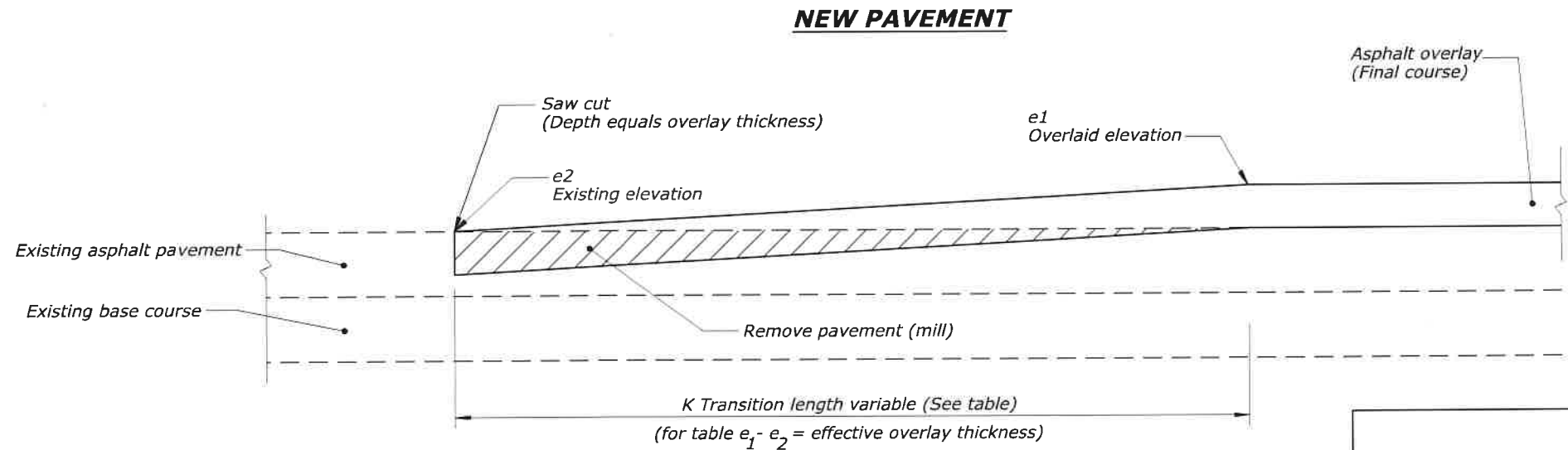


NOTE :

Provide a transition length in feet that is not less than the value obtained by multiplying the effective overlay thickness in inches (difference between the existing and overlaid elevations) by the K value from the Table for the posted speed of the roadway.

Use $K*[e1-e2]=T$, or $K*[d1-d2]=T$ (whichever applies), to obtain the transition length.
(Minimum transition length=30 feet)

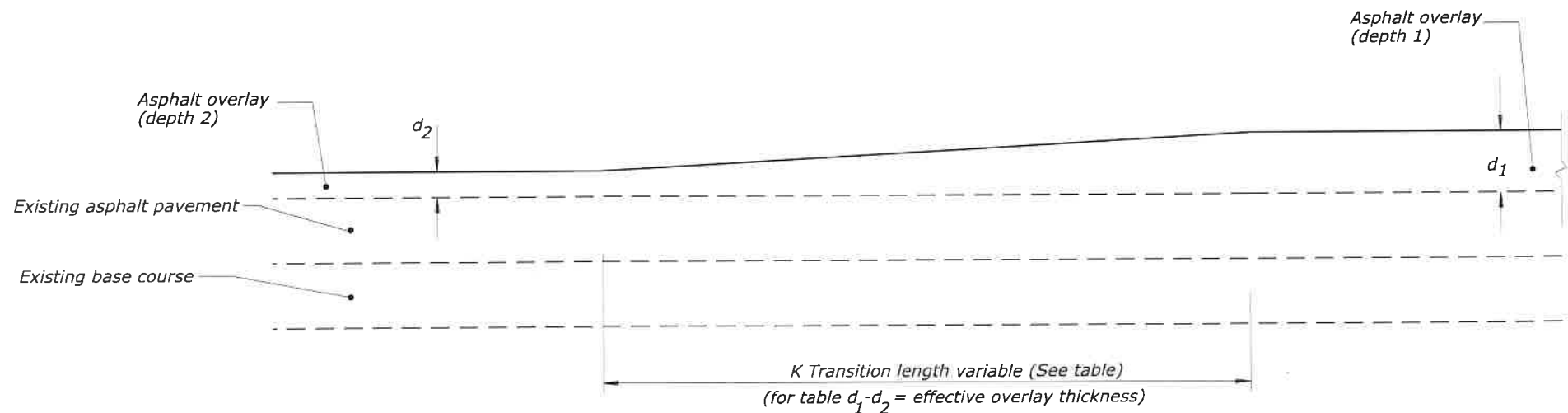
Example :
If the posted speed is 55 MPH
Effective overlay thickness = 2 inches
Then the minimum transition length =
2 inches x 42.5 ft./in. = 85 feet.



K VALUE TABLE (ft/in)

POSTED SPEED (MPH) *	30	35	40	45	50	55	60	65	70	75
K	30	32.5	35	37.5	40	42.5	45	47.5	50	52.5

* Use a K Value of 30 for speeds less than 30 MPH.



OVERLAY - DEPTH TRANSITIONS



03/26/2021
FOR SELECTION ONLY

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY DETAIL

PAVEMENT TRANSITIONS

DETAIL APPROVED FOR USE

APPROVED : FEBRUARY 2013

DETAIL

E401-01

NO SCALE

User: DENFWP02\$

3:01:26 PM I:\denpwp01\denp\pawicsworking\845976\484812_1\K401-02_st401-01RW.dgn

3/25/2021

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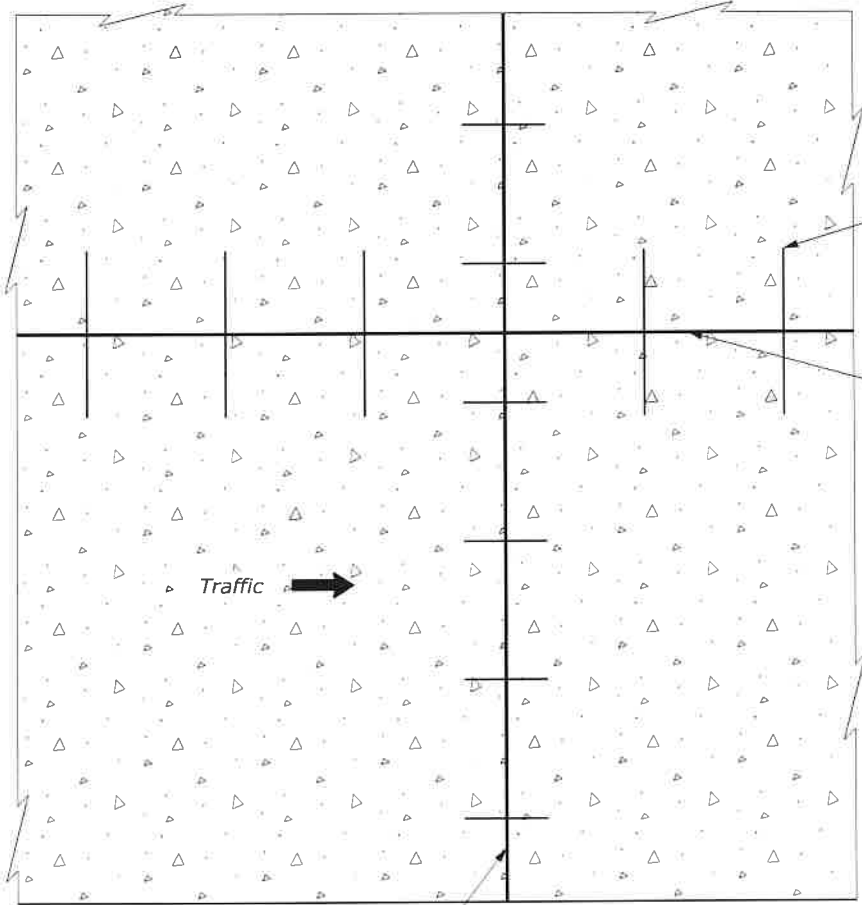
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3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	R1

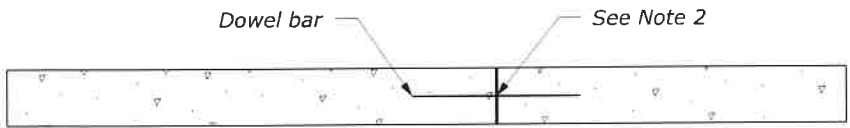
NOTE:

1. Provide the same type of dowel assemblies and tie bars for joints in plain portland cement pavement as shown for joints in reinforced pavement.
2. See Standard 501-2 for joint and joint sealing details.
3. Lap longitudinal and transverse reinforcement not less than 15 inches.



Transverse joint

PLAN



Dowel bar

See Note 2

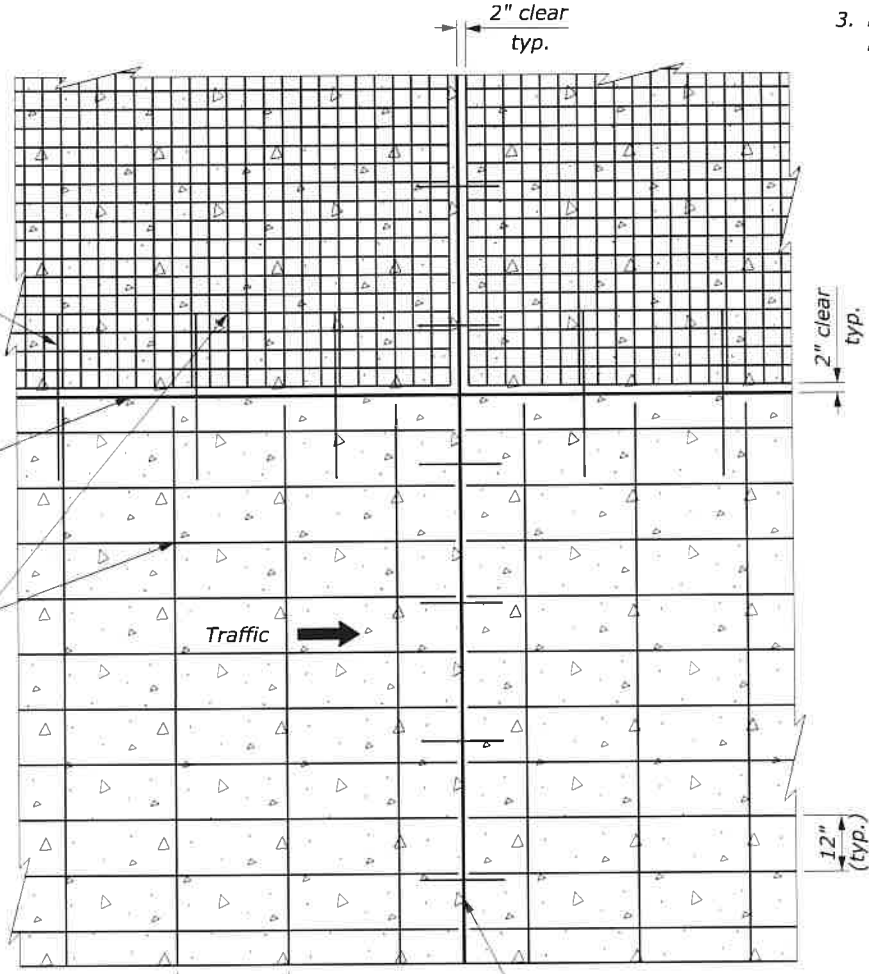
PROFILE

PLAIN MINOR CONCRETE PAVEMENT

Tie bar

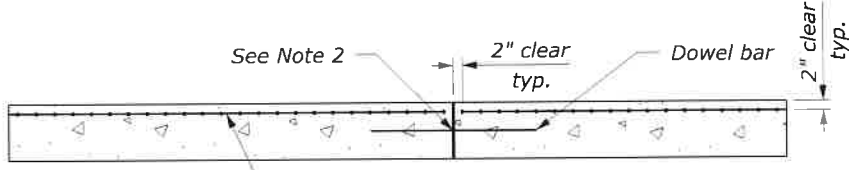
Longitudinal joint

Slab reinforcement 4" x 4" - W6 x W6 welded wire reinforcement or No. 4 bars



24" (typ.)

PLAN



See Note 2

2" clear typ.

Dowel bar

2" clear typ.

Slab reinforcement 4" x 4" - W6 x W6 welded wire reinforcement or No. 4 bars

PROFILE

REINFORCED MINOR CONCRETE PAVEMENT

PAVEMENT THICKNESS (in)	TRANSVERSE JOINT SPACING (ft)
$T < 6$	10
$6 \leq T < 12$	15



03/26/2021

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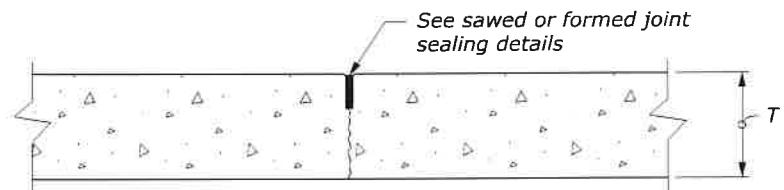
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY OFFICE

U.S. CUSTOMARY STANDARD

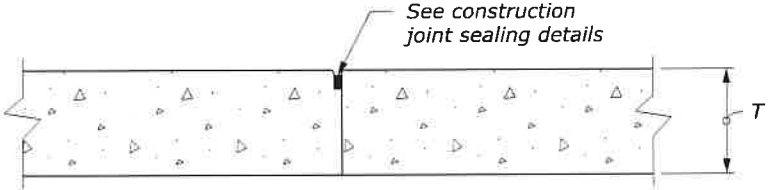
MINOR CONCRETE PAVEMENT

NO SCALE

STANDARD APPROVED FOR USE	STANDARD
REVISED: 9/2016	501-1



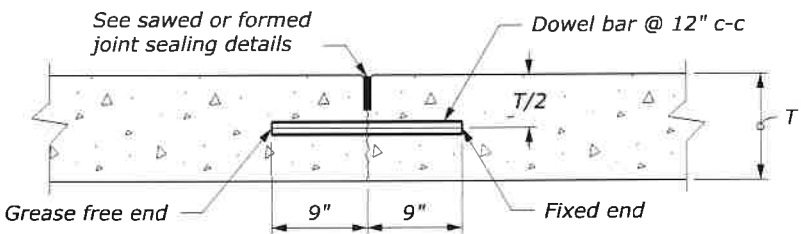
CONTRACTION JOINT
UNDOWELED - TRANSVERSE and
UNTIED - LONGITUDINAL



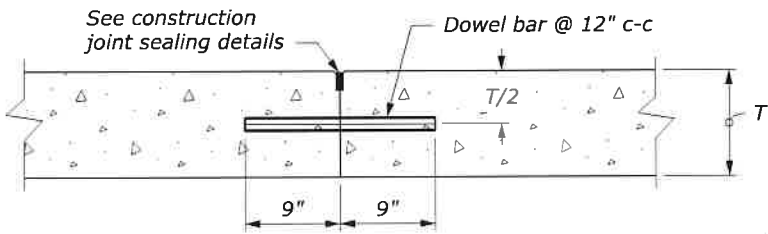
CONSTRUCTION JOINT
PLAIN - TRANSVERSE or LONGITUDINAL

NOTE:

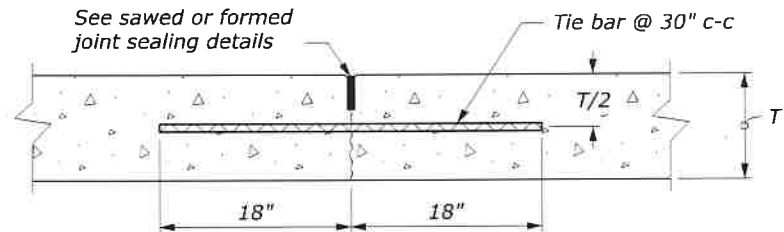
1. Use epoxy-coated material for all tie bars, dowels, and other steel used in the construction of concrete pavement.
2. Deformed reinforcing bars or hook bolts may be used for tie bars.
3. Do not place tie bars within 15 inches of transverse joints.
4. Install isolation joints when abutting a fixed structure. Use expansion joint material extending the full depth and length of the concrete surface.
5. Transverse and longitudinal construction joints are not included in the joint layout plan. Use transverse and longitudinal construction joints sparingly. Submit planned construction joint locations for approval.
6. For construction joints, if tie bars and dowels are not set into concrete during placement, drill and anchor the tie bars and dowels into the existing concrete construction with epoxy resin.
7. Maintain joint sealant shape factor of 1:1; except when silicone sealant is used maintain the width to depth shape factor of 2:1 or as recommended by sealant manufacturer.
8. See Section 712 for joint material requirements.
9. See Standards 501-1 or 502-1 for reinforcement details.



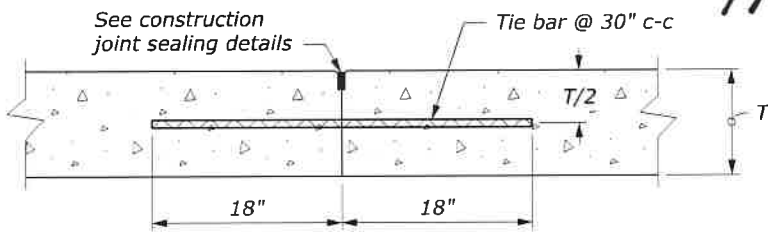
CONTRACTION JOINT
DOWELED - TRANSVERSE



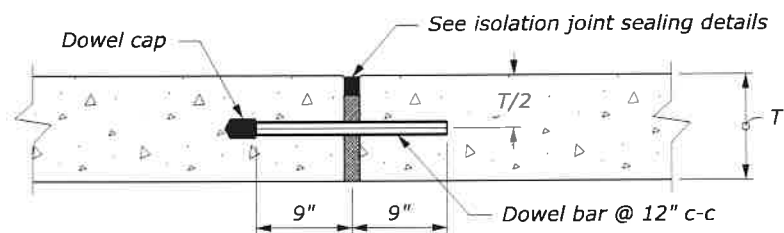
CONSTRUCTION JOINT
DOWEL BUTT - TRANSVERSE



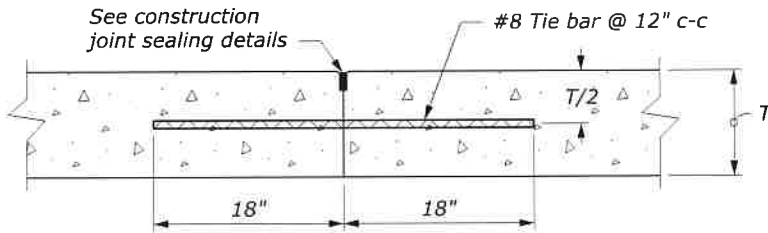
CONTRACTION JOINT
TIED - LONGITUDINAL



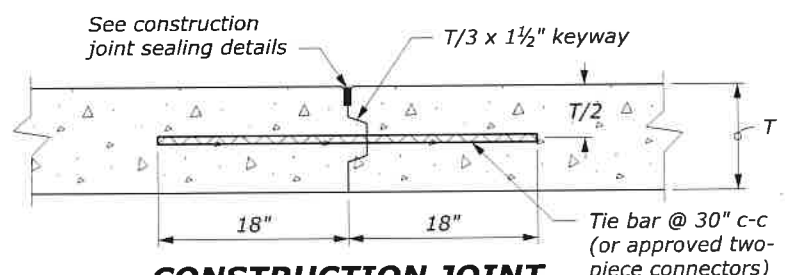
CONSTRUCTION JOINT
TIED BUTT - LONGITUDINAL



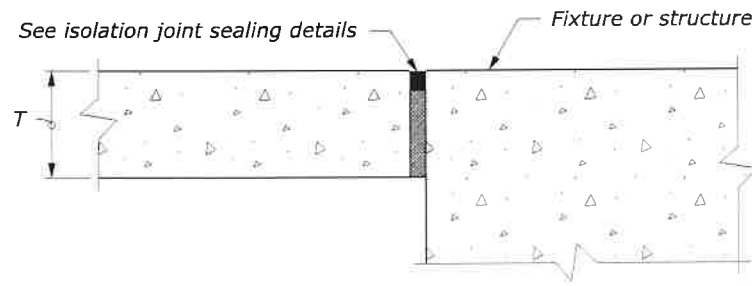
ISOLATION/EXPANSION JOINT
DOWELED - TRANSVERSE



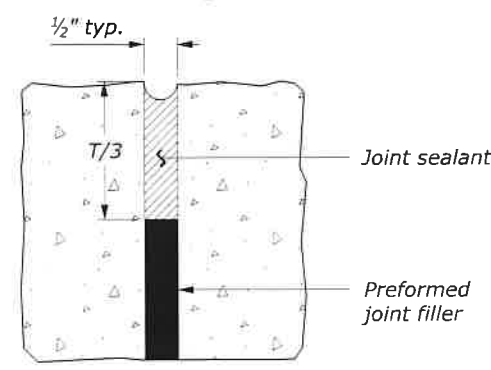
CONSTRUCTION JOINT
TIED BUTT - TRANSVERSE



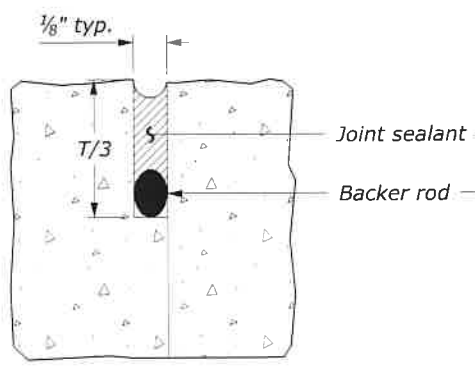
CONSTRUCTION JOINT
KEYWAY - LONGITUDINAL



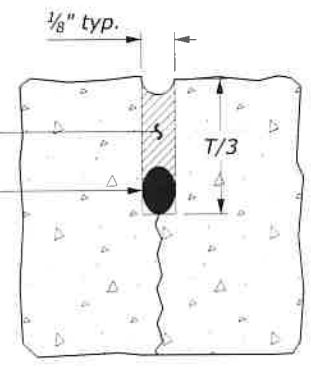
ISOLATION JOINT
UNDOWELED - LONGITUDINAL



ISOLATION JOINT



CONSTRUCTION JOINT



SAWED OR FORMED JOINT

MINOR CONCRETE PAVEMENT JOINT SEALING DETAILS

BAR SIZES		
PAVEMENT THICKNESS (T) (in)	TIE BAR	DOWEL BAR DIAMETER (in)
$T \leq 8$	#5	1
$8 < T \leq 10$	#5	1 1/4
$10 < T \leq 12$	#6	1 1/2

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY OFFICE

U.S. CUSTOMARY STANDARD

MINOR CONCRETE PAVEMENT JOINTS

STANDARD APPROVED FOR USE
REVISED: 9/2016

STANDARD
501-2

NO SCALE

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3/25/2021

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3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T1

METAL ROUND PIPE CULVERT

FILL HEIGHT AND METAL THICKNESS TABLE FOR HELICAL LOCKSEAM AND WELDED SEAM PIPE CULVERT

STEEL																
PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	2½" x ½" CORRUGATIONS					3" x 1" CORRUGATIONS					5" x 1" CORRUGATIONS				
		METAL THICKNESS (INCH/GAGE)														
		0.064/16	0.079/14	0.109/12	0.138/10	0.168/8	0.064/16	0.079/14	0.109/12	0.138/10	0.168/8	0.064/16	0.079/14	0.109/12	0.138/10	0.168/8
		MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)														
12	12	100	100	100	100	100										
15	12	100	100	100	100	100										
18	12	100	100	100	100	100										
21	12	100	100	100	100	100										
24	12	100	100	100	100	100										
30	12	85	100	100	100	100										
36	12	71	89	100	100	100	81	100	100	100	100					
42	12	61	76	100	100	100	70	87	100	100	100					
48	12	53	66	93	100	100	61	76	100	100	100	54	68	95	100	
54	12		59	83	100	100	54	68	95	100	100	48	60	85	100	
60	12			74	97	100	49	61	86	100	100	43	54	76	98	
66	12				87	100	44	55	78	100	100	39	49	69	89	
72	12				80	97	40	51	71	92	100	36	45	63	82	
78	12					87	37	47	66	85	100	33	42	58	75	
84	12					75	35	43	61	78	96	31	39	54	70	
90	12						32	40	57	73	90	29	36	51	65	
96	12							38	53	69	84		34	48	61	
102	18							36	50	65	79		32	45	57	
108	18								47	61	75			42	54	
114	18								45	58	71			40	52	
120	18								43	55	67			38	49	
126	18									52	64				47	
132	18									50	61				44	
138	18									48	58				42	
144	18										56				50	

ALUMINUM																
PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	2½" x ½" CORRUGATIONS					3" x 1" CORRUGATIONS									
		METAL THICKNESS (INCH/GAGE)														
		0.060/16	0.075/14	0.105/12	0.135/10	0.164/8	0.060/16	0.075/14	0.105/12	0.135/10	0.164/8					
		MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)														
12	12	100	100	100	100	100										
15	12	100	100	100	100	100										
18	12	100	100	100	100	100										
21	12	88	100	100	100	100										
24	12	77	97	100	100	100										
30	12	62	77	100	100	100	71	89	100	100	100					
36	12	52	64	90	100	100	59	74	100	100	100					
42	12	44	55	77	99	100	51	64	89	100	100					
48	12				67	87	100	44	56	78	100	100				
54	18				54	71	88	39	50	69	93	100				
60	18					57	72	35	45	62	83	98				
66	18						58	32	40	56	76	89				
72	18						45	30	37	55	70	82				
78	24								34	48	64	75				
84	24										44	59	70			
90	24										41	62	65			
96	24										38	51	61			
102	24												46	55		
108	24												42	50		
114	24													45		
120	24													40		

ALUMINUM														
PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	2½" x ½" CORRUGATIONS					3" x 1" CORRUGATIONS							
		METAL THICKNESS (INCH/GAGE)												
		0.060/16	0.075/14	0.105/12	0.135/10	0.164/8	0.060/16	0.075/14	0.105/12	0.135/10	0.164/8			
		MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)												
12	12	100	100	100	100	100								
15	12	100	100	100	100	100								
18	12	100	100	100	100	100								
21	12	88	100	100	100	100								
24	12	77	97	100	100	100								
30	12	62	77	100	100	100	71	89	100	100	100			
36	12	52	64	90	100	100	59	74	100	100	100			
42	12	44	55	77	99	100	51	64	89	100	100			
48	12			67	87	100	44	56	78	100	100			
54	18			54	71	88	39	50	69	93	100			
60	18				57	72	35	45	62	83	98			
66	18					58	32	40	56	76	89			
72	18					45	30	37	55	70	82			
78	24							34	48	64	75			
84	24								44	59	70			
90	24									41	62	65		
96	24									38	51	61		
102	24										46	55		
108	24										42	50		
114	24											45		
120	24											40		

NOTE:

- When directed, camber pipe culverts upward from a chord through the inlet and outlet inverts an ordinate amount equal to 1% of the pipe length. Develop camber on a parabolic curve. If the midpoint elevation on the parabolic curve as designed exceeds the elevation of the inlet invert, reduce the amount of camber or increase the pipe culvert gradient.
- Fill heights exceeding 100 feet require special analysis by the CO.
- The fill heights in the table are for helical lockseam and welded seam pipe only. Fill heights for culvert pipe with annular corrugations are more restrictive than those of helical lockseam and welded seam pipe. Obtain approval before furnishing annular corrugation pipe.
- Measure minimum cover from the top of the pipe culvert to the subgrade for flexible pavements, and to the top of the pavement for rigid pavements. Measure maximum fill height from the top of the pipe to the top of the pavement for both flexible and rigid pavement.

METAL PIPE ARCH CULVERT

FILL HEIGHT AND METAL THICKNESS TABLE FOR HELICAL LOCKSEAM AND WELDED SEAM PIPE CULVERT

STEEL																
PIPE ARCH SIZE SPAN x RISE INCHES	EQUI- VALENT DIAMETER INCHES	MINIMUM CORNER RADIUS INCHES	MINIMUM COVER INCHES	2 3/8" x 1/2" CORRUGATIONS				3" x 1" CORRUGATIONS				5" x 1" CORRUGATIONS				
				METAL THICKNESS (INCH/GAGE)												
				0.064/16	0.079/14	0.109/12	0.138/10	0.168/8	0.079/14	0.109/12	0.138/10	0.168/8	0.079/14	0.109/12	0.138/10	0.168/8
				MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)												
17 x 13	15	3	12	13												
21 x 15	18	3	12	12												
24 x 18	21	3	12	13												
28 x 20	24	3	12	13												
35 x 24	30	3	12	12												
42 x 29	36	3.5	12	12												
49 x 33	42	4	12		12											
57 x 38	48	5	12			12										
60 x 46	54	8	15					21				21				
64 x 43	54	6	12			12										
66 x 51	60	9	15					21				21				
71 x 47	60	7	12				12									
73 x 55	66	12	18					20				20				
77 x 52	66	8	12				12									
81 x 59	72	14	18					17				17				
83 x 57	72	9	12				12									
87 x 63	78	14	18					17				17				
95 x 67	84	16	18					17				17				
103 x 71	90	16	18						17			17				
112 x 75	96	18	21						16			16				
117 x 79	102	18	21						16			16				
128 x 83	108	18	24						16				16			
137 x 87	114	18	24						16				16			
142 x 91	120	18	24						16					16		

ALUMINUM															
PIPE ARCH SIZE SPAN x RISE INCHES	EQUI- VALENT DIAMETER INCHES	MINIMUM CORNER RADIUS INCHES	MINIMUM COVER INCHES	2 3/8" x 1/2" CORRUGATIONS				3" x 1" CORRUGATIONS							
				METAL THICKNESS (INCH/GAGE)											
				0.060/16	0.075/14	0.105/12	0.135/10	0.060/16	0.075/14	0.105/12	0.135/10				
				MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)											
17 x 13	15	3	12	13											
21 x 15	18	3	12	12											
24 x 18	21	3	12	13											
28 x 20	24	3	12			13									
35 x 24	30	3	12			12									
42 x 29	36	3.5	15				12								
49 x 33	42	4	15				12								
57 x 38	48	5	15					12							
60 x 46	54	8	15						21						
64 x 43	54	6	18				12								
66 x 51	60	9	18						21						
73 x 55	66	12	18							20					
81 x 59	72	14	21									17			
87 x 63	78	14	21									17			
95 x 67	84	16	24									17			
103 x 71	90	16	24											17	

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ALUMINUM															
PIPE ARCH SIZE SPAN x RISE INCHES	EQUI- VALENT DIAMETER INCHES	MINIMUM CORNER RADIUS INCHES	MINIMUM COVER INCHES	2 ² / ₃ " x 1 ¹ / ₂ " CORRUGATIONS				3" x 1" CORRUGATIONS							
				METAL THICKNESS (INCH/GAGE)											
				0.060/16	0.075/14	0.105/12	0.135/10	0.060/16	0.075/14	0.105/12	0.135/10				
				MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)											
17 x 13	15	3	12	13											
21 x 15	18	3	12	12											
24 x 18	21	3	12	13											
28 x 20	24	3	12		13										
35 x 24	30	3	12		12										
42 x 29	36	3.5	15			12									
49 x 33	42	4	15			12									
57 x 38	48	5	15				12								
60 x 46	54	8	15					21							
64 x 43	54	6	18				12								
66 x 51	60	9	18					21							
73 x 55	66	12	18						20						
81 x 59	72	14	21									17			
87 x 63	78	14	21									17			
95 x 67	84	16	24									17			
103 x 71	90	16	24											17	



03/26/2021

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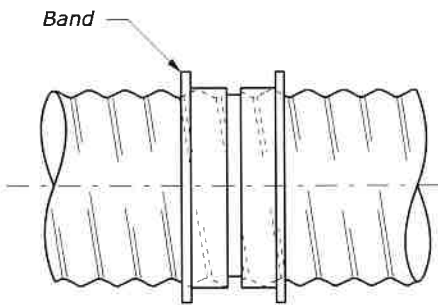
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3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T2

COUPLING BANDS FOR METAL PIPE CULVERT ^[1]					
CORRUGATION SIZE ^[2] INCHES	ROUND PIPE DIAMETER INCHES	PIPE ARCH SPAN × RISE INCHES	MINIMUM BAND WIDTH (INCHES)		
			ANNULAR CORRUGATED BANDS ^[3]	HELICALLY CORRUGATED BANDS ^[4]	SEMI- CORRUGATED BANDS ^[5]
1½ × ¼	underdrain ^[6]	-	10.5	7	10.5
2⅔ × ½	12 to 36	17 × 13 to 42 × 29	7	12	
	42 to 72	49 × 33 to 83 × 57	10.5	12	
	78 to 84	-	10.5	12	10.5
3 × 1	36 to 72	60 × 46 to 81 × 59	12	14	10.5
	78 to 144	87 × 64 to 142 × 91	12	14	10.5
5 × 1	36 to 72	60 × 46 to 81 × 59	20	22	
	78 to 144	87 × 64 to 142 × 91	20	22	

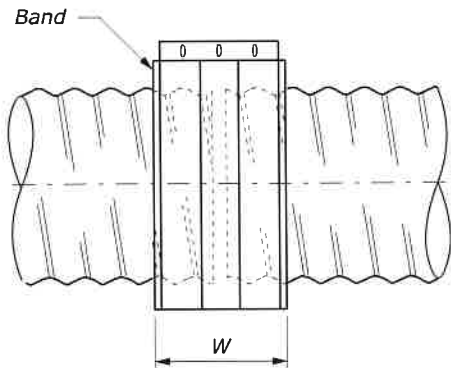
- ^[1] Fabricate annular, helical and semi-corrugated type coupling bands from the same metal as the connecting pipe. Provide coupling bands not more than 3 nominal sheet thicknesses thinner than the thickness of the pipe to be connected, and no thinner than 0.052 inch for steel or 0.048 inch for aluminum. Fasten coupling bands with the following diameter of bolt: ⅜" for 18" round culvert (21" × 15" pipe arch) or less ½" for 21" round culvert (24" × 18" pipe arch) or more
- ^[2] For helically corrugated pipe with rerolled ends, the nominal corrugations size refers to the dimension of the end corrugation in the pipe.
- ^[3] Use annular corrugated bands with pipes having annular corrugations or with helical pipe having rerolled end to form annular corrugations. A 10.5 inch band is acceptable on pipe ends rerolled with 2⅔" × ½" corrugations. A 12 inch band is acceptable on pipe ends rerolled with 3" × 1" pipe corrugations.
- ^[4] Use helical corrugated bands with pipes having helically corrugated ends.
- ^[5] The minimum band widths shown for 3" × 1" and 5" × 1" corrugated sizes apply to 2⅔" × ½" corrugations on rerolled pipe ends.
- ^[6] Smooth sleeve-type couplers and flat bands may be used for pipe diameters of 12" or less. Use a matching metal having a nominal thickness of not less than 0.040 inch for steel, or 0.036 inch for aluminum, or a plastic with an equivalent strength to metal.



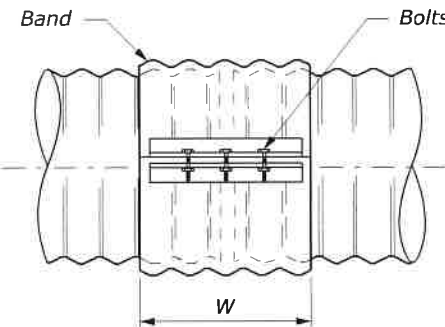
SLEEVE JOINT

Smother sleeve with center stop.
Stab type joint

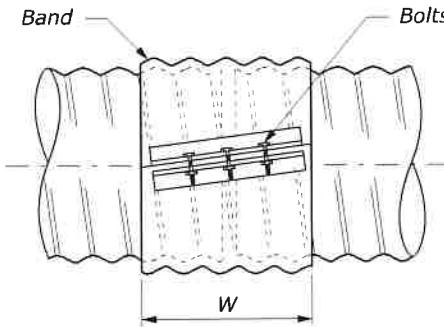
SMOOTH SLEEVE BAND



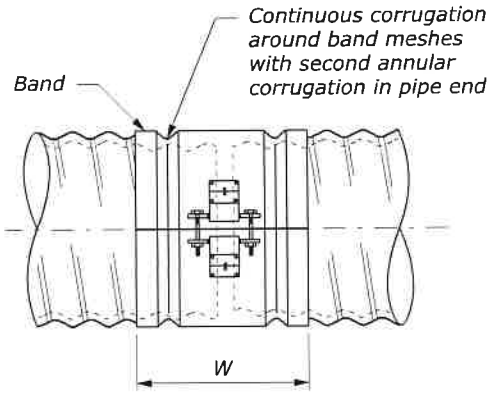
FLAT BAND



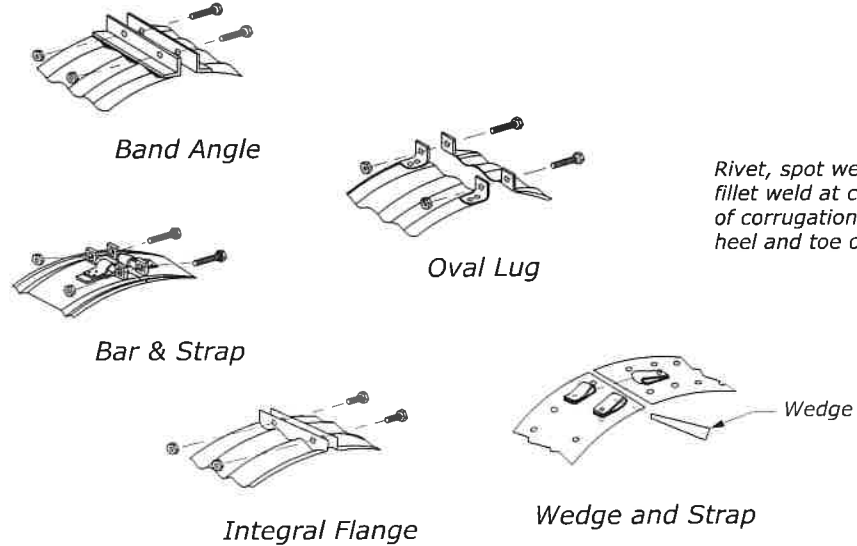
SIDE VIEW



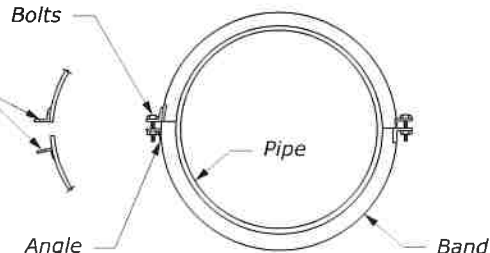
SIDE VIEW



SIDE VIEW



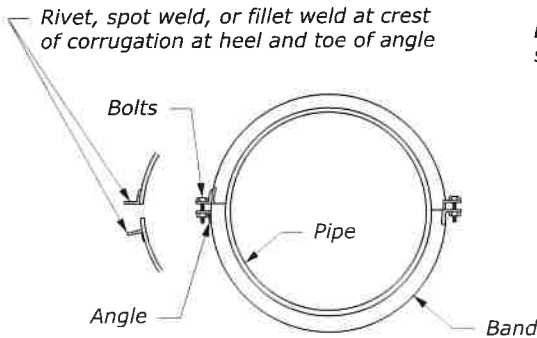
STANDARD BAND CONNECTIONS



END VIEW

Second angle connection optional to 42" diameter, required above 42" diameter

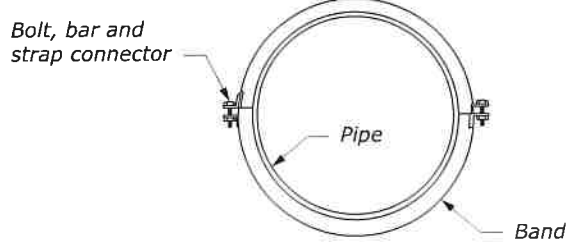
ANNULAR BAND



END VIEW

Second angle connection optional to 42" diameter, required above 42" diameter

HELICAL BAND



END VIEW

SEMI-CORRUGATED BAND

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY OFFICE	
U.S. CUSTOMARY STANDARD	
METAL PIPE CULVERT COUPLING BAND	
STANDARD APPROVED FOR USE 12/1993	STANDARD
REVISED: 4/1994 6/2005	602-2

NO SCALE

- NOTE:**
- Watertight pipe joints are not required unless specified in the Special Contract Requirements.
 - Other types of coupling bands or fastening devices that comply with the joint performance criteria of AASHTO Standard specifications for Highway Bridges, Division II Section 26 may be used.



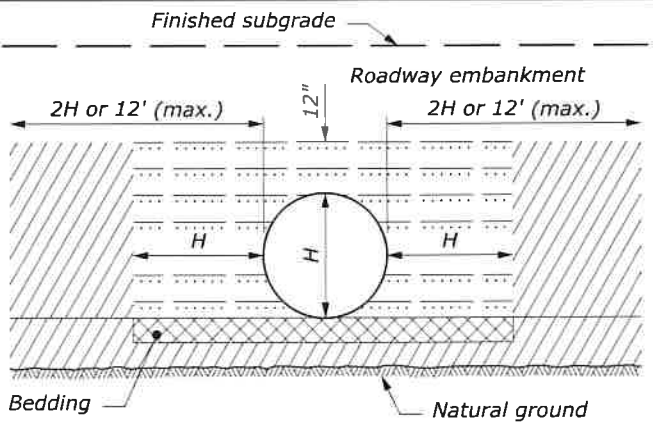
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FOR SELECTION ONLY

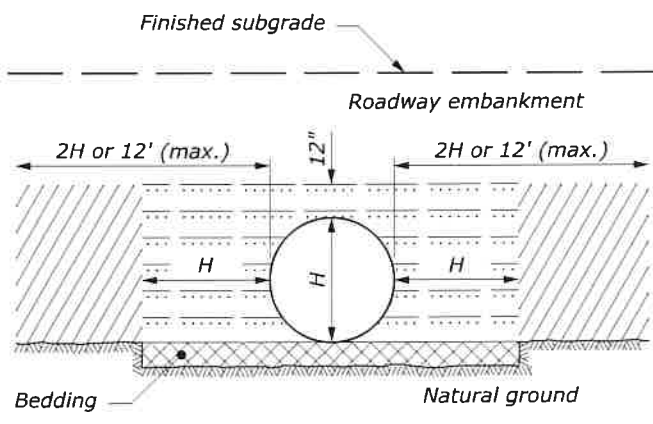
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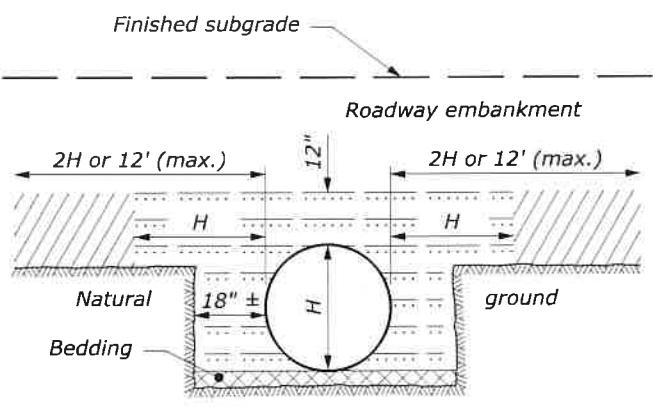
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T3



ABOVE NATURAL GROUND



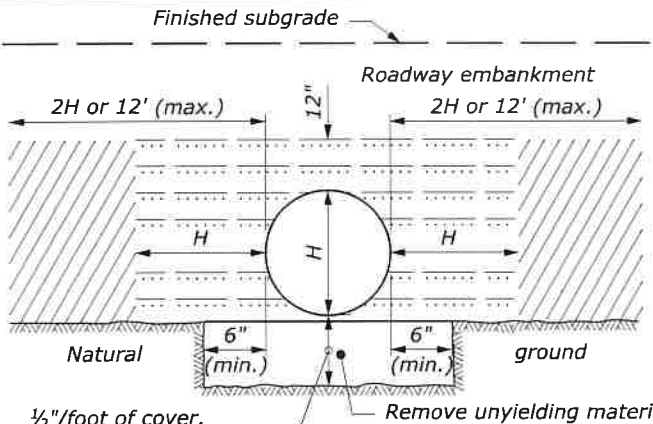
ON NATURAL GROUND



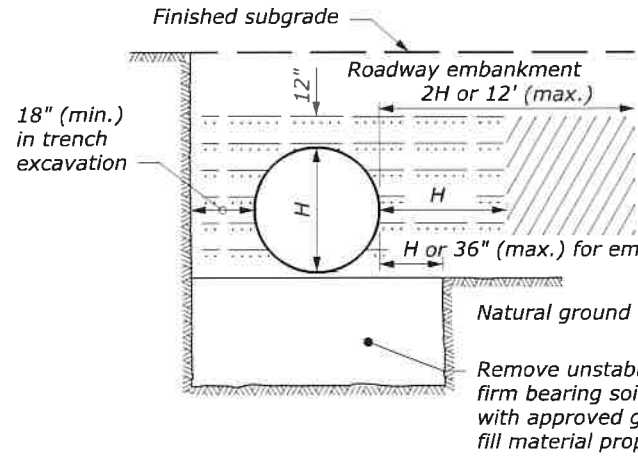
ABOVE AND BELOW NATURAL GROUND

LEGEND:

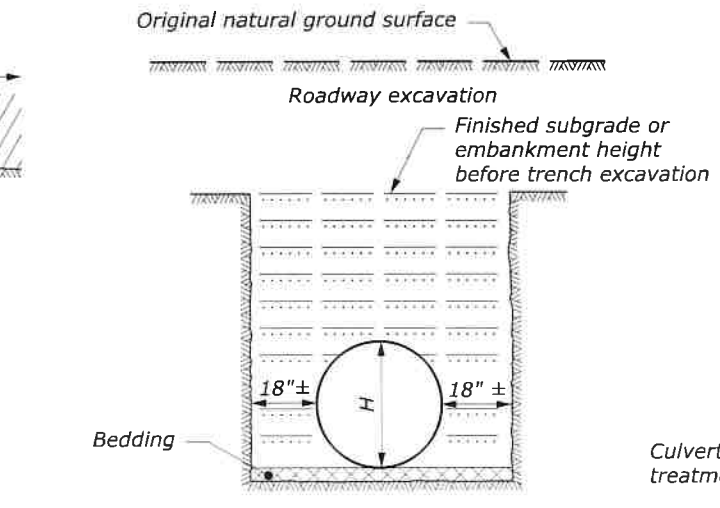
- Bedding material (uncompacted)
- Embankment material placed in layers not exceeding 6" compacted depth.
- Compacted backfill material placed in layers not exceeding 6" compacted depth; or lean concrete backfill in accordance with Section 614.
- Impermeable backfill material.



ON UNYIELDING MATERIAL

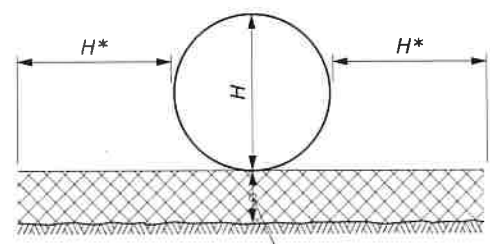


ON UNSTABLE MATERIAL



BELOW NATURAL GROUND OR TRENCH EXCAVATION IN EMBANKMENT

BEDDING DEPTH	
PIPE SIZE (H)	DEPTH
12" to 54"	4"
> 54"	6"

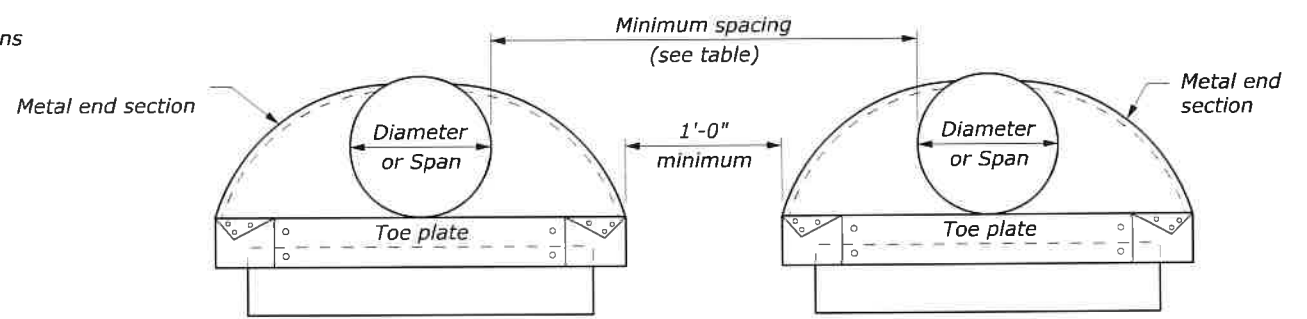


PIPE BEDDING

NOTE:

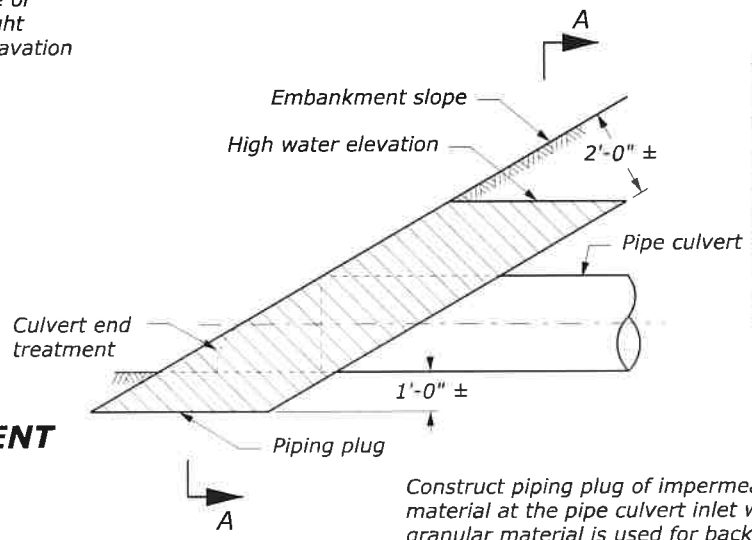
- When directed, camber pipe culverts upward from a chord through the inlet and outlet inverts an ordinate amount equal to 1% of the pipe length. Develop camber on a parabolic curve. If the midpoint elevation on the parabolic curve as designed exceeds the elevation of the inlet invert, reduce the amount of camber or increase the pipe culvert gradient.
- H equals the diameter of all round pipe culverts or the rise dimension of all pipe arch culverts.
- See Section 704 for bedding and backfill requirements.
- Use lean concrete backfill for culverts with cover less than 12 inches. Minimum allowable cover is 6 inches.

MINIMUM SPACING	
DIAMETER or SPAN	SPACING
UP to 48"	24"
48" and UP	Half diameter or span or 36", whichever is less



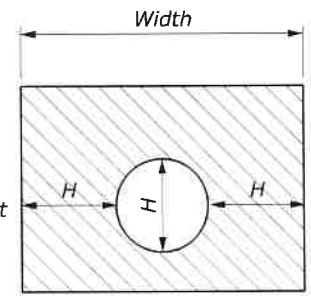
ELEVATION

MULTIPLE PIPE INSTALLATION



PIPING PLUG

NO SCALE



SECTION A-A



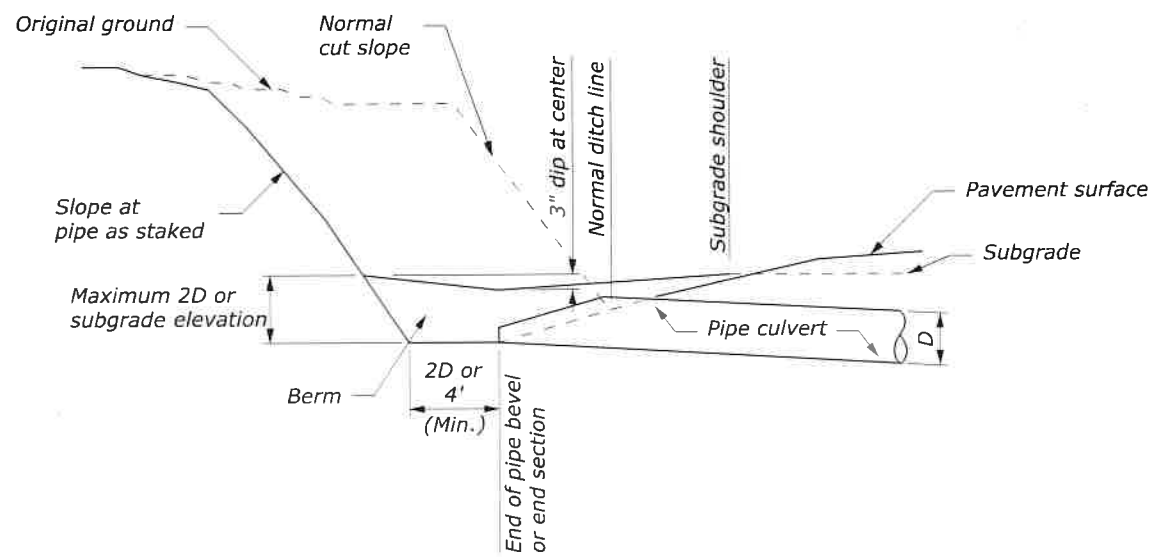
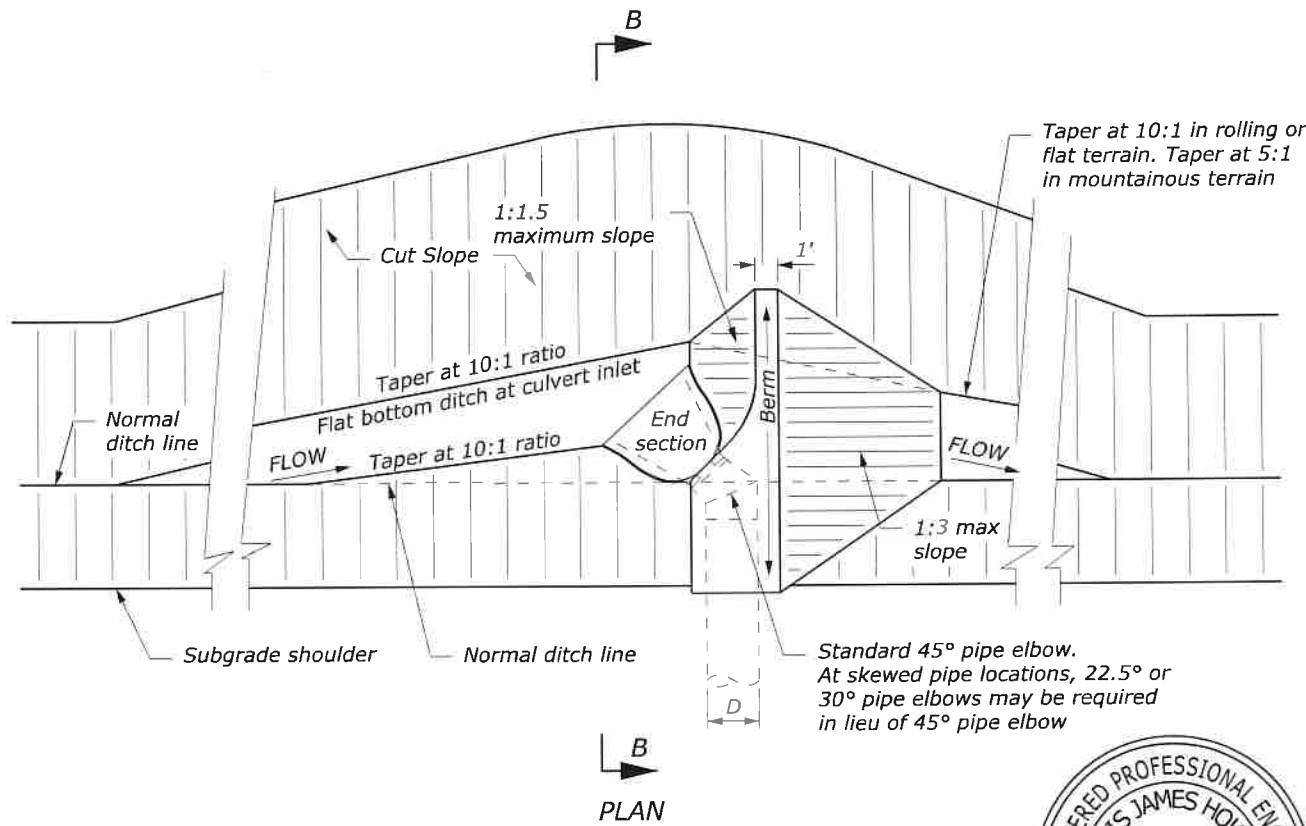
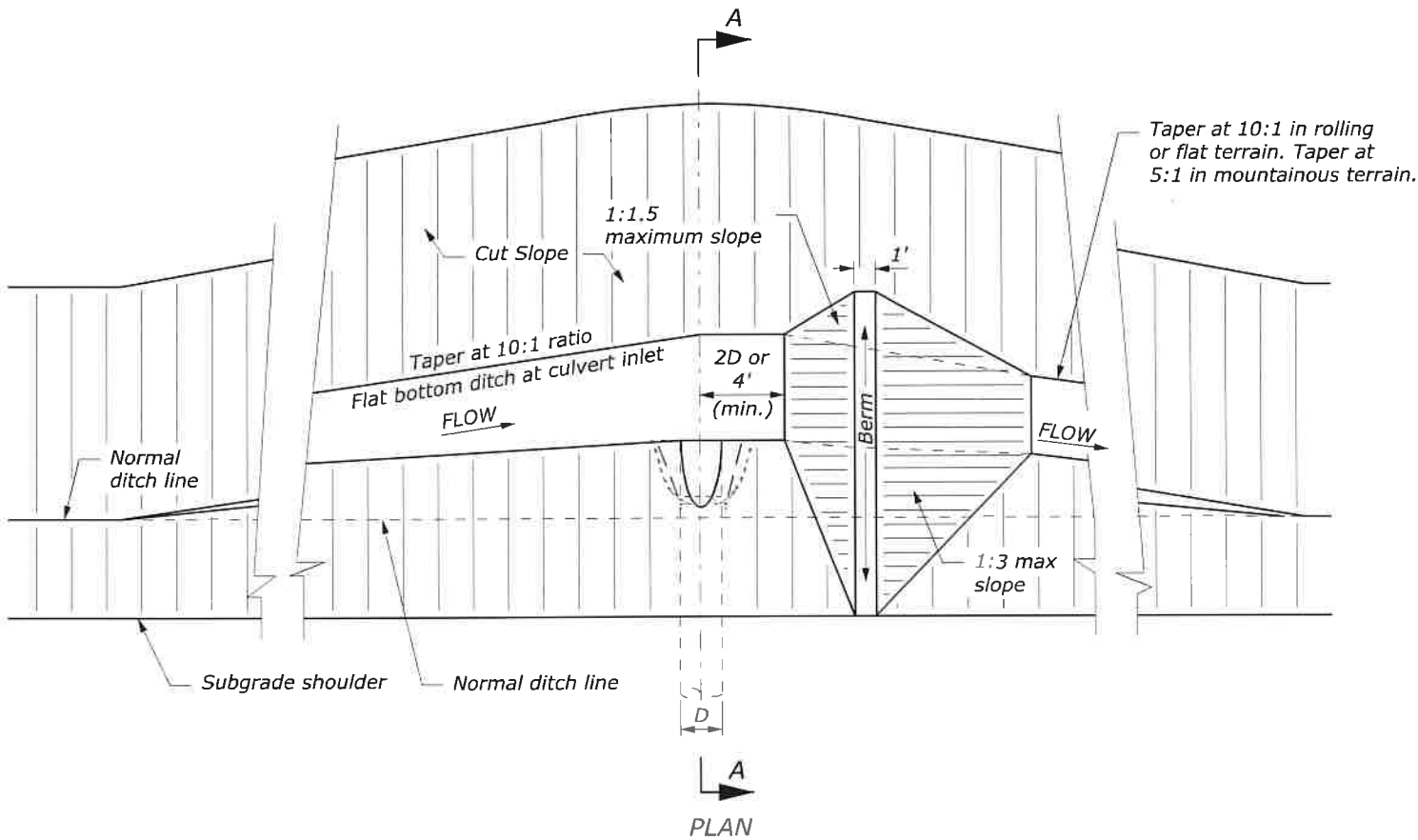
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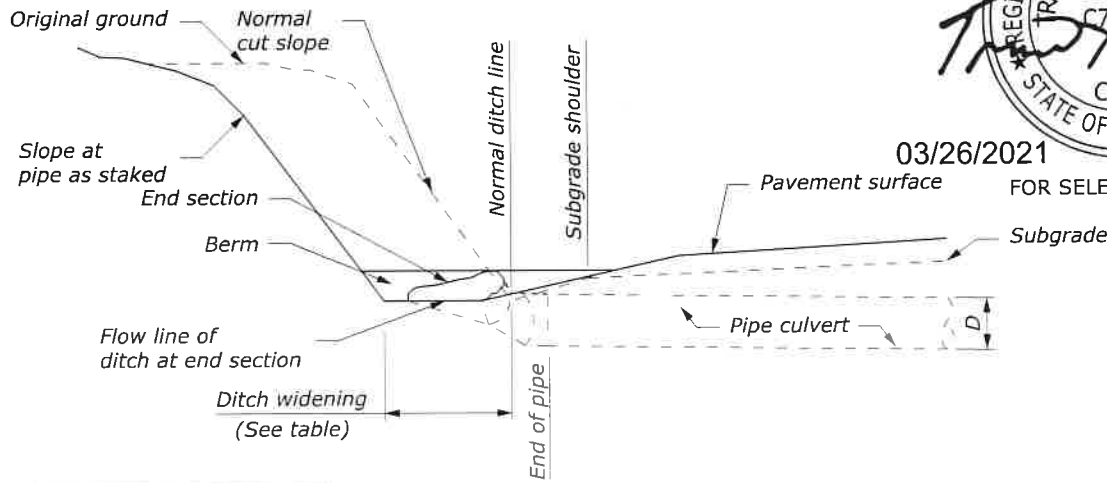
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION FEDERAL LANDS HIGHWAY OFFICE	
U.S. CUSTOMARY STANDARD	
METAL AND PLASTIC PIPE CULVERT BEDDING	
STANDARD APPROVED FOR USE 12/1993	STANDARD
REVISED: 4/1994 6/2005 DRAFT: 10/2017	602-3

NOTE:

1. D equals the diameter of all round pipe or the rise dimension of all pipe arch culverts.



SECTION A-A
TYPE I



DITCH WIDENING	
PIPE SIZE (D)	WIDENING
18"	5'
24"	6'
30"	7'

SECTION B-B
TYPE II

NO SCALE



03/26/2021
FOR SELECTION ONLY

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY OFFICE
U.S. CUSTOMARY STANDARD
**PIPE CULVERT INLET
TREATMENT IN CUT SLOPES**

STANDARD APPROVED FOR USE 12/1993
REVISED: 4/1994 6/2005
STANDARD
602-6

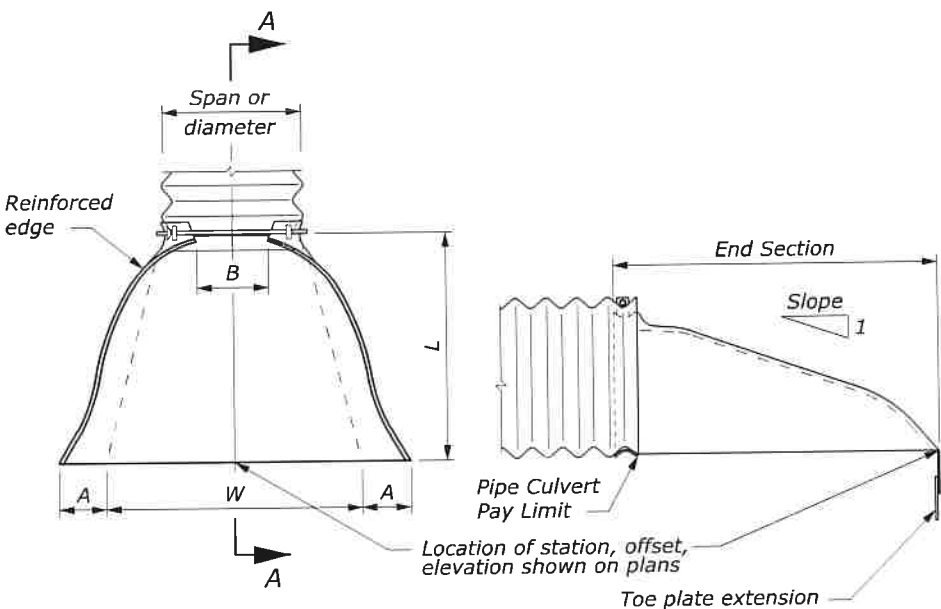
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END SECTIONS FOR ROUND PIPE CULVERT

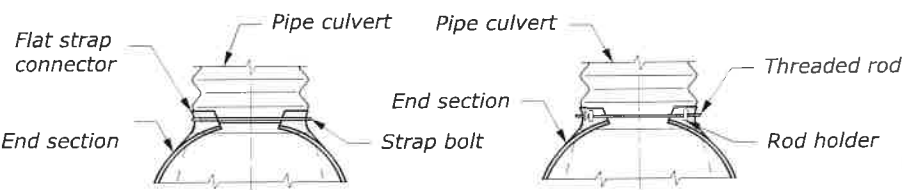
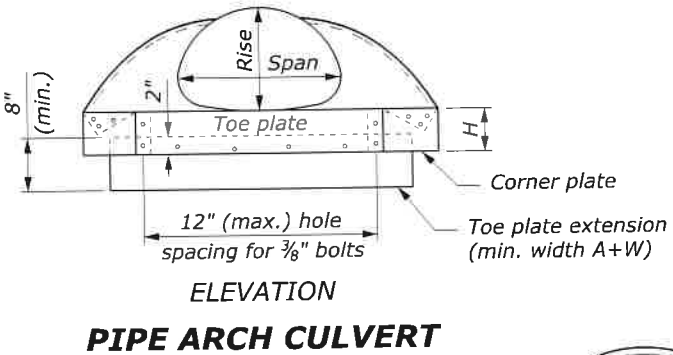
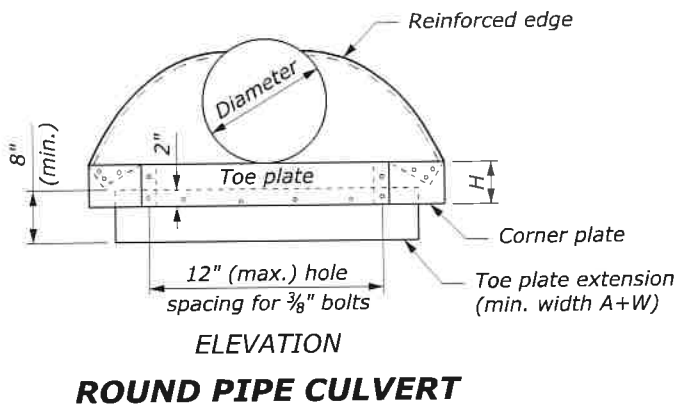
END SECTIONS FOR ROUND PIPE CULVERT										
PIPE SIZE DIAMETER INCHES	METAL THICKNESS				DIMENSIONS INCHES					SLOPE Approx
	STEEL		ALUMINUM							
	INCHES	GAGE	INCHES	GAGE	A (min)	B (max)	H (min)	L (±2")	W (max)	
12	0.064	16	0.060	16	5	7	6	21	44	2¼
15	0.064	16	0.060	16	6	8	6	26	52	2¼
18	0.064	16	0.060	16	7	10	6	31	58	2⅛
21	0.064	16	0.060	16	8	12	6	36	66	2⅛
24	0.064	16	0.060	16	9	13	6	41	72	2⅛
30	0.079	14	0.075	14	11	16	8	51	88	2⅝
36	0.079	14	0.075	14	13	19	9	60	105	2
42	0.109	12	0.105	12	15	25	10	69	122	2⅝
48	0.109	12	0.105	12	17	29	12	78	131	2
54	0.109	12	0.105	12	17	33	12	84	143	2
60	0.109	12	0.105	12	17	36	12	87	157	1⅞
66	0.109	12	0.105	12	17	39	12	87	162	1⅞
72	0.109	12	0.105	12	17	44	12	87	169	1½
78	0.109	12	0.105	12	17	48	12	87	178	1⅝
84	0.109	12	0.105	12	17	52	12	87	184	1⅓
90	0.109	12	0.105	12	17	58	12	87	188	1¼
96	0.109	12	0.105	12	17	58	12	87	197	1⅛



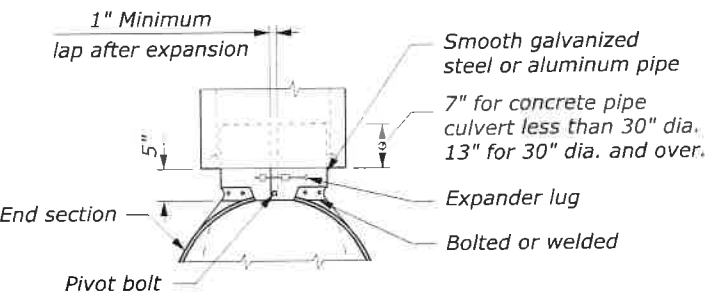
PLAN SECTION A-A
ROUND OR PIPE ARCH CULVERT

- NOTE:
1. Variations in design and dimensions are permitted to allow for manufacturer's standards.
 2. Fabricate the diameter of the end section of Design B to match the inside diameter of the concrete pipe culvert.
 3. Design C may be used in lieu of design A for all metal pipe culvert sizes. Coupling bands may be any acceptable type for the pipe culvert specified.
 4. Fabricate multiple piece bodies with lap seams tightly joined by 3/8" rivets or bolts. Fabricate end section center panels for 60" and larger diameter pipe and equivalent pipe arch from 0.138 inch steel or 0.135 inch aluminum.
 5. On end section center panels for 66" and larger equivalent pipe arch provide 2 1/2" x 2 1/2" x 1/4" angle reinforcement bolted or riveted under the center panel seam.
 6. Supplement the reinforced edges of end sections for 60" and larger diameter pipe and 66" and larger equivalent pipe arch with 2 1/2" x 2 1/2" x 1/4" stiffener angles attached with bolts or rivets.
 7. Fabricate connector section, corner plate and toe plate extensions from the same metal thickness as the panel body. Use toe plate extension where shown on the plans.
 8. Warp embankment slopes to match the slope of the flared end sections.

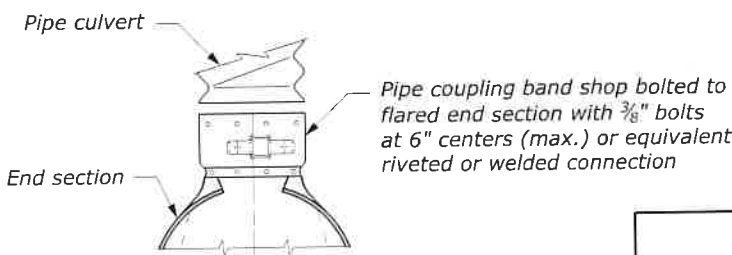
END SECTIONS FOR PIPE ARCH CULVERT											
PIPE SIZE SPAN x RISE INCHES	EQUI- VALENT DIAM. (INCHES)	METAL THICKNESS				DIMENSIONS INCHES					SLOPE Approx.
		STEEL		ALUMINUM							
		INCHES	GAGE	INCHES	GAGE	A (min)	B (max)	H (min)	L (±2")	W (max)	
17 x 13	15	0.064	16	0.060	16	7	9	6	19	30	2½
21 x 15	18	0.064	16	0.060	16	7	10	6	23	36	2½
24 x 18	21	0.064	16	0.060	16	8	12	6	28	42	2½
28 x 20	24	0.064	16	0.060	16	9	14	6	32	48	2½
35 x 24	30	0.079	14	0.075	14	10	16	8	39	60	2½
42 x 29	36	0.079	14	0.075	14	12	18	9	46	75	2½
49 x 33	42	0.109	12	0.105	12	13	21	12	53	85	2½
57 x 38	48	0.109	12	0.105	12	18	26	12	63	90	2½
60 x 46	54	0.109	12	0.105	12	18	34	12	70	102	2
64 x 43	54	0.109	12	0.105	12	18	30	12	70	102	2
66 x 51	60	0.109	12	0.105	12	18	33	12	77	116	1½
71 x 47	60	0.109	12	0.105	12	18	33	12	77	114	1½
73 x 55	66	0.109	12	0.105	12	18	36	12	77	126	1½
77 x 52	66	0.109	12	0.105	12	18	36	12	77	126	1½
81 x 59	72	0.109	12	0.105	12	18	39	12	77	138	1½
83 x 57	72	0.109	12	0.105	12	18	39	12	77	138	1½
87 x 63	78	0.109	12	0.105	12	20	38	12	77	148	1½
95 x 67	84	0.109	12	0.105	12	20	34	12	87	162	1½
103 x 71	90	0.109	12	0.105	12	20	38	12	87	174	1½
112 x 75	96	0.109	12	0.105	12	20	40	12	87	174	1½



DESIGN A
CONNECTION TO ANNULAR
CORRUGATED METAL PIPE



DESIGN B
CONNECTION TO CONCRETE
PIPE INLET END



DESIGN C
CONNECTION TO METAL PIPE
OR OUTLET END OF CONCRETE PIPE

NO SCALE



03/26/2021

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL
METAL END SECTIONS

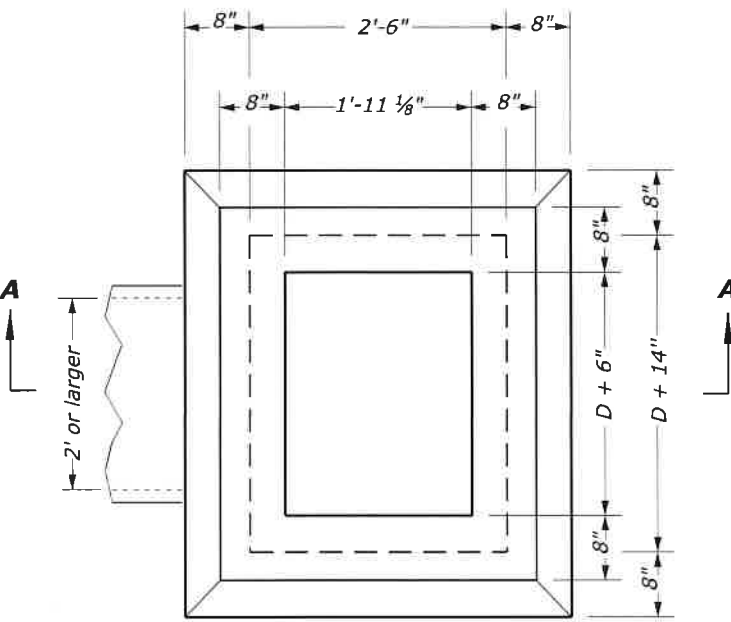
SPECIAL
602-A

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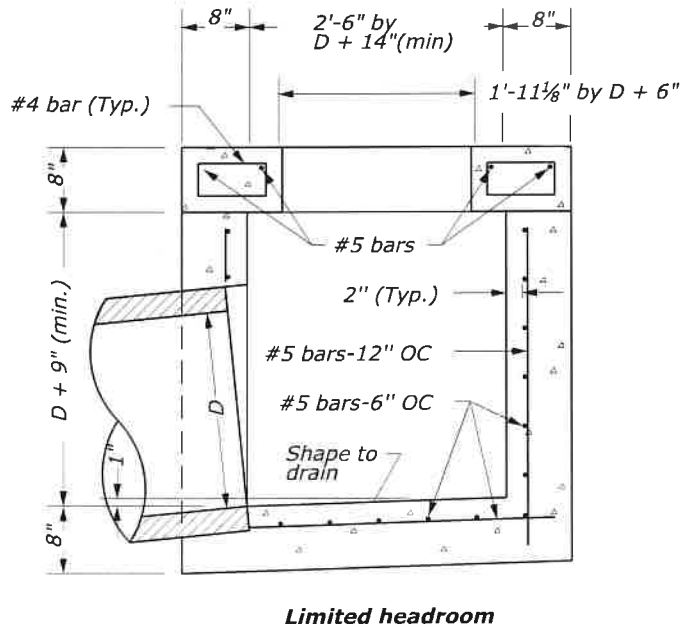
3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T6



REGISTERED PROFESSIONAL ENGINEER
RAVIS JAMES HOWARD
C74036
CIVIL
STATE OF CALIFORNIA
03/26/2021

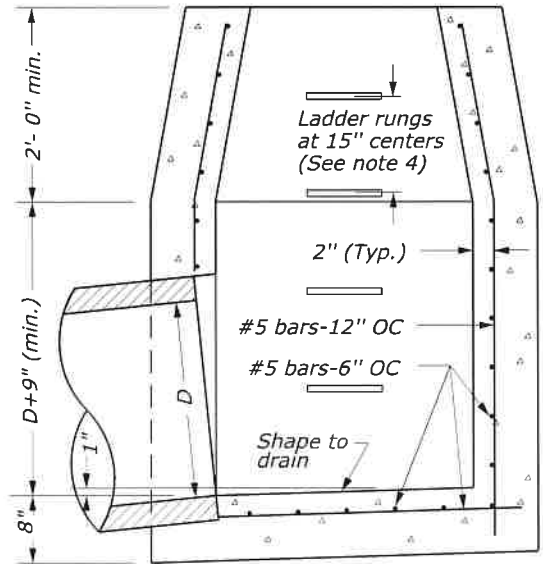
- NOTES:
1. At the option of the Contractor walls less than 4 feet may be of either concrete block or concrete as shown.
 2. Construct Type 6A-A inlets for pipes 24 inch and larger for "Limited Headroom", unless otherwise directed by the CO.
 3. Construct inlets parallel to the roadway centerline and grade. For pipes on skew, adapt inlets as directed by the CO.
 4. Construct ladder rungs of 3/4" round or 3/4" square steel or wrought iron where depth exceeds 4'-0".
 5. For frames and gratings, minor variations in design and dimensions are permitted to allow manufacturers standards. All grates are to be bicycle safe.
 6. Orient curved vanes toward direction of stormwater flow. In a sump condition, orientation of curved vanes can be in either direction. Contractor is responsible for correct grate orientation towards stormwater flow.
 7. Construct Type 6A-6 metal frame and grating for 6" reveal, unless otherwise directed by the CO.
 8. Type 6A-6 Inlets are paid for as an Each item under 60403-0000, Inlet.



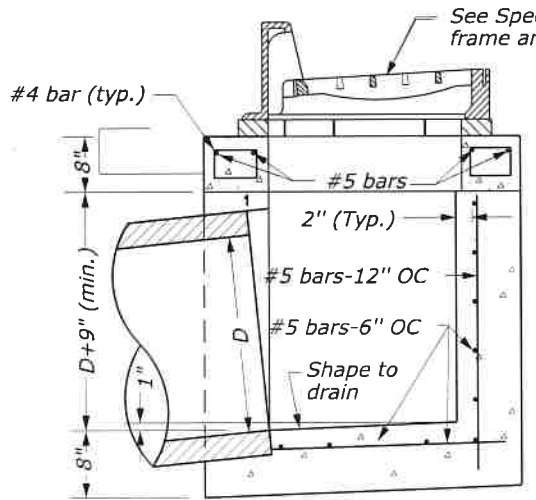
Limited headroom

SECTION A-A

TYPE 6A-A INLET
(for 24" or larger pipes)

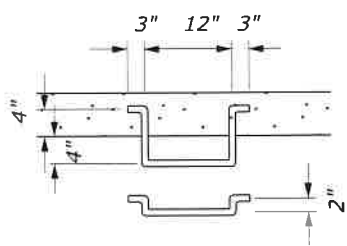


Ample headroom



SECTION A-A

TYPE 6A-6 INLET
(up to 24" pipes)

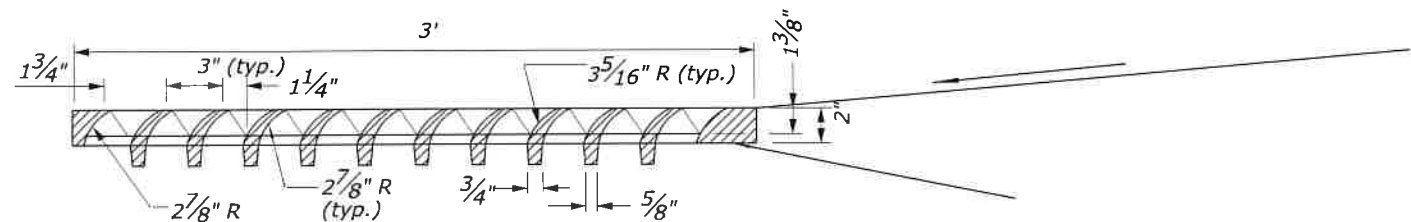


LADDER RUNG

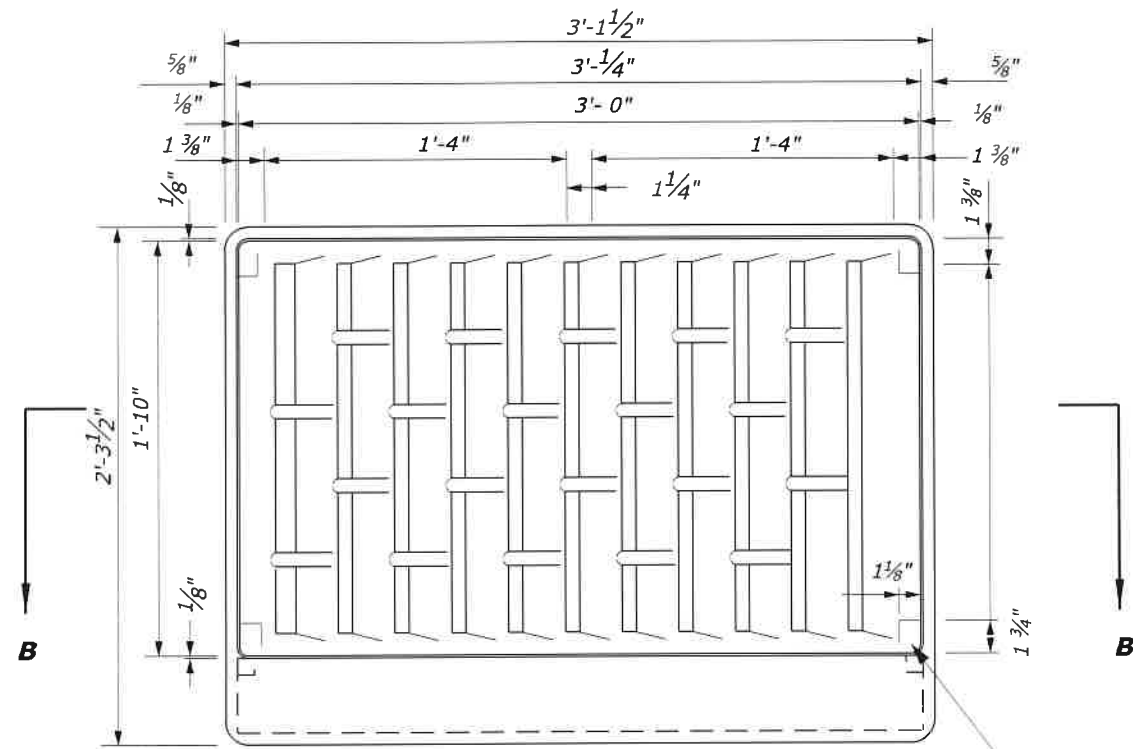
NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY SPECIAL	
INLET, TYPE 6A-6	
Sheet 1 of 2	
	SPECIAL 604-A

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T7

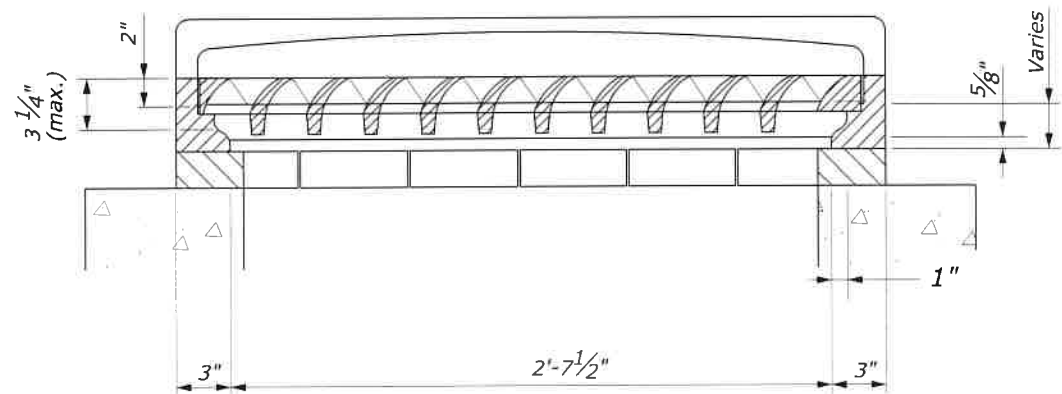


FRONT ELEVATION GRATE TYPE 6A-6 MOUNTED (CURVED VANE GRATINGS)



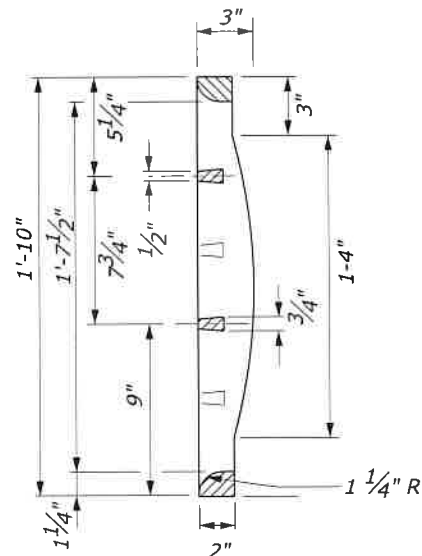
(4) Position notches

TOP VIEW FRAME GRATE TYPE 6A-6 MODIFIED (CURVED VANE GRATINGS)

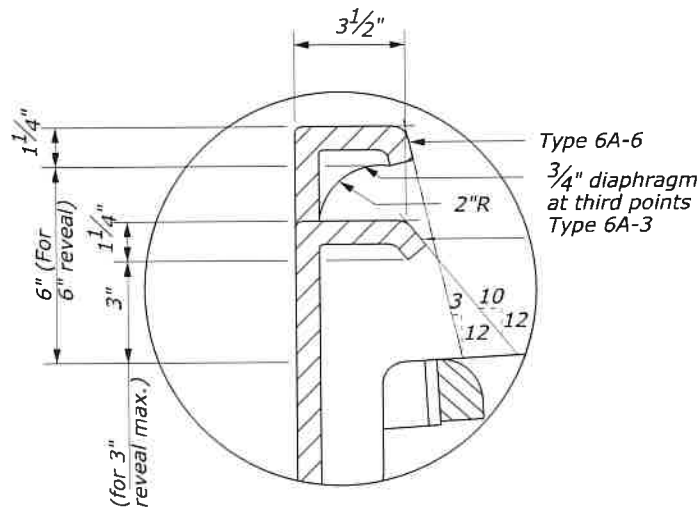


SECTION B-B

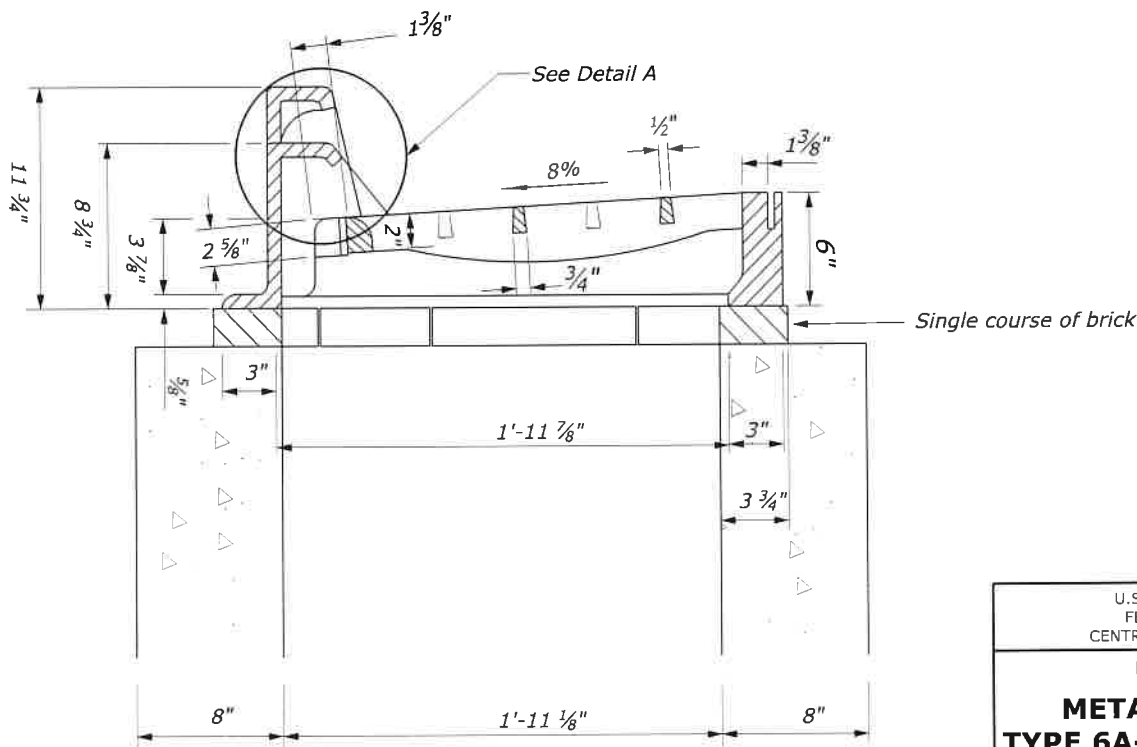
METAL FRAMES AND GRATING TYPE 6A-6 MODIFIED



SIDE ELEVATION GRATE TYPE 6A-6 MODIFIED (CURVED VANE GRATINGS)



DETAIL A



NO SCALE

NOTES:

1. For frames and gratings, minor variations in design and dimensions are permitted to allow manufacturers standards. All grates are to be bicycle safe.

2. Orient curved vanes toward direction of stormwater flow. In a sump condition, orientation of curved vanes can be in either direction. Contractor is responsible for correct grate orientation towards stormwater flow.



03/26/2021

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL
**METAL FRAME AND GRATE,
TYPE 6A-6 (CURVED VANE GRATE)**

Sheet 2 of 2

SPECIAL
604-A

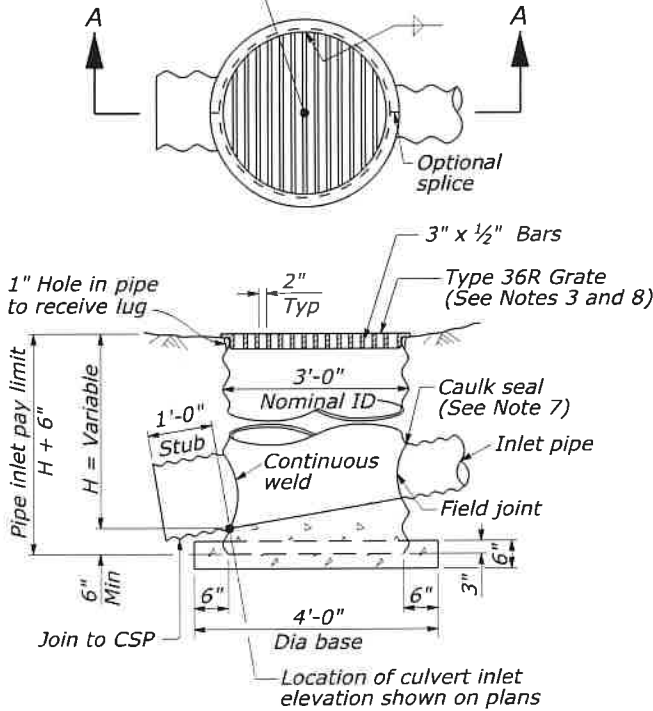
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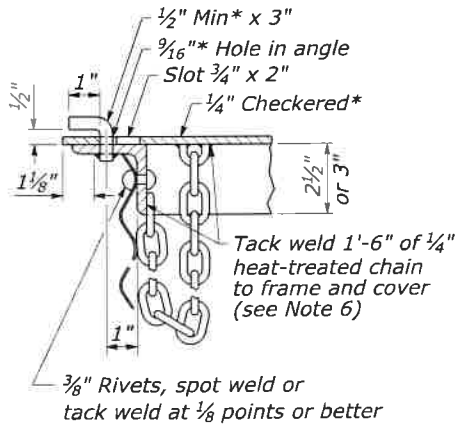
3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T8

Location of station, offset, elevation for grate shown on plans



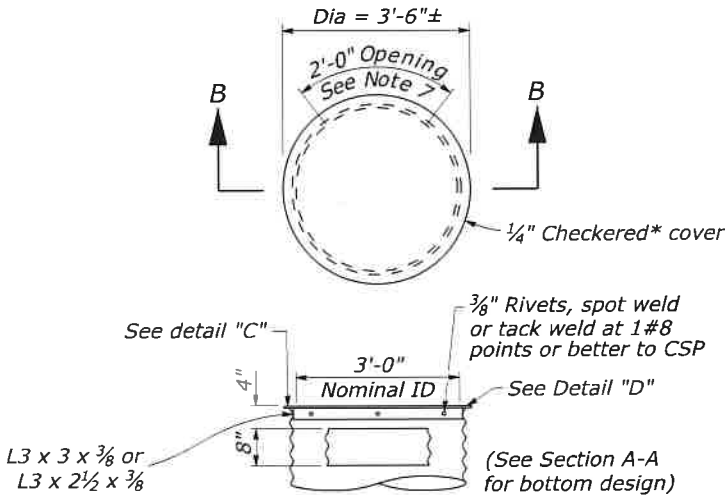
SECTION A-A
TYPE GMP
Steel pipe inlet with grate



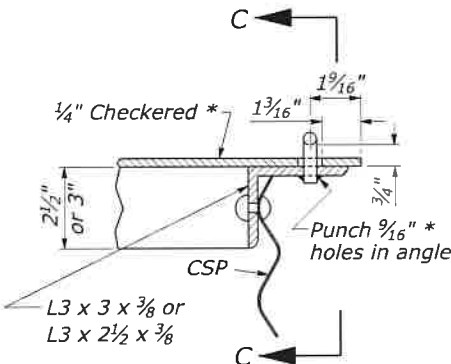
DETAIL "C"



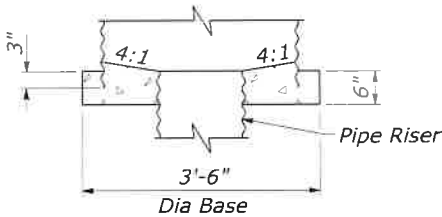
SECTION E-E



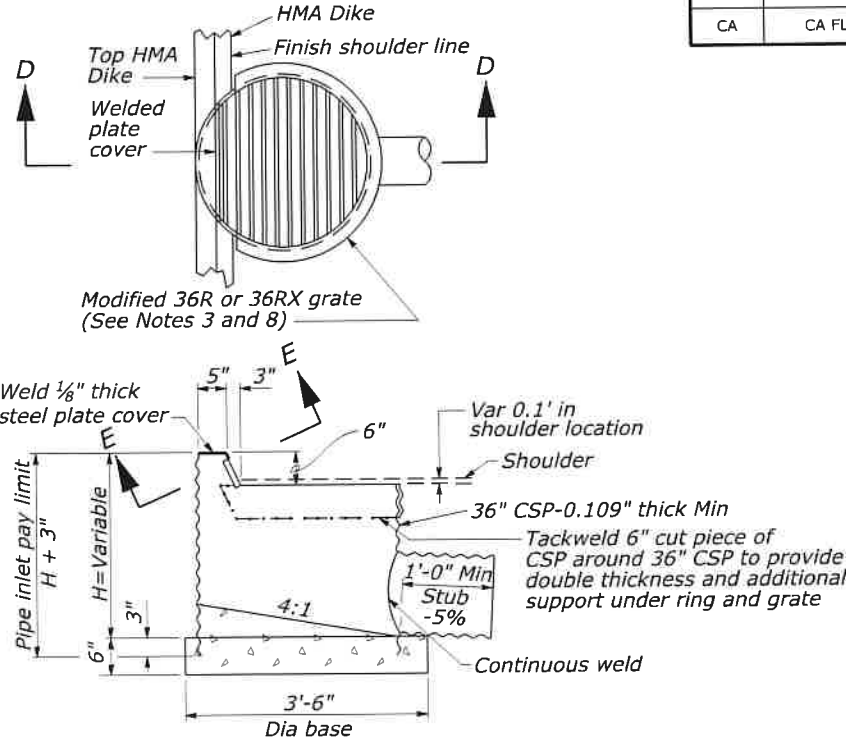
SECTION B-B
TYPE OMP or OMPI
Steel pipe inlet with side opening
and steel cover (see Note 6)



DETAIL "D"



TYPE ODI BASE DETAIL FOR
PIPE RISER CONNECTION



SECTION D-D
TYPE ODI
Steel pipe inlet with grate and
raised opening at HMA dike flowline

NOTES:

- Inlet pipes shall not protrude into basin.
- Except for inlets used for junction boxes, basin floors shall have minimum slope of 4:1 from all directions toward outlet pipe, and a wood trowel finish.
- See Standard Plans D77B for Grate and Frame Details and weights of Miscellaneous Iron and Steel.
- Designation of Type OMPI pipe inlets on plans indicates trash racks are to be furnished and installed on all side openings. See Standard Plan D75C for trash rack details.
- More than one side opening may be required. Location and number as ordered by the Engineer.
- Chain to be provided when specified.
- Caulk seal with pliable mixture of sand, portland cement, and emulsified asphalt (Mixture of 1 part portland cement, 3-5 parts sand, and 1 1/2 parts SSI emulsified asphalt).
- Place pipe so bars of grate will be parallel with main surface flow.
- Steel pipe inlets are paid for as an Each item under 60404-0000, Catch Basin.



03/26/2021

ADAPTED FROM CALTRANS
STANDARD PLAN D75A

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

STEEL PIPE INLETS

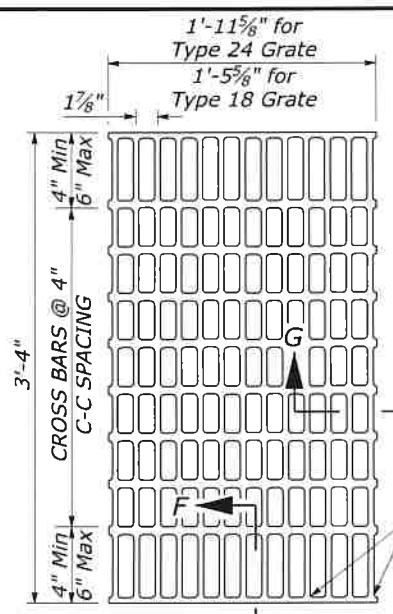
SPECIAL
604-B

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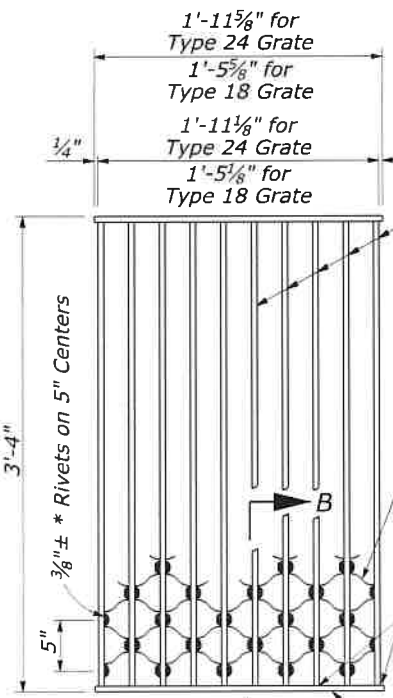
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3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T9



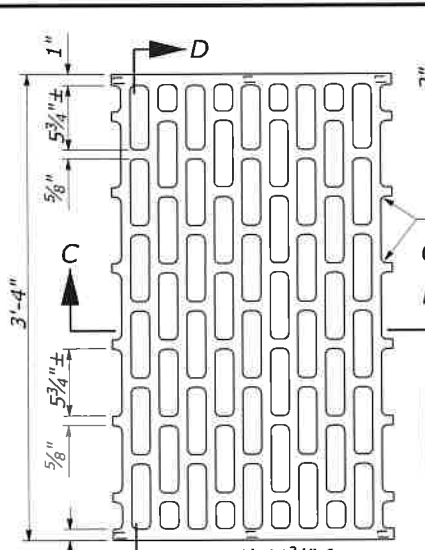
SECTION F-F
SECTION G-G
TYPE 18-10 AND 24-13 GRATE
(Welded Steel)



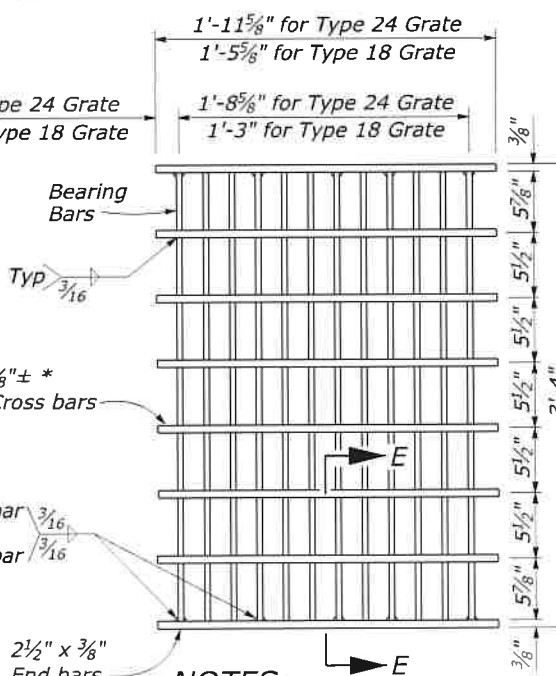
SECTION B-B
TYPE 18-8S AND 24-10S GRATE
(Welded Steel) Reticuline type

NOTES:
Bearing bars to be 3/2" x 1/4" bars on 1 7/8" centers.
3/8" ± * Cross bars may be fillet welded, resistance welded or electroforged to bearing bars.
Weight of Type 24 grate = 141 LBS.
Weight of Type 18 grate = 107 LBS. (Type 24 grate shown).

03/26/2021
REGISTERED PROFESSIONAL ENGINEER
TRAVIS JAMES HOWARD
C74036
CIVIL
STATE OF CALIFORNIA



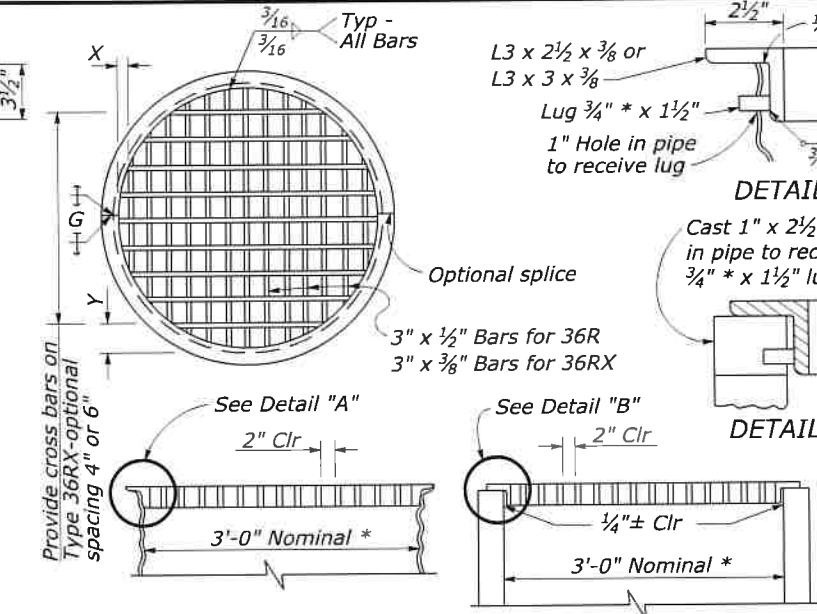
SECTION C-C
TYPE 18-8C AND 24-10C GRATE
(Cast ductile iron)



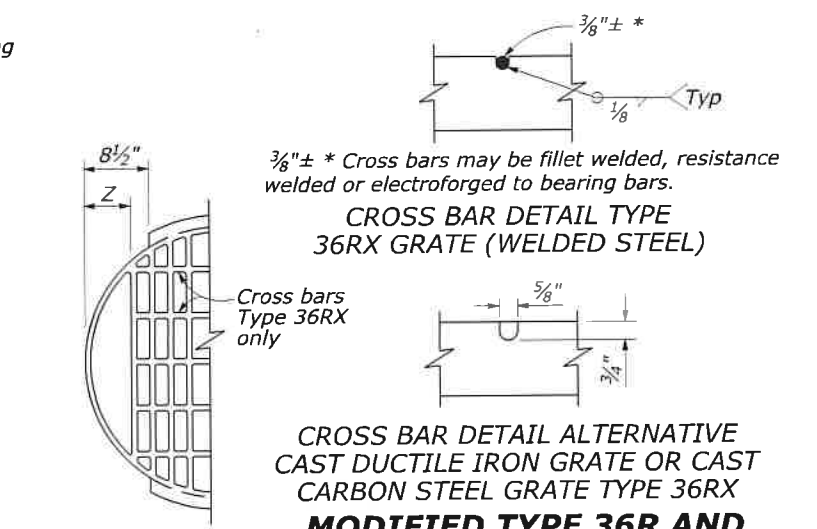
SECTION E-E
TYPE 18-9X AND 24-12X GRATE
(Welded Steel)

TYPE 18 GRATE	TYPE 24 GRATE
a = 3/8"	a = 7/8"
b = 3/8"	b = 3/4"

NOTES:
Weight of Type 24 grate = 155 LBS.
Weight of Type 18 grate = 130 LBS.
On Type 18 grate omit center bearing point.



TYPE 36R AND 36RX GRATE DETAILS



- NOTES:**
- When alternative grates are allowed - Final pay based on alternative with the lesser weight.
 - Use frame shown on Standard Plan D74A, D74B or D77A as appropriate.
 - When Type 24-10S, 24-12X or 24-13 grates are used with GDO Inlets, a 1/4" x 3 1/2" x 3'-4 1/8" steel bar shall be welded across the center of inlet frame to separate the individual grates.
 - See Standard Plan D77A for connecting chain to welded grate and frame. When chain is required, do not use cast ductile iron grate.

GRATE BAR SPACING TABLE						
TYPE	No. OF BARS	CLEAR BAR SPACING	X	4" SPACING	6" SPACING	Z
36R	13	2"	2 1/16"	-	-	-
36RX (STEEL)	15	2"	9/16"	3 3/4"	5 3/4"	-
36RX (CAST)	13	2"	2 1/4"	3 3/4"	5 3/4"	-
36R Mod	12	2"	2 1/8"	-	-	5"
36RX Mod (STEEL)	13	2"	9/16"	3 3/4"	5 3/4"	5 1 1/16"
36RX Mod (CAST)	12	2"	2 1/8"	3 3/4"	5 3/4"	5"

**ADAPTED FROM CALTRANS
STANDARD PLAN D77B
NO SCALE**

**BASIS FOR MISC IRON AND STEEL
FINAL PAY WEIGHTS FOR
DRAINAGE INLETS**

INLET TYPE	GRATE TYPE	No. OF GRATES	WEIGHT LB
GDO (SEE NOTE 4)	24-10C	2	391
	24-10S	2	456
	24-12X	2	473
	24-13	2	374
G0, G0L, G1, G2, G3, G4 (TYPE 24)	24-10C	1	202
	24-10S	1	229
	24-12X	1	239
	24-13	1	188
G4 (TYPE 18) G5, G6	18-8S	1	187
	18-9X	1	187
	18-10	1	149
	18-8S	2	374
GT1, GT2	18-9X	2	374
	18-10	2	298
	24-10C	2	404
	24-10S	2	458
GT3, GT4	24-12X	2	478
	24-13	2	376
	36RX (Mod)	1	196
	36RX	1	215
GMP, GCP, GCPI	36R (Mod)	1	220
GMP, GCP, GCPI	36R	1	236
TRASH RACK			22
GRATE CHAIN			3

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

GRATE DETAILS

SPECIAL
604-C

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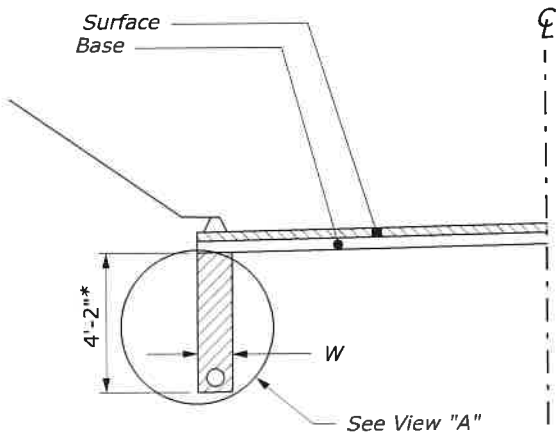
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3/25/2021

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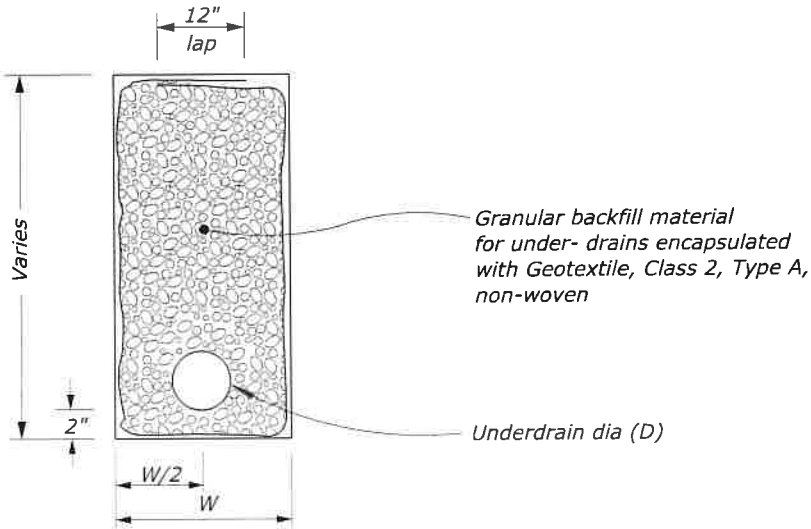
- NOTES:
1. Location of pipe underdrains may be adjusted by the CO.
 2. Minimum underdrain grade is 0.5 percent.

DIAMETER (D)	MINIMUM WIDTH (W)
6"	15"



PAVED DITCH

* Adjust depth to meet field conditions



VIEW A



03/26/2021

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

**UNDERDRAIN, FOR
PAVEMENT AND DITCHES**

NO SCALE

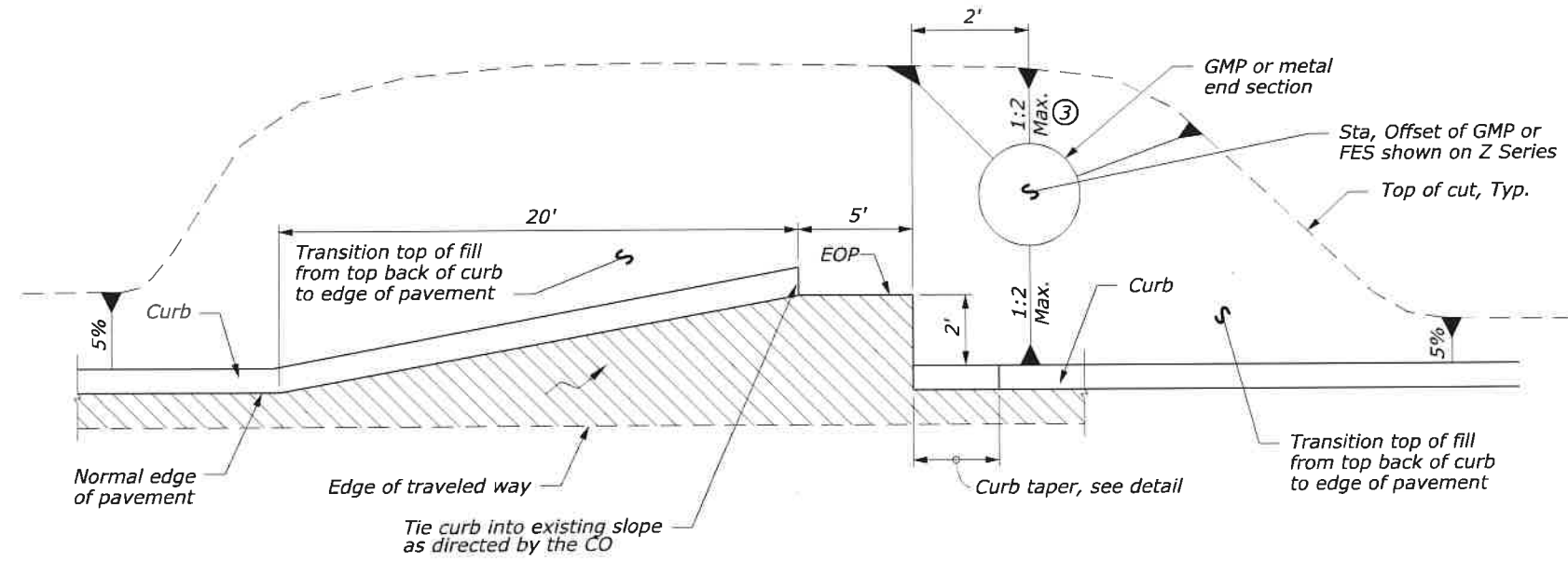
SPECIAL
605-A

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9/6/2022

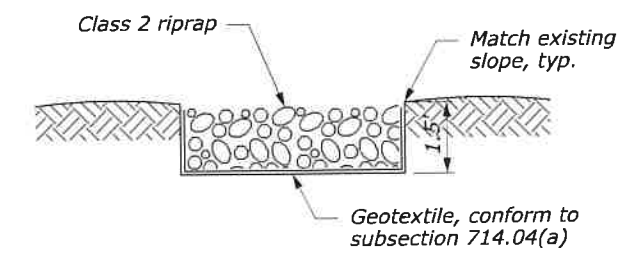
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T11



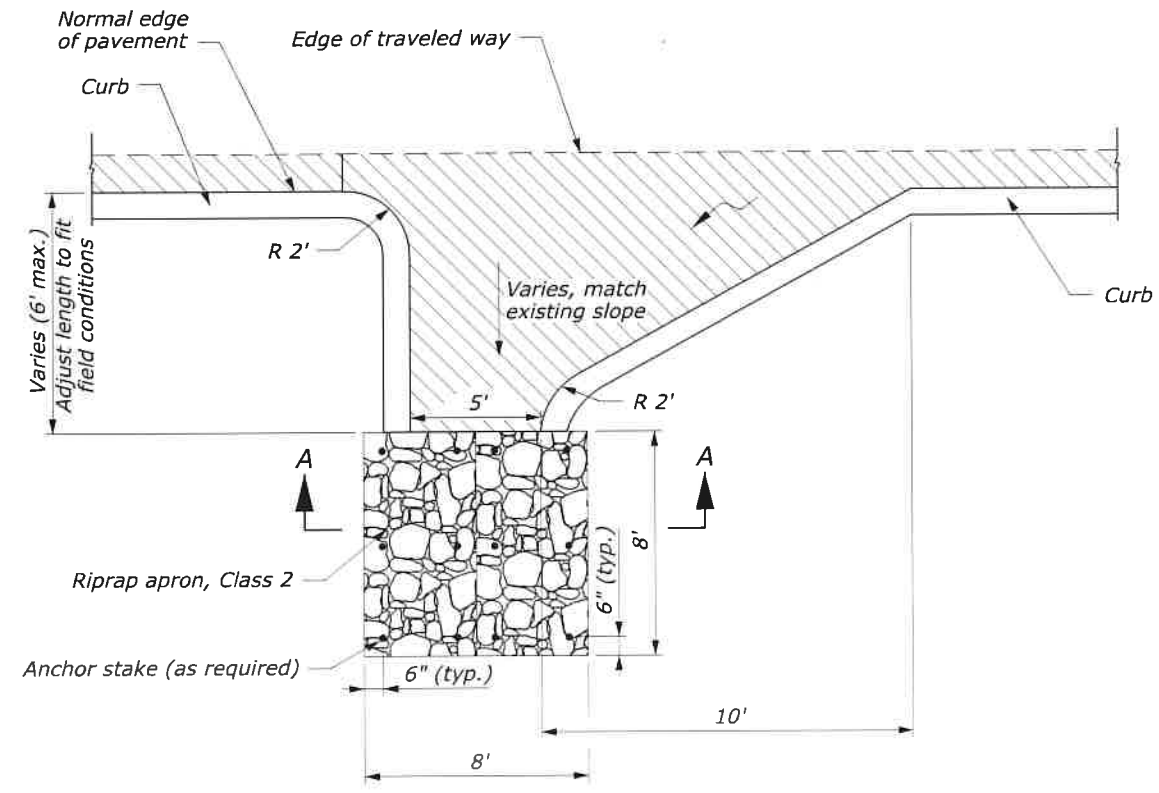
CUT SIDE CURB CUT

NOTES:

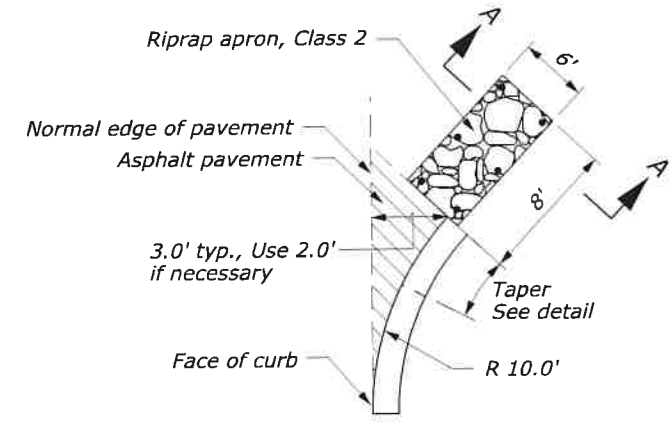
1. Curb for flared curb terminus will be measured under curb items. Adjust as necessary to fit field conditions.
2. Riprap and revet mattress for curb terminus on mainline will be measured under their respective pay items.
3. Cut slope may exceed 1:2 in rock excavation locations as shown on the plans and as approved by the CO.
4. Additional curb for curb cuts on mainline will be measured under curb items. Riprap and revet mattress for curb cuts will be measured under their respective pay items.



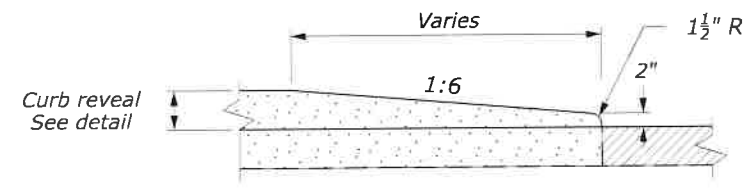
SECTION A-A



FILL SIDE CURB CUT



FLARED CURB TERMINUS



CURB TAPER

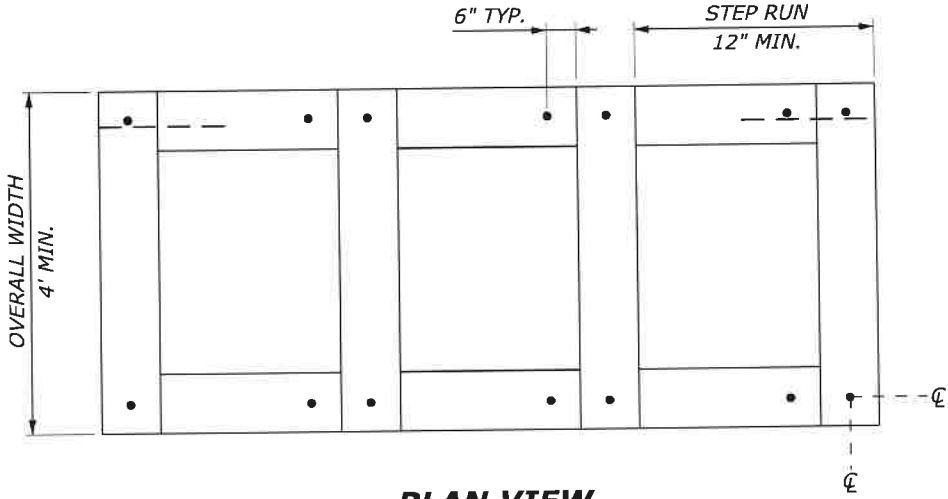
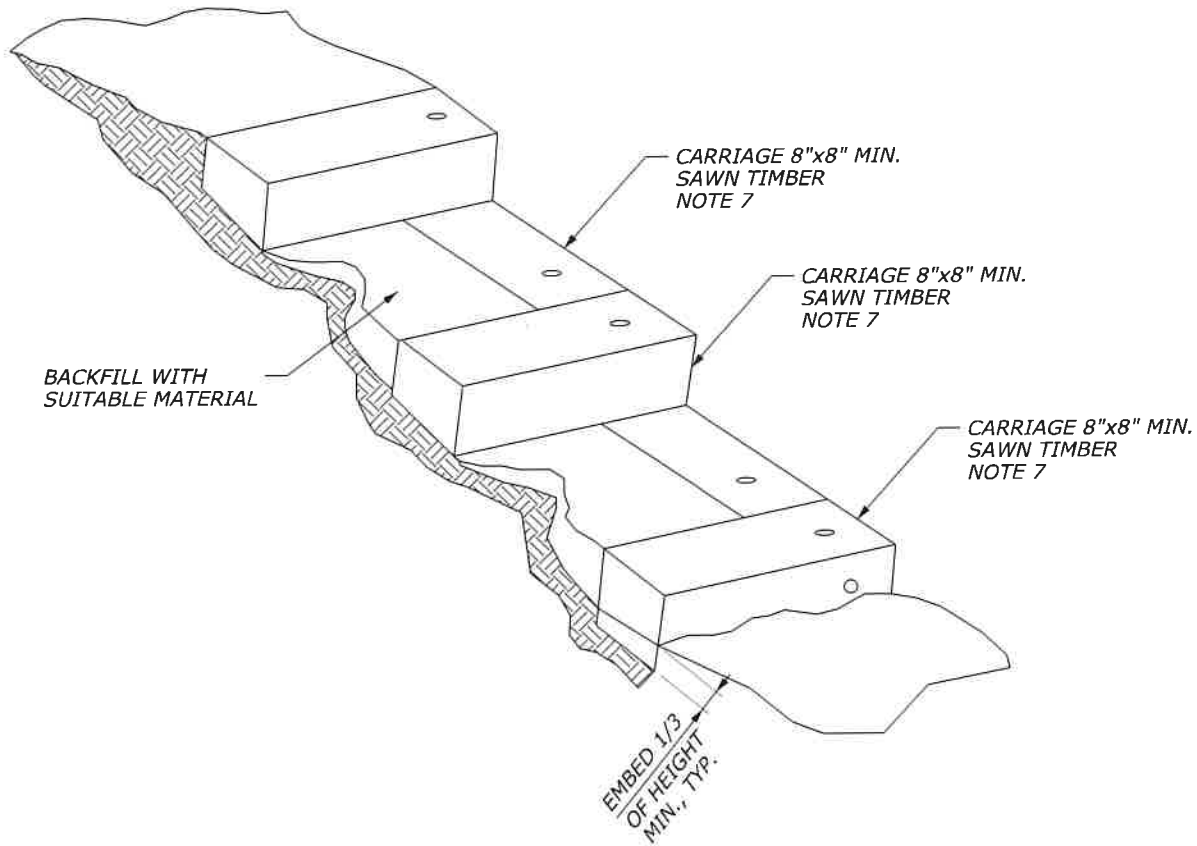


09/06/2022

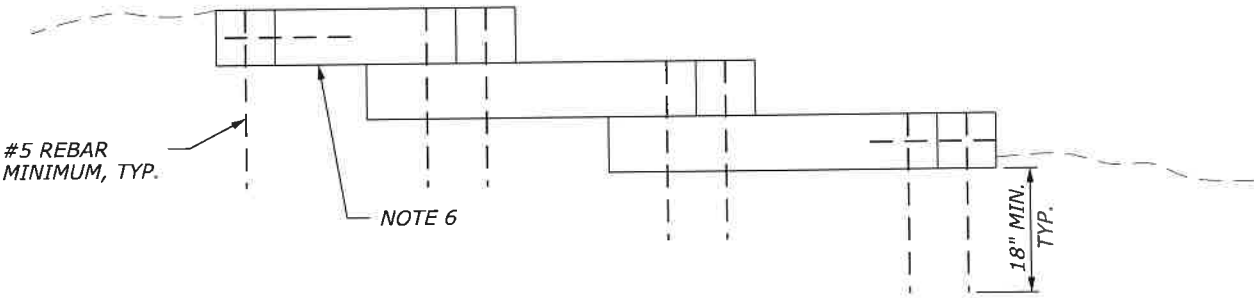
U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION
U.S. CUSTOMARY SPECIAL
CURB DETAILS
SPECIAL 609-A

NO SCALE

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T12



PLAN VIEW



ELEVATION VIEW

- NOTES:
1. PRE-DRILL HOLES FOR REBAR AND PINS TO PREVENT SPLITTING OF TIMBERS.
 2. RECESS END OF REBAR 1/2" BELOW TOP OF TIMBER.
 3. COMPACT BACKFILL IN 6" LIFTS UNTIL NO VISUAL DISPLACEMENT.
 4. MINIMUM OVERLAP OF BOTTOM CARRIAGE IS THE SAME AS THE STEP RUN LENGTH.
 5. PROVIDE RISERS AND CARRIAGE WITH THE SAME CROSS SECTIONAL DIMENSIONS.
 6. NO DIRECT PAYMENT FOR EXCAVATION.
 7. PROVIDE SAWN TIMBER PRESSURE TREATED WITH A WATERBORNE PRESERVATIVE COMPLIANT WITH APWA USE CATEGORY UC4A.



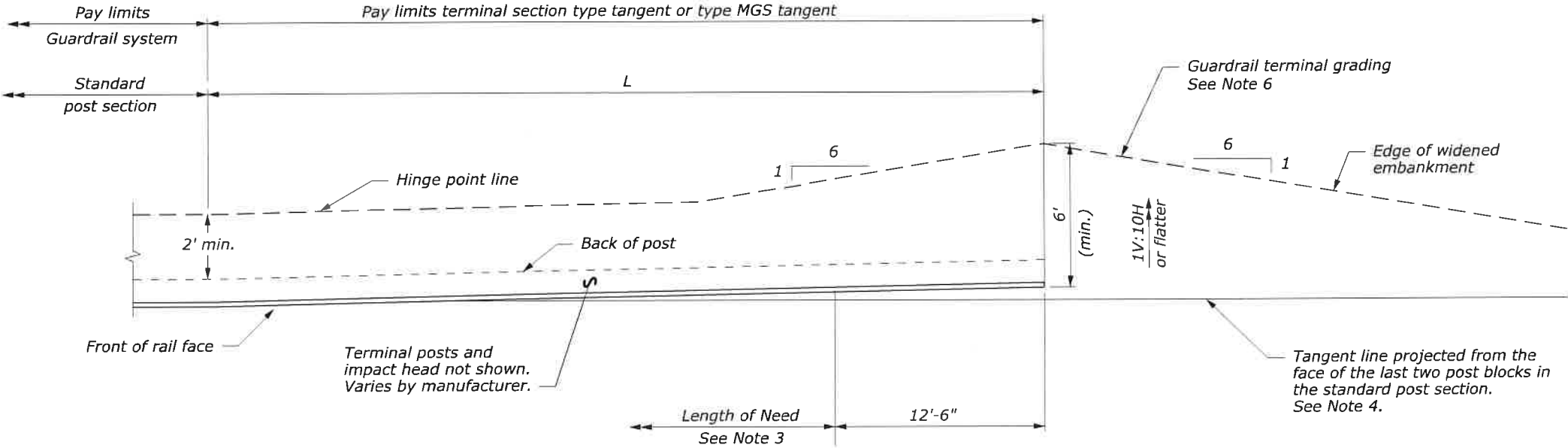
03/26/2021

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY SPECIAL	
STAIR DETAILS	
NO SCALE	SPECIAL 609-B

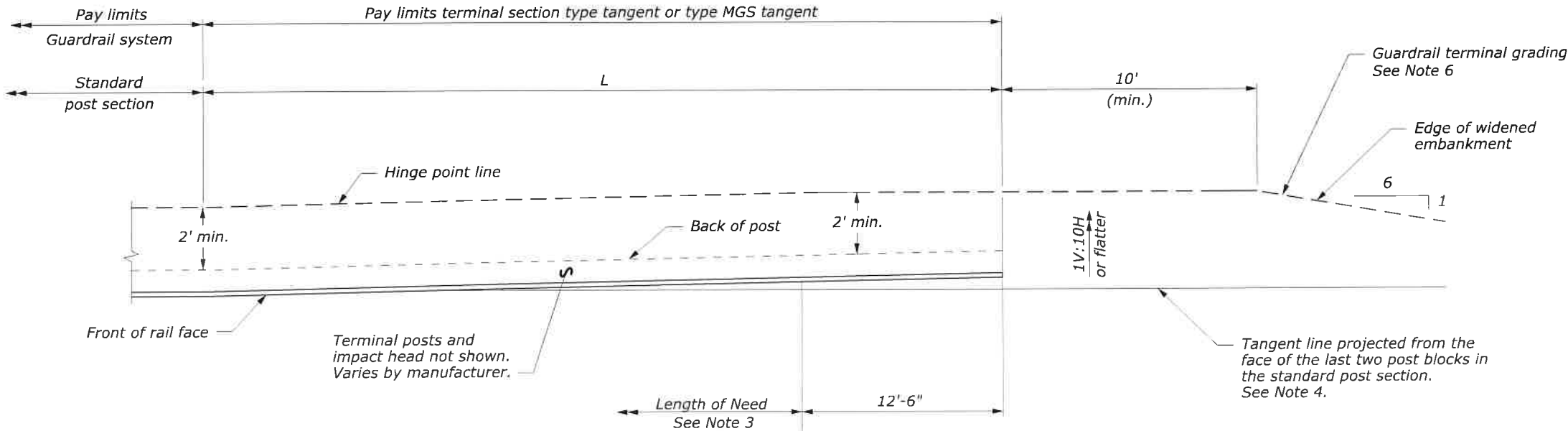
NOTE:

1. Install tangent terminal according to the manufacturer's recommendations. See manufacturer's drawings for other details.
2. Construct the terminal grading layout as shown in the staking notes or model. If no staking notes or model are provided, use the preferred grading layout as much as practical within site constraints. If necessary because of site limitations, use the alternative grading layout.
3. For design purposes, the length of need is assumed to begin at post 3. Verify the length of need with the manufacturer for a specific product. Adjust grading as necessary to install the tangent terminal according to the manufacturer's recommendations.
4. Install terminal at a 1:25 taper or flatter, to position the end farther away from the edge of the shoulder, or use a taper according to manufacturer's recommendations.
5. Install a reflectorized object marker on the impact head.
6. Construct a 1V:4H slope outside of the guardrail terminal grading extents where practical.

TEST LEVEL	L (ft)
2 (\leq 45 mph)	25
3 ($>$ 45 mph)	37.5 or 50 (for G4)
	50 (for MGS)



PLAN
PREFERRED GRADING



PLAN
ALTERNATIVE GRADING



03/26/2021

FOR SELECTION ONLY

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
FEDERAL LANDS HIGHWAY OFFICE

U.S. CUSTOMARY STANDARD
**G4 AND MGS
W-BEAM GUARDRAIL
TYPE TANGENT TERMINAL
AND GRADING**

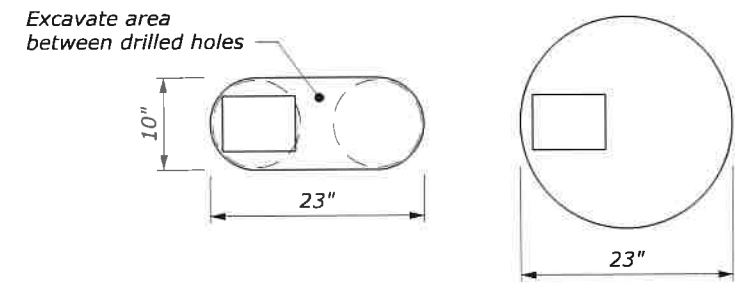
STANDARD APPROVED FOR USE 6/2005

REVISED:
DRAFT: 03/2018

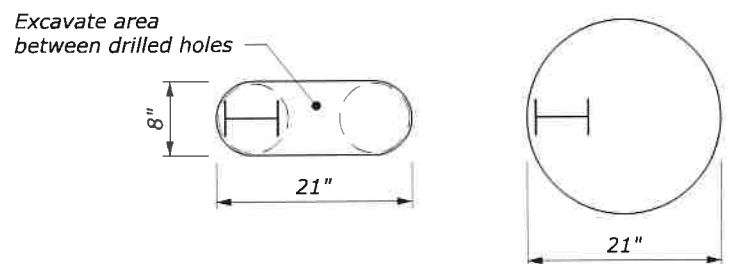
STANDARD
617-20

NO SCALE

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T14

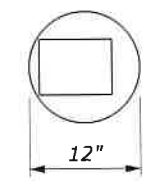


Wood Post

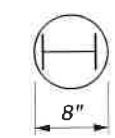


Steel Post

PLAN VIEW



Wood Post

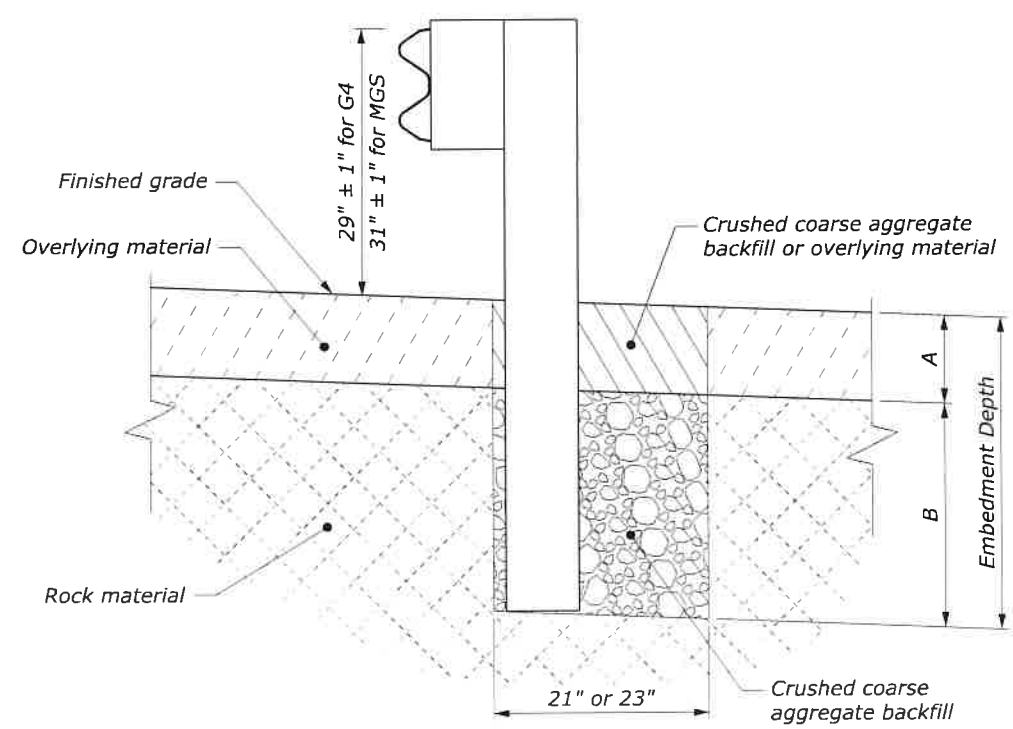


Steel Post

PLAN VIEW

NOTE:

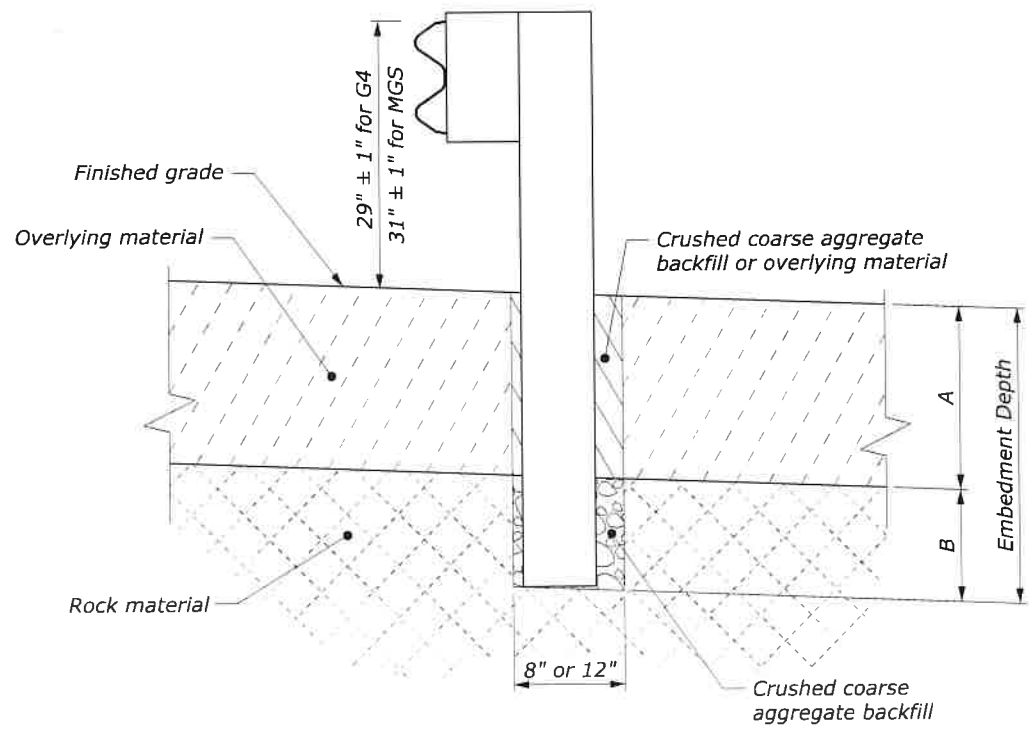
1. Use this standard when posts cannot be embedded to the minimum depth shown on Special 617-A.
2. Unless otherwise specified, use either the circular or the oblong hole configuration for Case 1 conditions.
3. Use crushed coarse aggregate backfill that conforms to "coarse aggregate for concrete" or "granular backfill for underdrain pipe with geotextile" in Section 703.
4. Place crushed coarse aggregate according to the post requirements in Section 617.
5. Treat field cut galvanized steel post surfaces that expose the base metal with two coats of zinc-oxide paint.



ELEVATION

Case 1: Overlying material depth (A) is 18" or less.

POST EMBEDMENT DIMENSIONS			
HOLE TYPE	EMBEDMENT DEPTH	OVERLYING MATERIAL (A)	DRILLING DEPTH (B)
Case 1	24" to 42"	0 to 18"	24"
	30" to 42"	> 18" to 30"	12"
Case 2	42"	> 30"	42" - A



ELEVATION

Case 2: Overlying material depth (A) is greater than 18".



03/26/2021

FOR SELECTION ONLY

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY DETAIL MGS AND G4 W-BEAM GUARDRAIL INSTALLATION IN ROCK	
REVISIED:	DETAIL C617-13

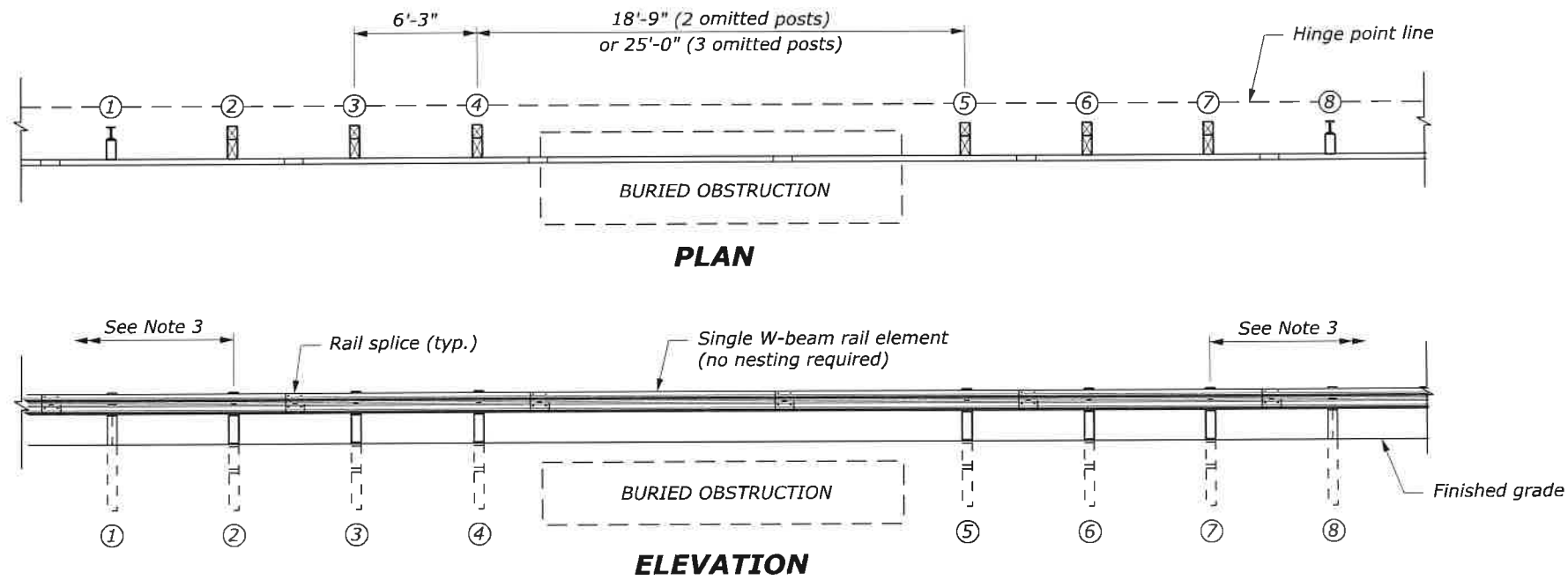
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3/25/2021

STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T15

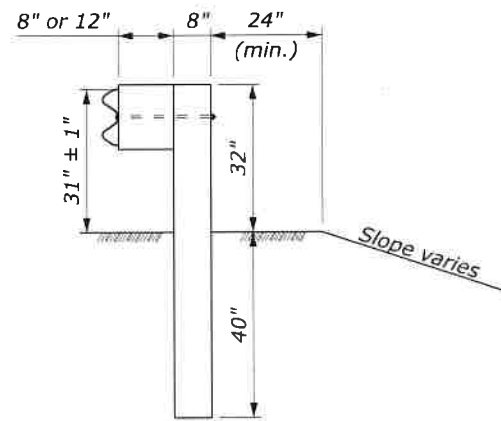


NOTE:

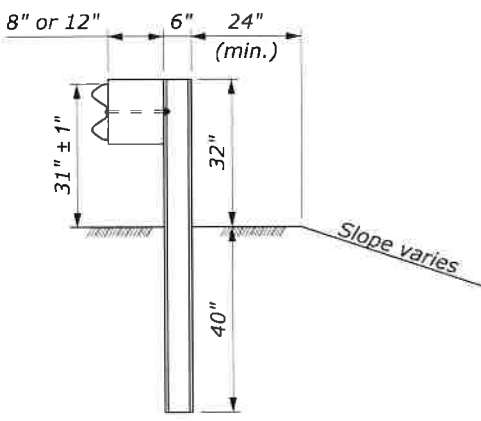
1. Posts ① and ⑧ may be wood or steel.
2. Use wood posts for CRT posts.
3. The minimum length of guardrail, including the end terminals, upstream and downstream of posts ② and ⑦ is 62.5 feet.
4. In locations where the culvert headwall extends above the finished grade to act as a vertical roadway curb, the maximum height of the culvert headwall above the finished grade is 2 inches.
5. See Special 617-A for other assembly details.



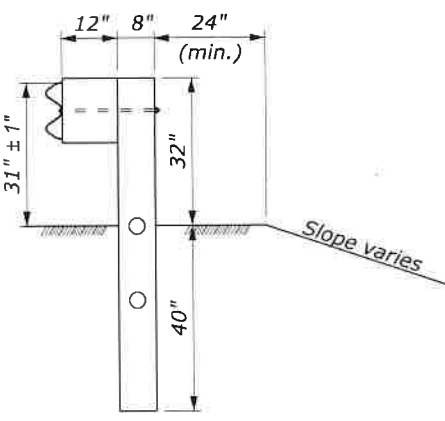
FOR SELECTION ONLY



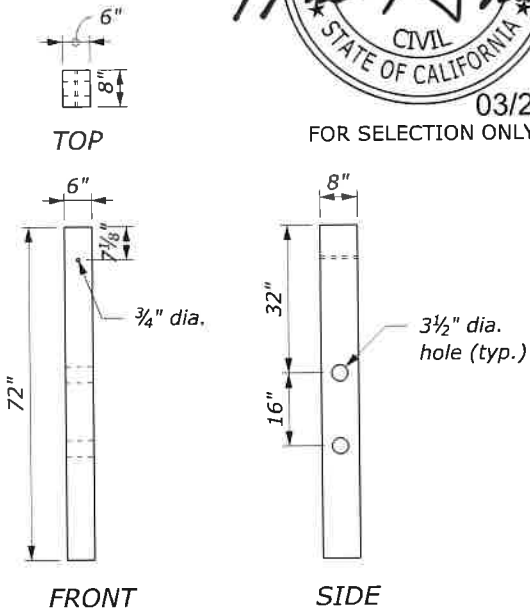
WOOD POST DETAIL
POST ① AND ⑧
See Note 1



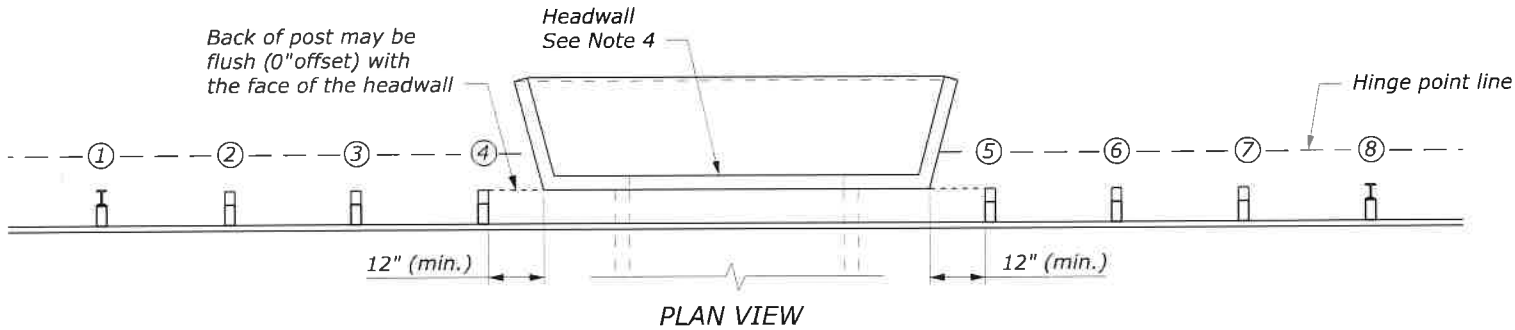
STEEL POST DETAIL
POST ① AND ⑧
See Note 1



CRT POST DETAIL
POST ② THRU ⑦
See Note 2



CRT WOOD POST



SPAN WITH HEADWALL DETAIL

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY DETAIL

**MGS W-BEAM GUARDRAIL
LONG-SPAN SYSTEM**

DETAIL APPROVED FOR USE	04/2020	DETAIL
REVISED:		C617-37

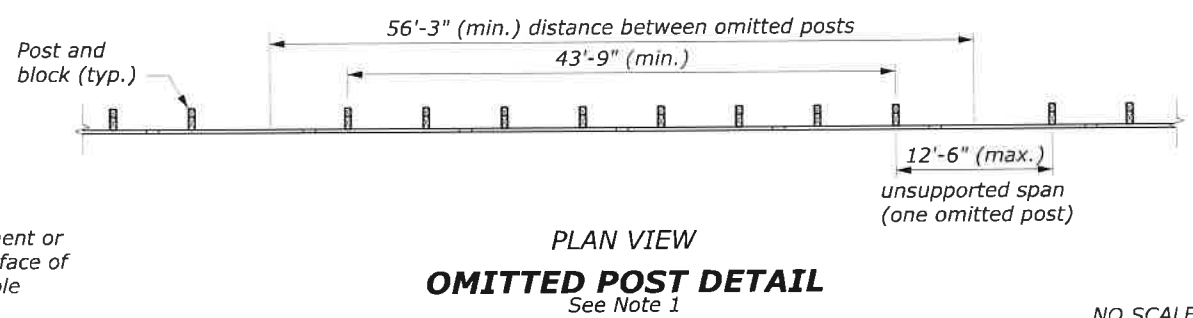
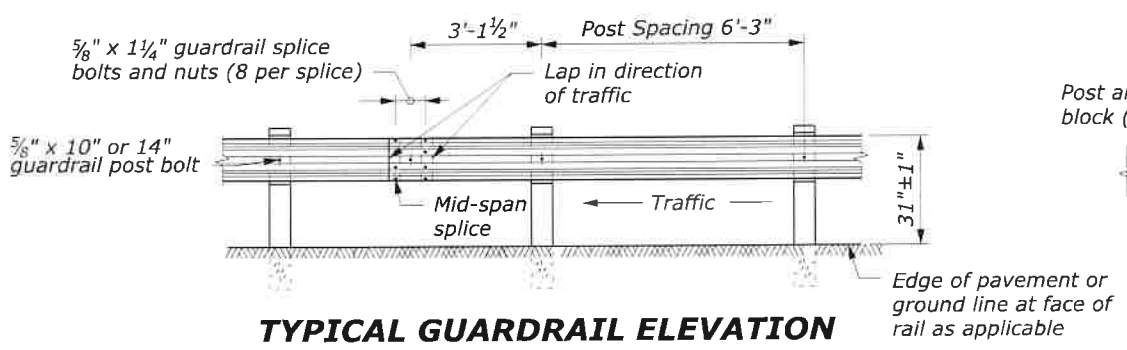
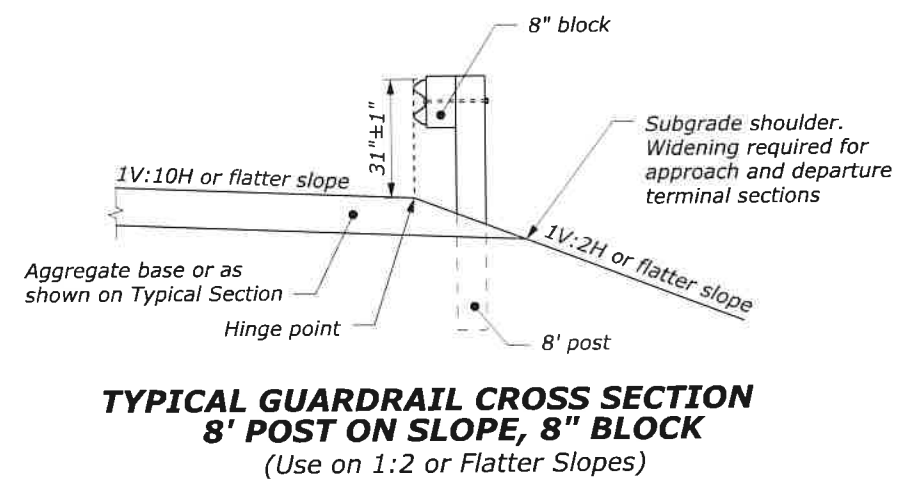
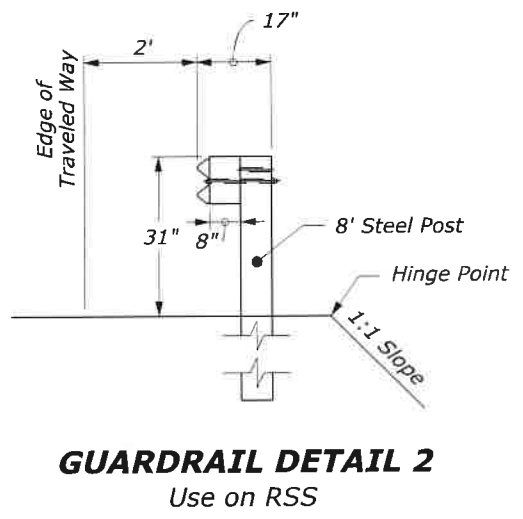
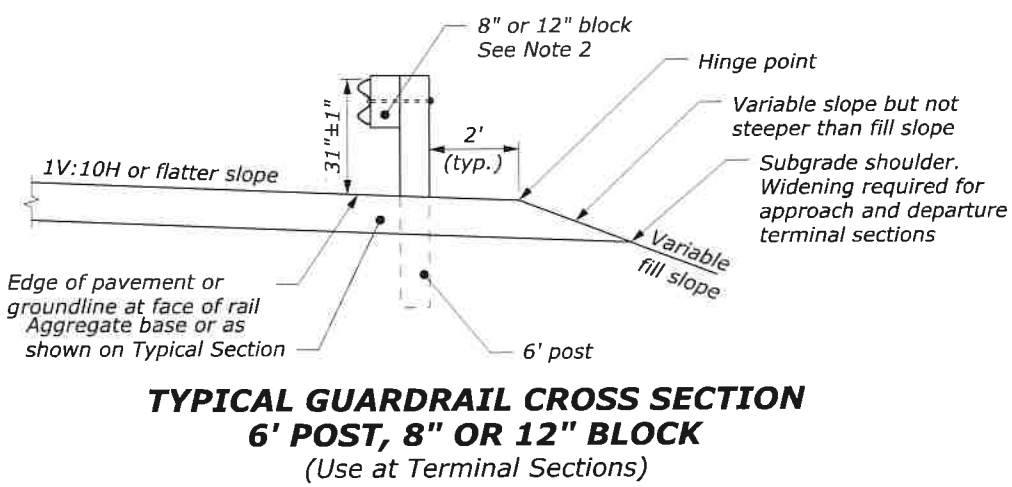
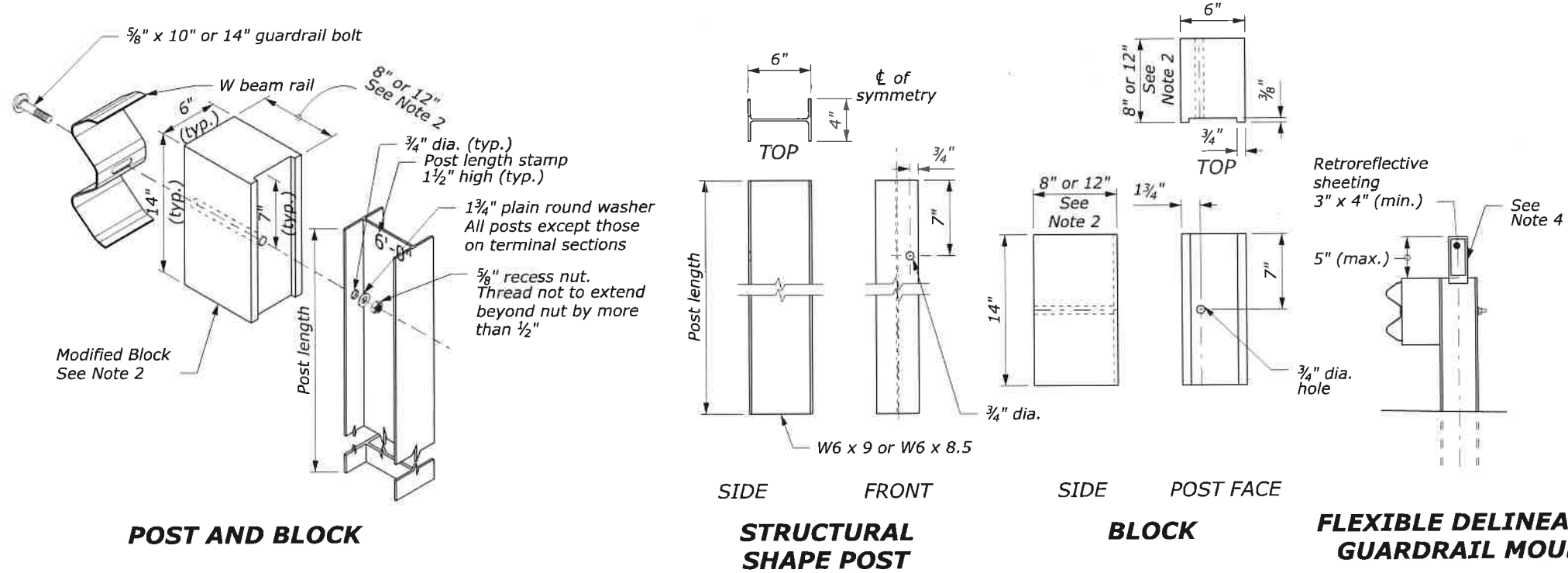
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T16

NOTE:

1. When encountering impenetrable material, one post may be omitted in locations where the typical guardrail cross section includes 2 feet (min.) between the back of the guardrail post and the hinge point. For all other locations, see Section 617 and Details C617-13 or C617-37.
2. Size of block shown elsewhere on the plans. Modified block may be wood, plastic, or composite material. Use consistent material throughout the length of guardrail run.
3. Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance, and accepted manufacturing practices.
4. Install a flexible hinged delineator every fourth post. Fasten delineator to the web of the steel post using either an adhesive or mechanical means according to the manufacturer's recommendations.



03/26/2021



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

MGS W-BEAM GUARDRAIL STEEL POSTS

SPECIAL 617-A

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3/25/2021

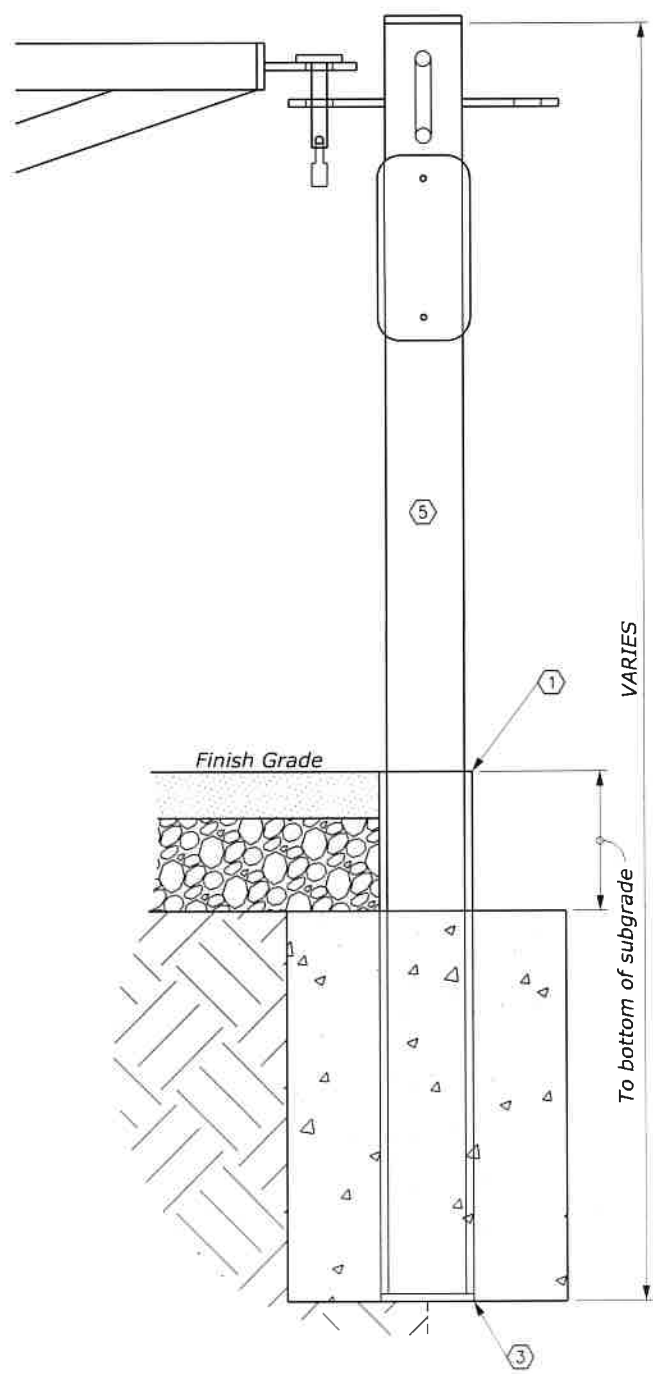
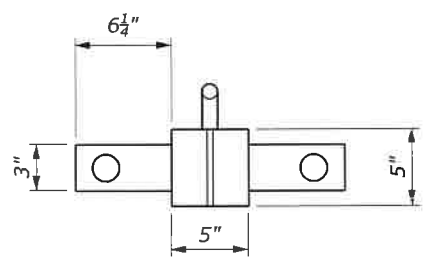
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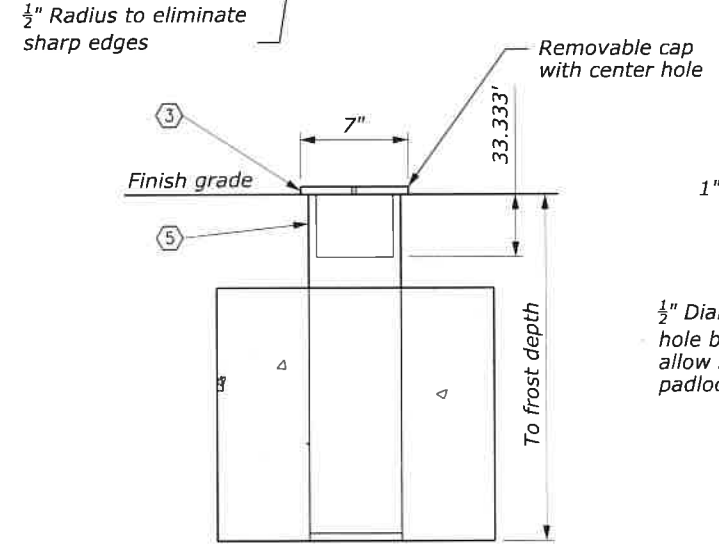
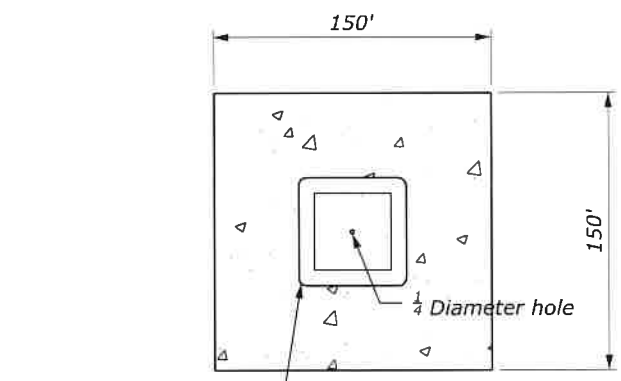
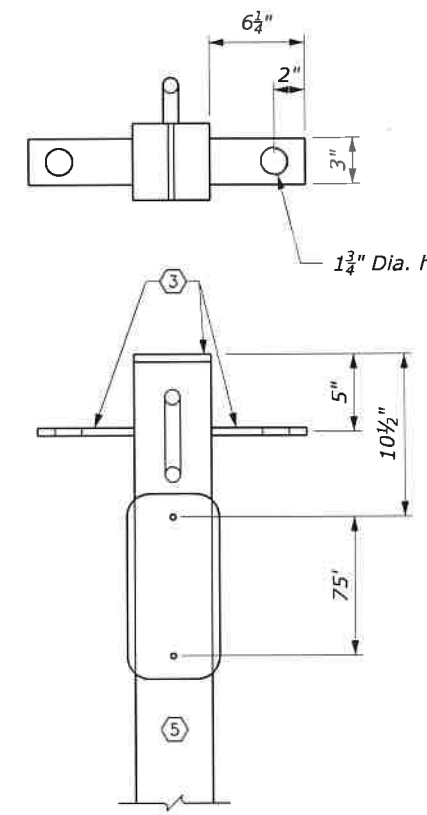
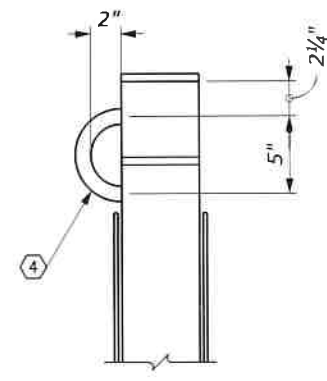
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STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T18

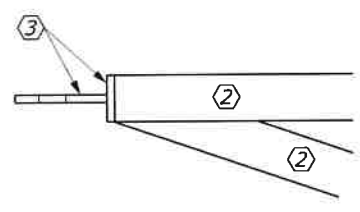
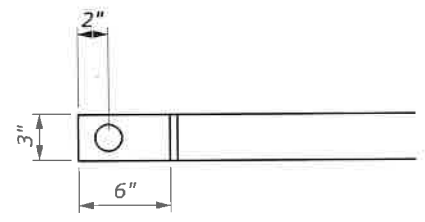


CENTER POST WITH SLEEVE DETAIL

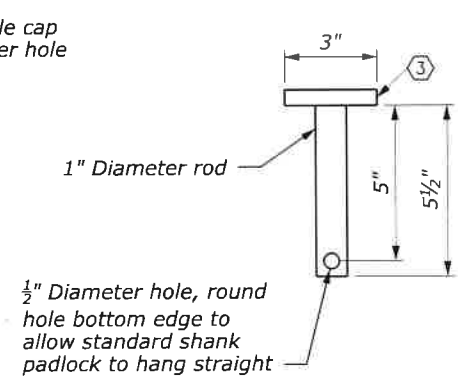
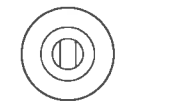
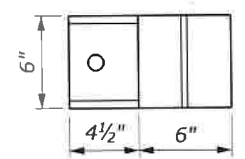
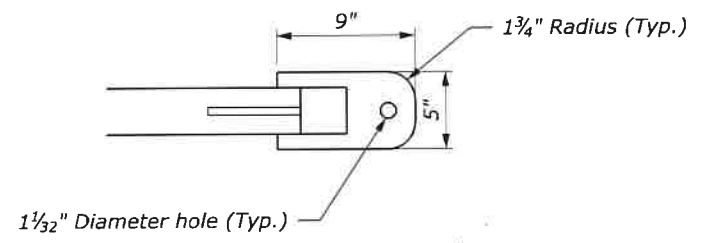
NOTE:
1. Materials list found on Sheet 1 of 3.



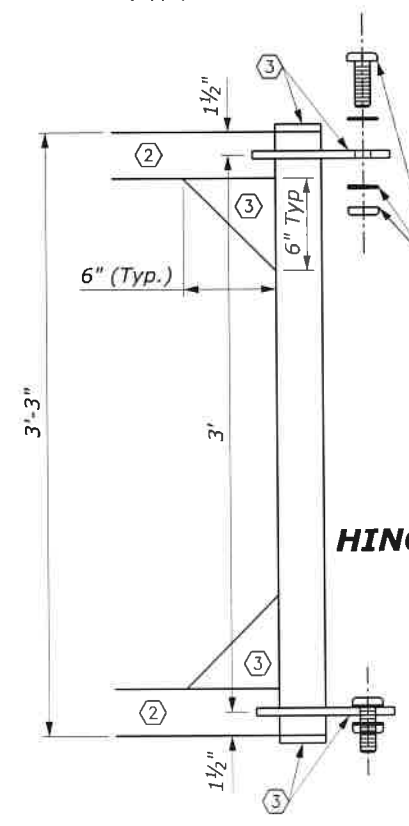
CENTER POST SLEEVE & CAP DETAIL



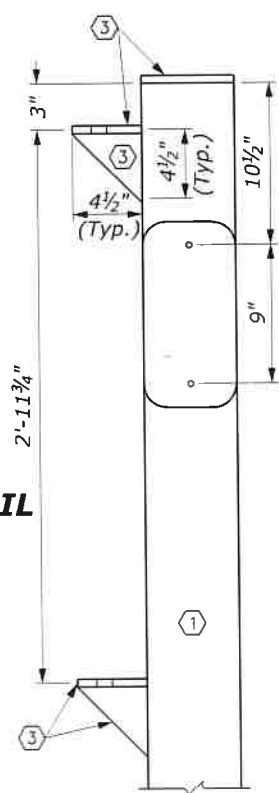
LOCKING DETAIL



LOCK CAP DETAIL



HINGE POST DETAIL



ADAPTED FROM UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST DIVISION DETAIL

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY SPECIAL	
27' METAL GATE	
Sheet 2 of 3	
	SPECIAL 619-A

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3/25/2021

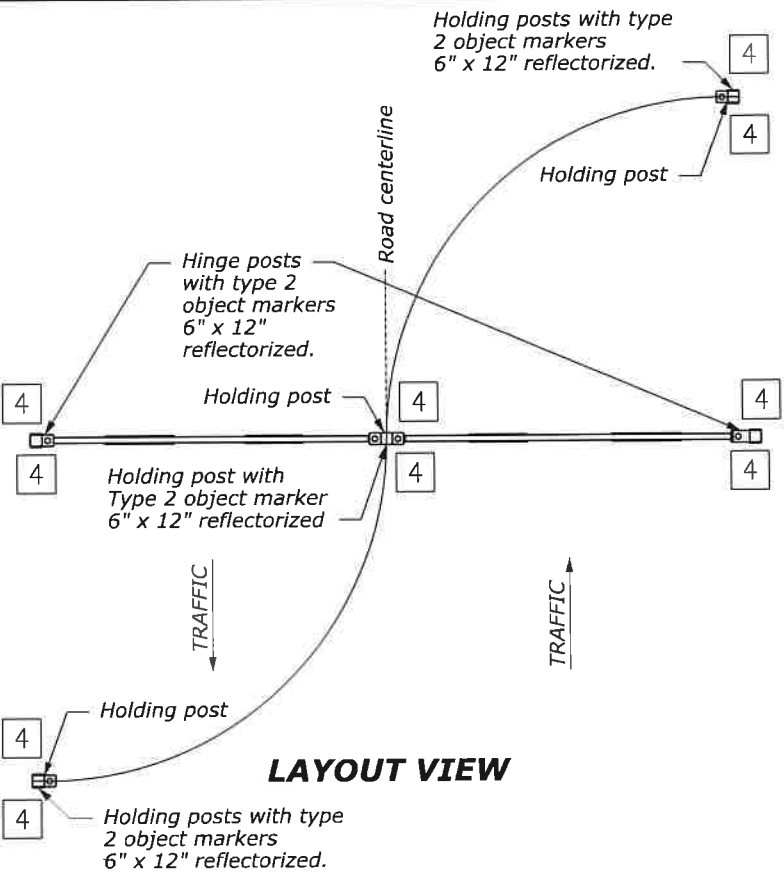
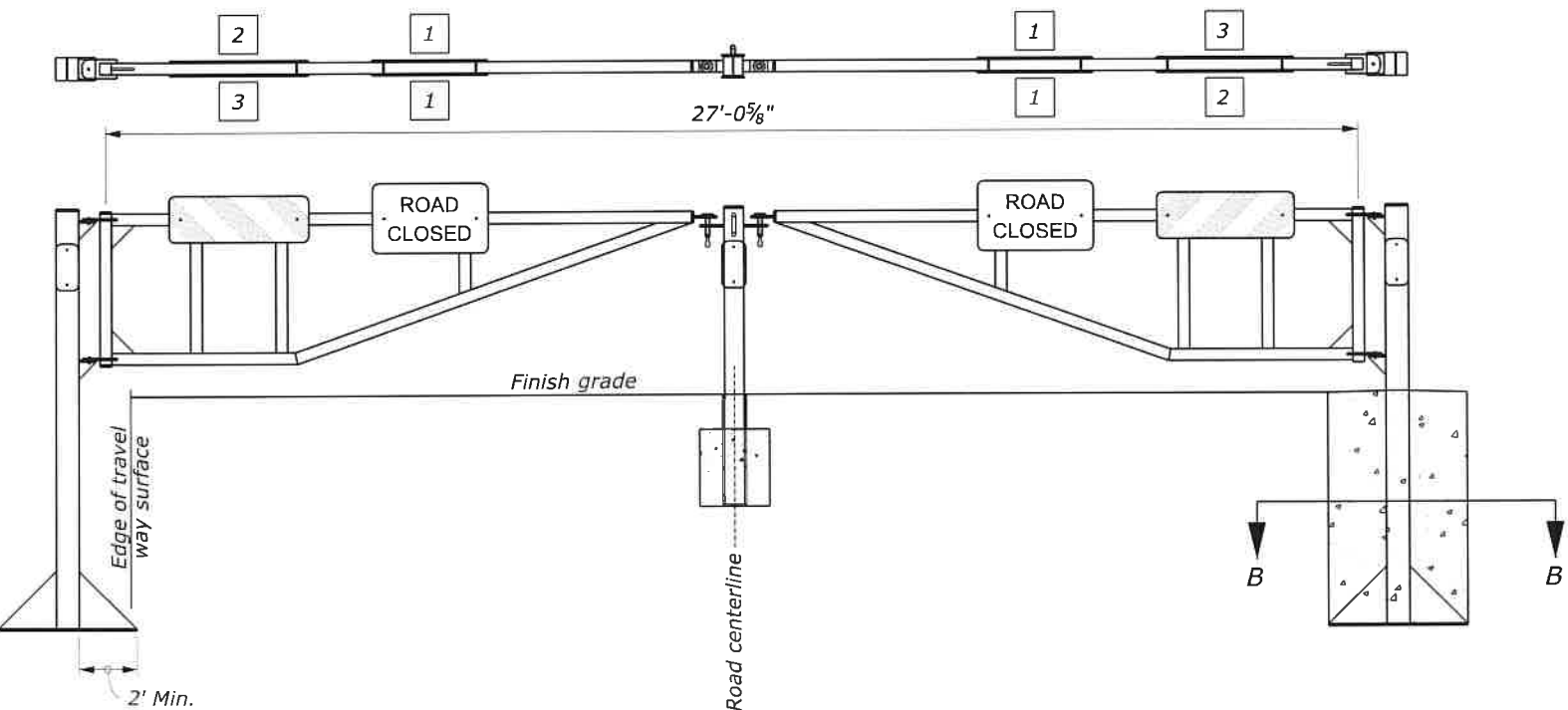
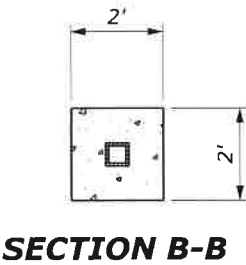
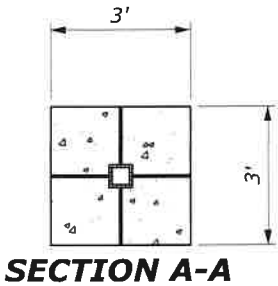
STATE	PROJECT	SHEET NUMBER
CA	CA FLAP 03S11(1)	T19

NOTE:

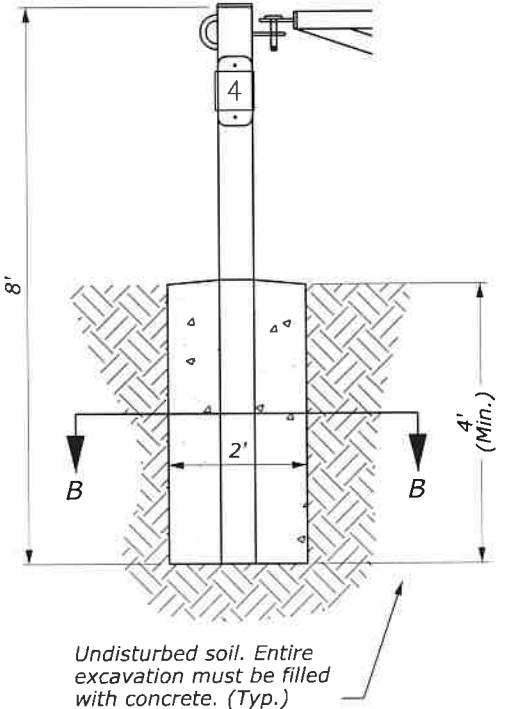
1. Field locate holding posts to support gate in open position.
2. If holes for posts are over excavated, the contractor must fill the over excavated holes with concrete at no extra cost to the government.
3. Slope exposed top portion of each concrete base a minimum of 2% to drain away from post.

SIGN SCHEDULE

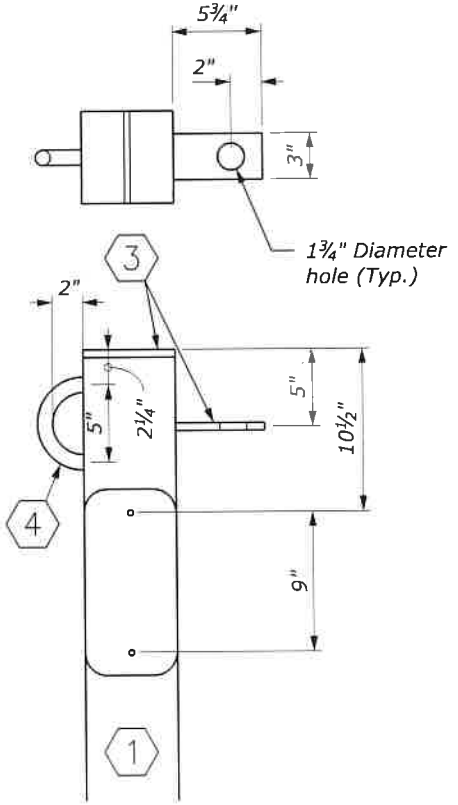
Sign	Qty.	Description	Size
1	4	R11-2	30" x 24"
2	2	OM3-R	36" x 12"
3	2	OM3-L	36" x 12"
4	10	OM2-2V	6" x 12"



LAYOUT VIEW



HOLDING POST DETAIL



ADAPTED FROM UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST DIVISION DETAIL

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

27' METAL GATE

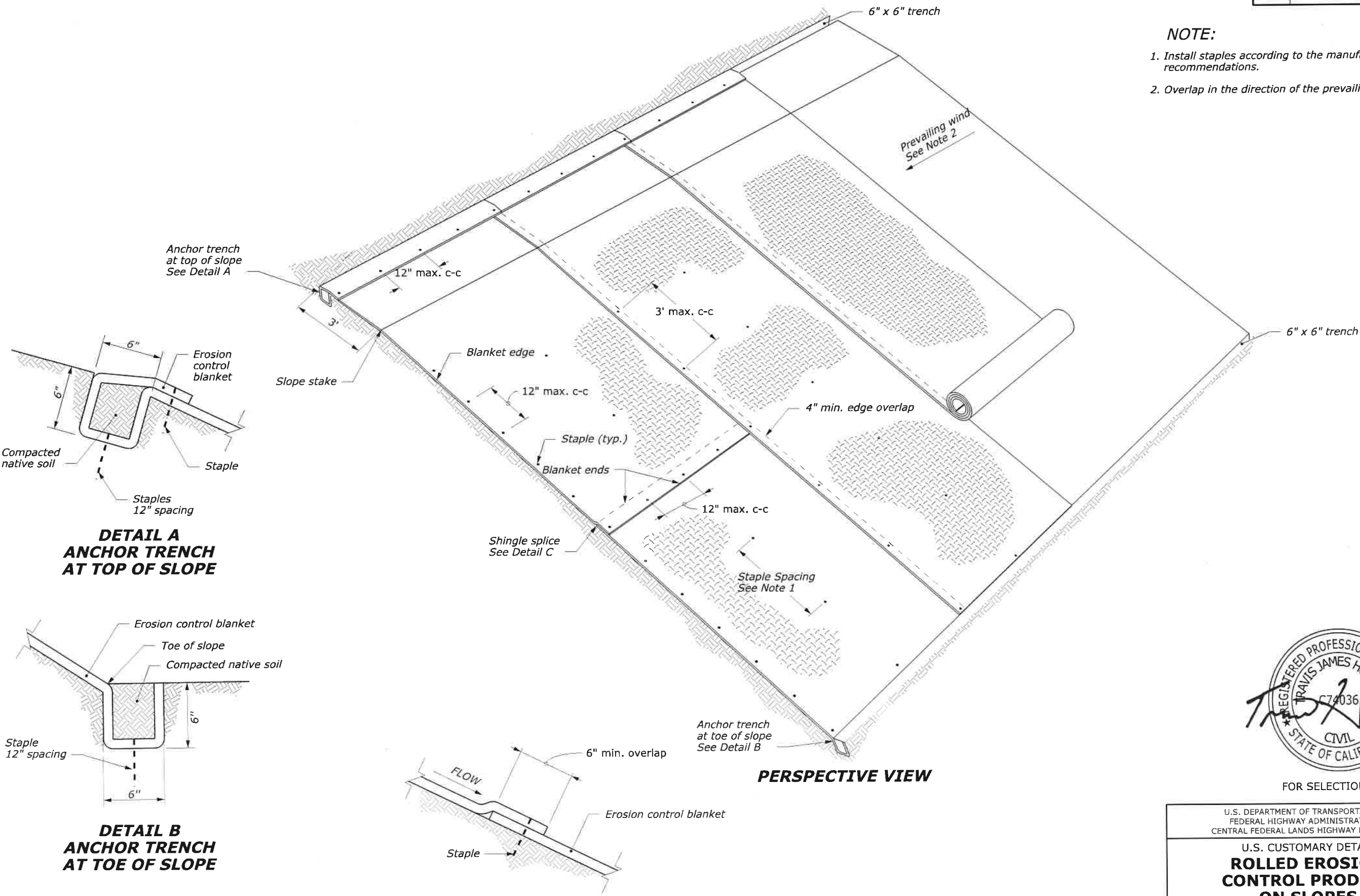
Sheet 3 of 3

SPECIAL
619-A

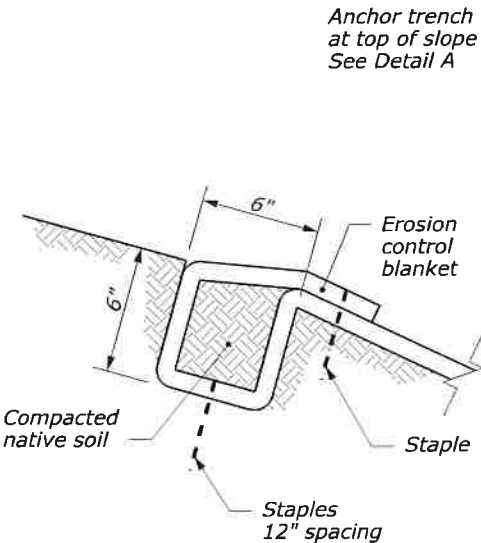
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CA	CA FLAP 03S11(1)	T20

NOTE:

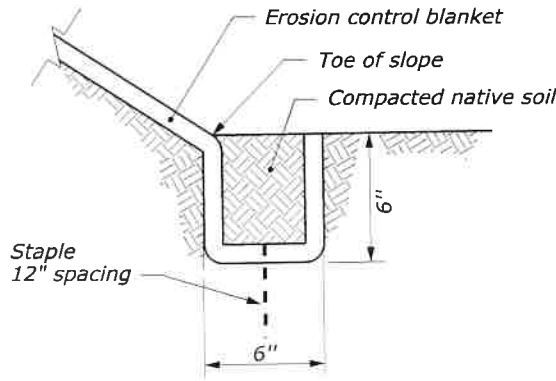
1. Install staples according to the manufacturer's recommendations.
2. Overlap in the direction of the prevailing wind.



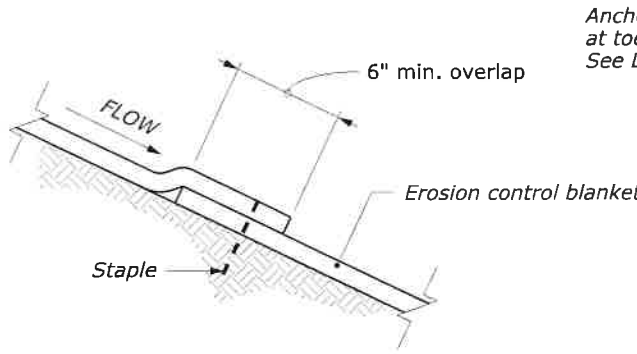
**DETAIL A
ANCHOR TRENCH
AT TOP OF SLOPE**



**DETAIL B
ANCHOR TRENCH
AT TOE OF SLOPE**



**DETAIL C
SHINGLE SPLICE**



PERSPECTIVE VIEW



03/26/2021
FOR SELECTION ONLY

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY DETAIL
**ROLLED EROSION
CONTROL PRODUCT
ON SLOPES**

DETAIL APPROVED FOR USE 01/2011

REVISED: 08/2014

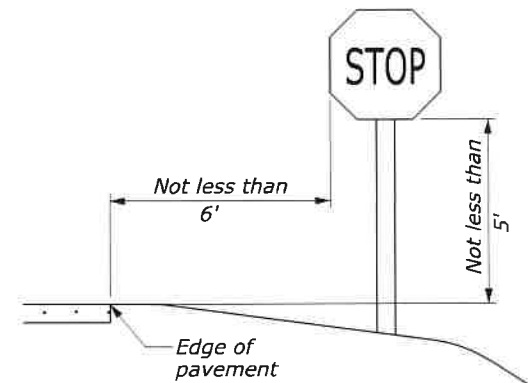
DETAIL
C629-50

NO SCALE

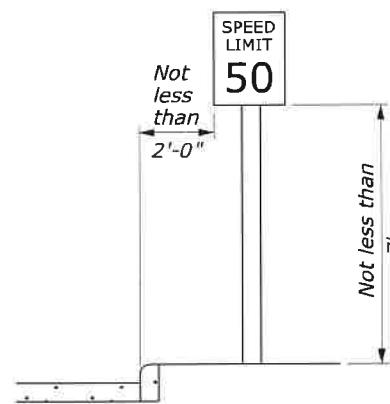
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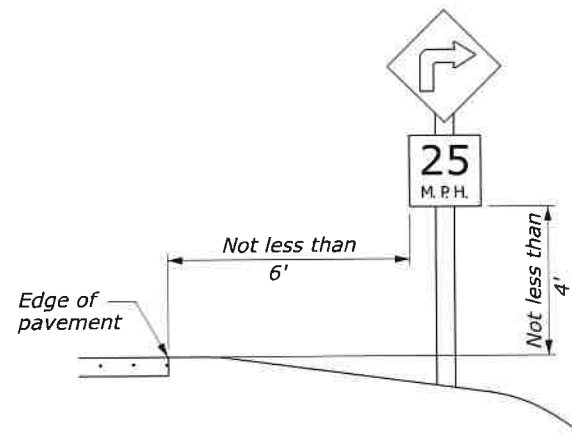
3/25/2021



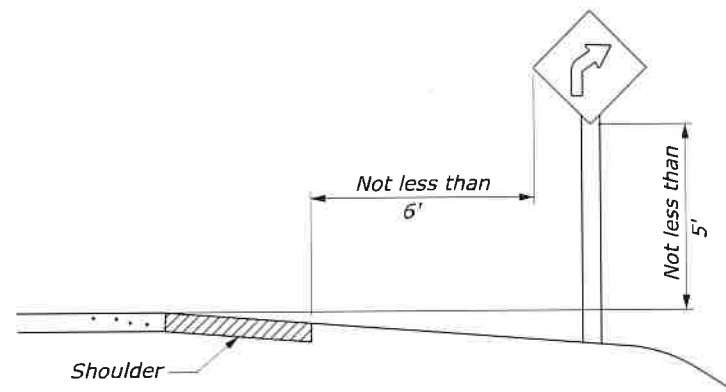
**ROADSIDE SIGN RURAL DISTRICT
NO SHOULDER**



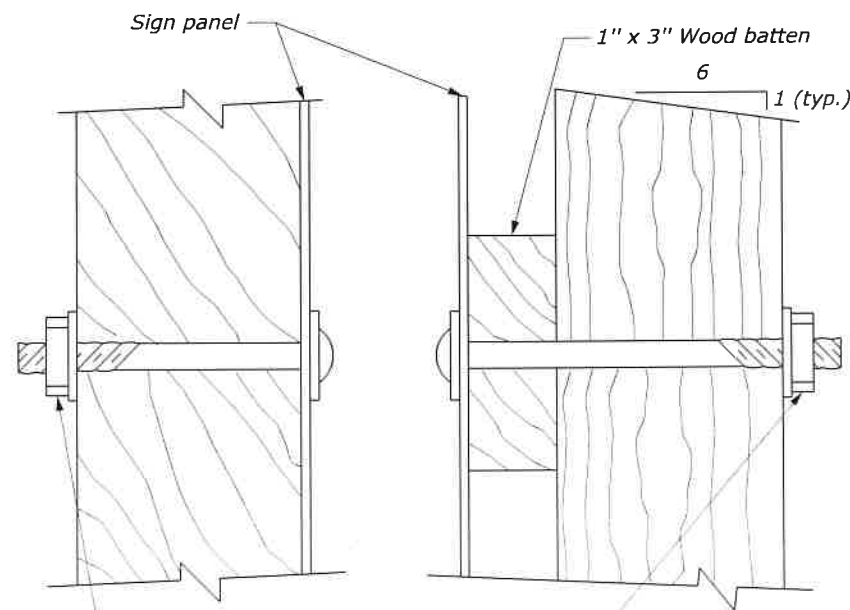
**ROADSIDE SIGN BUSINESS OR
RESIDENTIAL DISTRICT**



**WARNING SIGN WITH ADVISORY
SPEED PLAQUE RURAL DISTRICT**



**ROADSIDE SIGN RURAL DISTRICT
WITH SHOULDER**

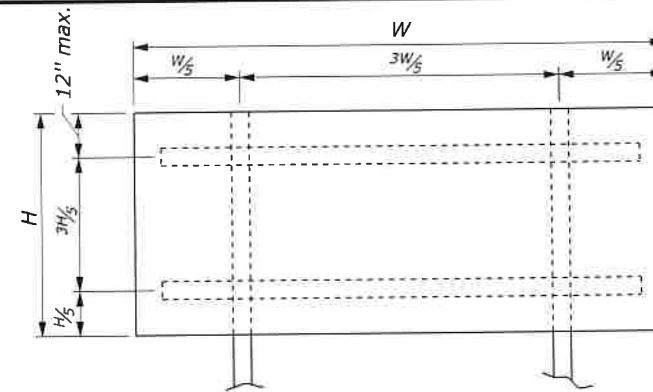


M10 bolt, hexnut and washer, 2024-T4
aluminum or galvanized steel or equal
as approved by the CO.

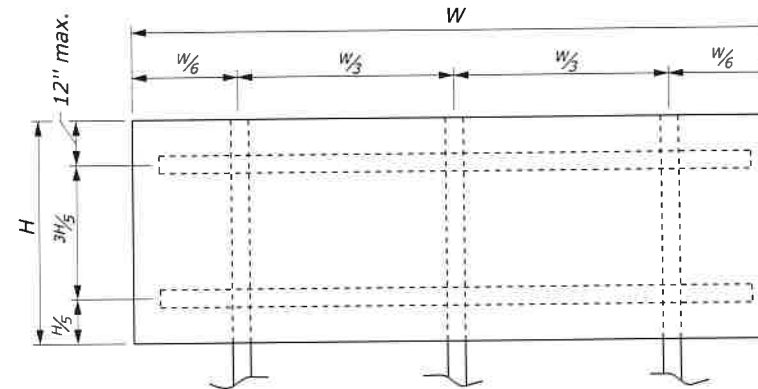
WITHOUT BATTEN

WITH BATTEN

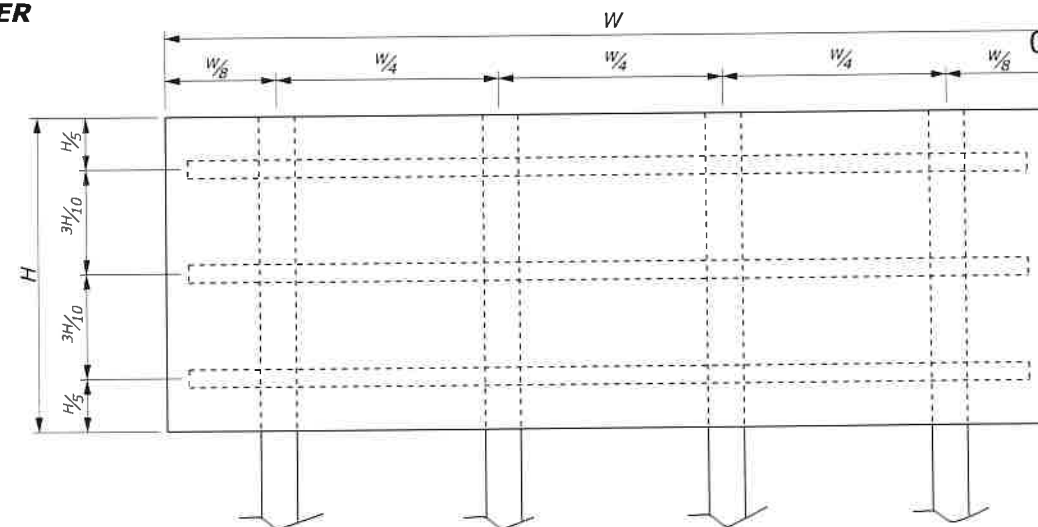
FASTENER DETAIL



DOUBLE POST



TRIPLE POST



QUADRUPLE POST

CHART A					
Post Size (Inch)	D (min.) *	Maximum Sign Area (sq. ft.)			
		Single Post	Double Post	Triple Post	Quadruple Post
4 x 4 (Wood)	3'	10	20		
4 x 6 (Wood)	4'	15	35	45	60
6 x 6 (Wood)	4'	20	50	75	100

* See note 6

CHART B	
Post Size	Hole Diameter
4" x 4"	None Required
4" x 6"	1.5"
6" x 6"	2"
6" x 8"	3"

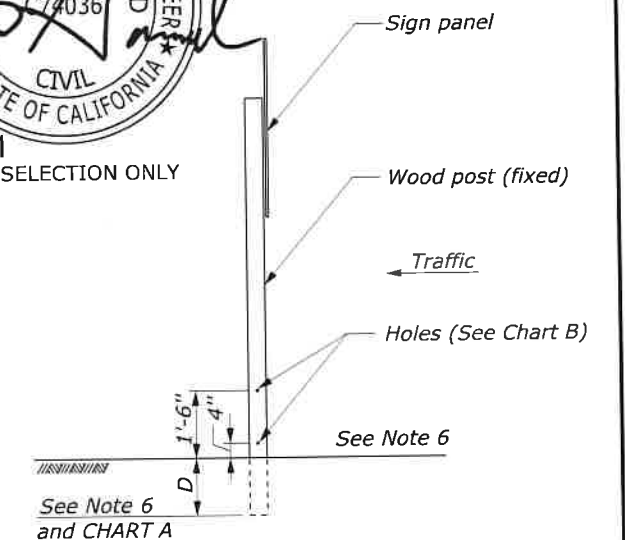
NOTES:

1. Locate and set sign height according to the 'Manual on Uniform Traffic Control Devices for Streets and Highways' (MUTCD), latest edition.
2. Use wood battens bolted to post at vertical spacings not to exceed 30-inches.
3. Use double posts if W is over 3 feet or the sign is larger than 10 square feet.
4. For sign punching details, see the blank standards in the "Standard Highway Signs" as specified in the MUTCD, latest edition.
5. For signs requiring posts sizes 6 inch x 6 inch and greater, signs are considered to be non-breakaway if multiple posts are required and posts cannot be spaced a minimum of 7 feet apart. Place non-breakaway signs outside the clearzone or shield with approved barrier. Do not place holes in posts of non-breakaway signs.
6. Provide Depth, D, according to the 'Manual on Uniform Traffic Control Devices for Streets and Highways' (MUTCD), latest edition, Section 2A.21 and the AASHTO manual 'Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals', latest edition or as directed by the CO. D(min.) is given in CHART A.



03/26/2021

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BREAKAWAY SUPPORT DETAIL

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
U.S. CUSTOMARY DETAIL	
SIGN STRUCTURES	
DETAIL APPROVED FOR USE	DETAIL
APPROVED: MAY 2011 REVISED: MARCH 2015	E633-01