

# **Design Detail Sheets**

**500**

SECTION

**500****Drainage**

NO.	DATE	TITLE
500-5	10-20-15	Precast Concrete Drain Extension
500-6	10-20-15	Median Culvert Extensions with Beveled Pipe and Guard
500-10	10-17-17	Outlets for Longitudinal, Transverse and Backslope Subdrains

SECTION

**510****Fencing**

NO.	DATE	TITLE
510-1	04-20-10	Chain Link Fence on Concrete Retaining Wall
510-2	03-28-95	Temporary Slope Drain
510-3	04-20-10	Supplemental Details of Field Fence (Small Animal Barrier)
510-4	04-21-15	Precast Stock Pass Extension
510-5	10-19-10	Small Animal Barrier for Gated Entrance

**Traffic Control - Two Lane - Stationary**

NO.	DATE	TITLE
520-54	10-17-06	Traffic Control Layout for Unpaved On-Site Detour w/ One-Lane Traffic
520-55	10-17-06	Traffic Control Layout for Unpaved On-Site Detour w/ Two-Way Traffic

SECTION

**531**

**ROADWAY PAVEMENT**

NO.	DATE	TITLE
531-2	04-21-20	Median Crossover at Interchange (50' Median)
531-3	04-21-20	Median Crossover at Interchange (64' Median)

SECTION

**533**

**ROADWAY PAVEMENT**

NO.	DATE	TITLE
533-1	04-21-20	Parallel Deceleration Taper for 16' Ramp (60MPH Design Speed)
533-2	04-21-20	Parallel Acceleration Taper for 16' Ramp (60MPH Design Speed)
533-3	04-21-20	Parallel Deceleration Taper for 18' Exit Loop (60MPH Design Speed)
533-4	10-18-22	Parallel Deceleration Taper for 24' Exit Loop (60MPH Design Speed)
533-5	04-21-20	Parallel Acceleration Taper for 24' Ramp (60MPH Design Speed)

SECTION

**535**

**ROADWAY SHOULDERS**

NO.	DATE	TITLE
535-3	04-16-13	Paved Shoulder Hot Mix Asphalt with 6" Sloped Curb and Gutter Unit

SECTION

**540**

**TRAFFIC BARRIERS AND APPURTENANCES**

NO.	DATE	TITLE
540-13	10-19-10	Barricade at Crossover

SECTION

**560****MISCELLANEOUS**

NO.	DATE	TITLE
560-2	03-28-95	Mailbox Turnouts (Granular Surfaced)
560-3	10-16-12	Grading Blister at Light Pole Footing
560-4	10-21-14	HMA Wedge for Superelevation
560-5	10-19-21	Painted Islands
560-6	10-18-16	Shared-use Trail or Sidewalk Behind Steel Beam Guardrail at Bridge Approach
560-7	04-19-22	Temporary Barrier Rail (Steel)
560-8	10-15-19	Water Service Curb Stop Cover Located in Sidewalk

SECTION

**570****EROSION CONTROL**

NO.	DATE	TITLE
570-1	10-18-16	Slash Mulch Berm
570-5	10-19-21	Erosion Control for Intake or Manhole Well
570-7	04-21-20	Grate Intake Sediment Filter Bag
570-8	10-17-17	Temporary Rock Berm for Sediment Control
570-11	10-19-21	Temporary Sediment Control for Culvert Extension with Exposed Soil
570-12	10-19-21	Temporary Sediment Control for Shoulder Widening with Exposed Soil
570-20	10-19-21	Foreslope Erosion Countermeasure Reventment Details (Minor Overtopping)
570-21	10-19-21	Foreslope Erosion Countermeasure Reventment Details (Major Overtopping)

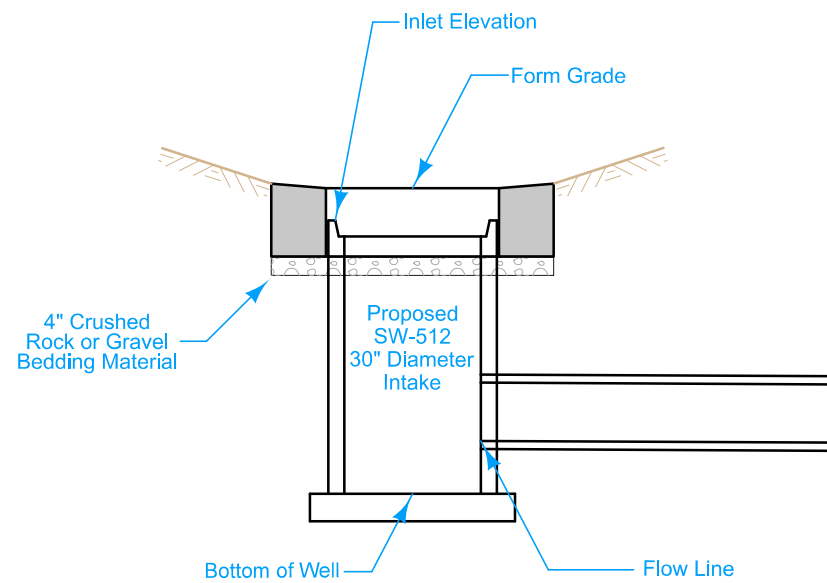
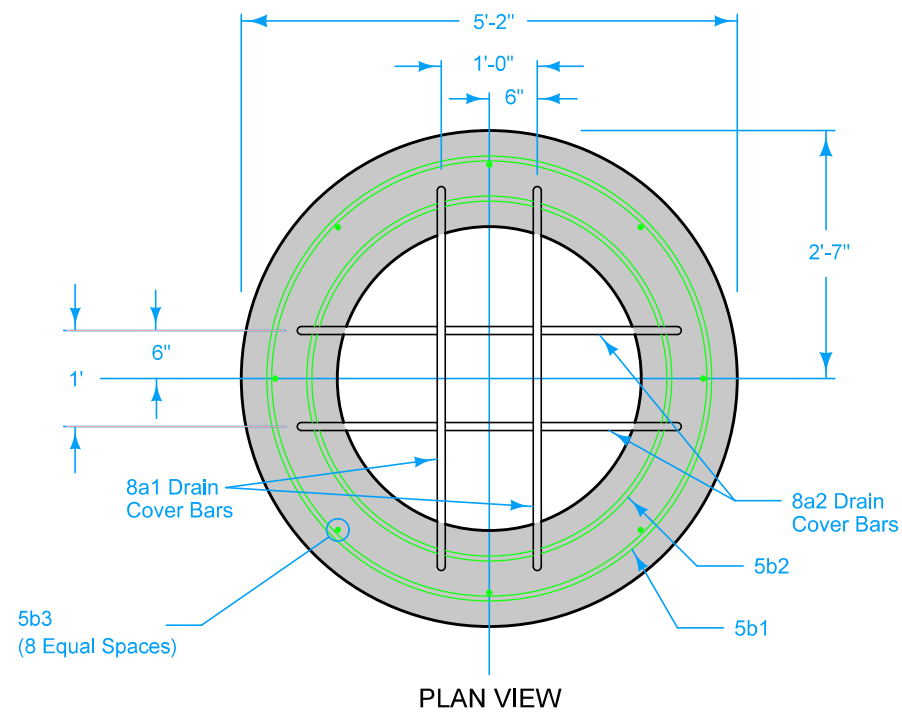
# DESIGNER INFORMATION

Minimum clear distance of 3 inches from the face of concrete to near reinforcing bar unless noted otherwise.

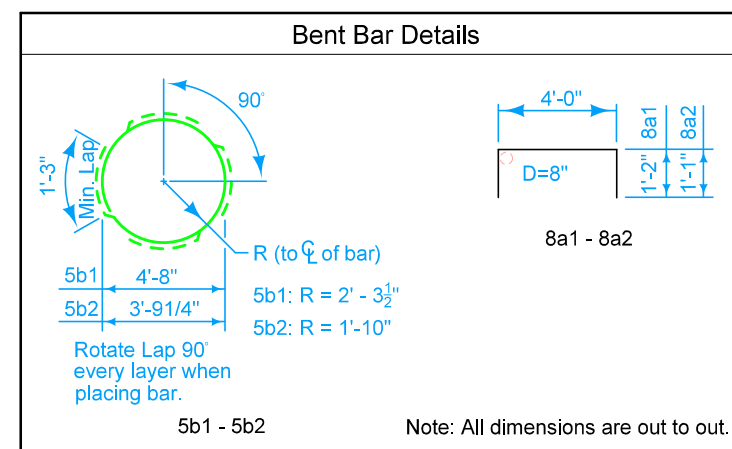
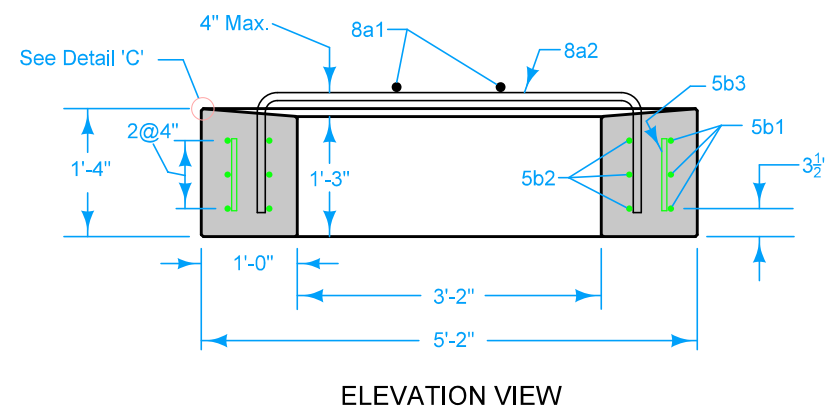
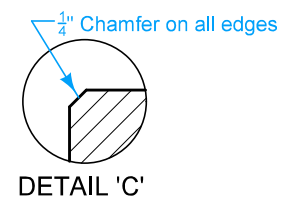
All reinforcing steel Grade 60.

Concrete  $f_c = 4.0$  ksi

- ① Galvanize 8a1 and 8a2 bars after bending. Ensure the 8a1 and 8a2 bars bear against each other during placement.



Estimated Quantities		
Item	Unit	Total
Structural Concrete ( Miscellaneous )	cu. yds.	0.64
Reinforcing Steel, Epoxy Coated	lbs.	101
Reinforcing Steel, Galvanized ①	lbs.	67



Reinforcing Bar List						
	Bar	Location	Shape	No.	Length	Weight
Galvanized	8a1	Drain Cover Bars - Top Layer	⌒	2	6'-4"	34
	8a2	Drain Cover Bars - Bottom Layer	⌒	2	6'-2"	33
	Reinforcing Steel, Galvanized - Total (lbs.)					67
Epoxy Coated	5b1	Circular Tie Bars - Outside Face	○	3	16'-0"	50
	5b2	Circular Tie Bars - Inside Face	○	3	13'-2"	42
	5b3	Tie Bars - Vertical	—	8	0'-9"	6
Reinforcing Steel, Epoxy Coated - Total (lbs.)					98	

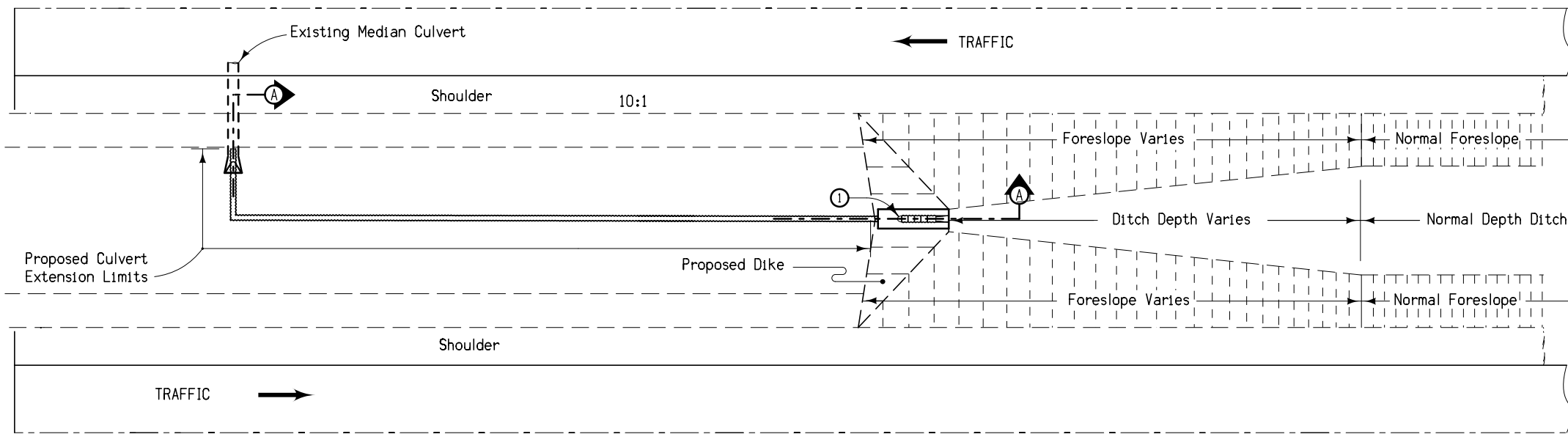
## INTAKE ADJUSTMENT RING

For bedding and backfill purposes, use crushed rock or crushed gravel material complying with Article 4120.04 of the Standard Specifications for all bedding and backfill. Place and compact the material according to Article 2435.03, A. Use 100% crushed gravel produced by crushing material retained on a 1.5 inch or larger screen.

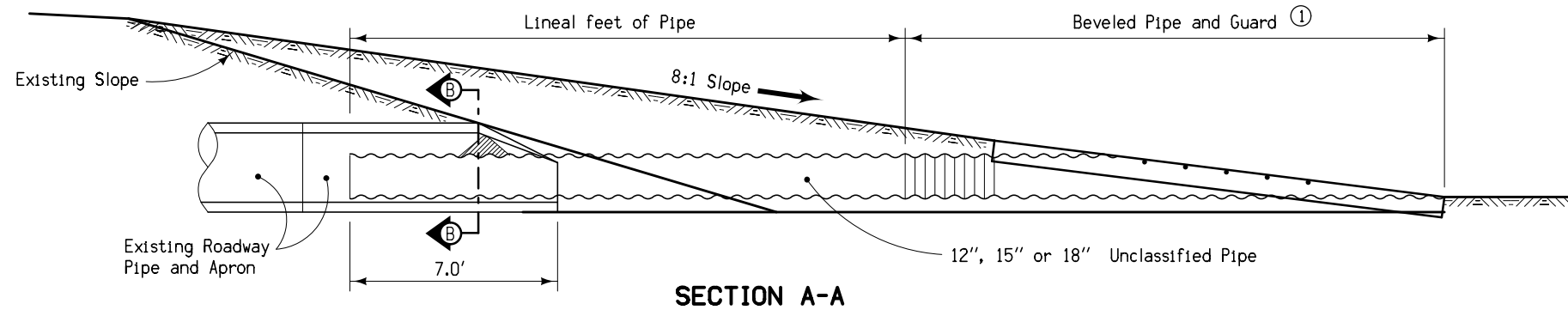
No.	Location		Proposed Intake Inlet Elev.	Form Grade Intake Adjustment Ring Elev.	Flow Line Elevation	Bottom of Well Elevation	Remarks
	Station	Offset					

	REVISION	
	NEW	10-20-15
<b>ROAD DESIGN DETAIL</b>		<b>500-05</b>
REVISIONS: New.		SHEET 1 of 1

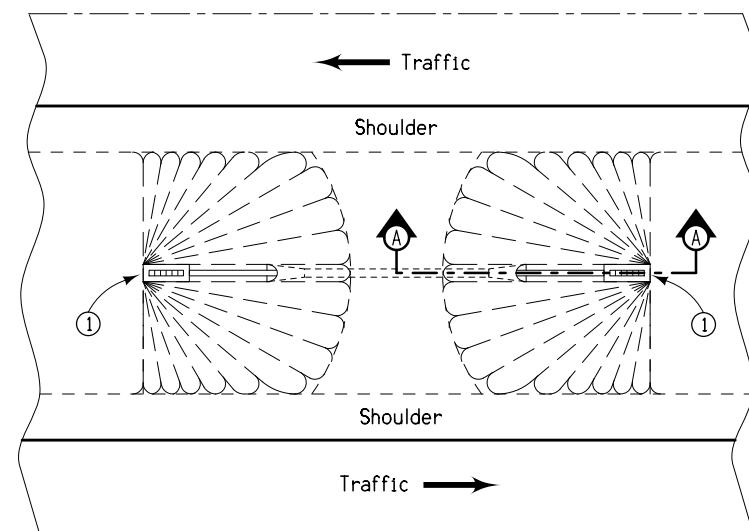
**PRECAST CONCRETE  
DRAIN EXTENSION**



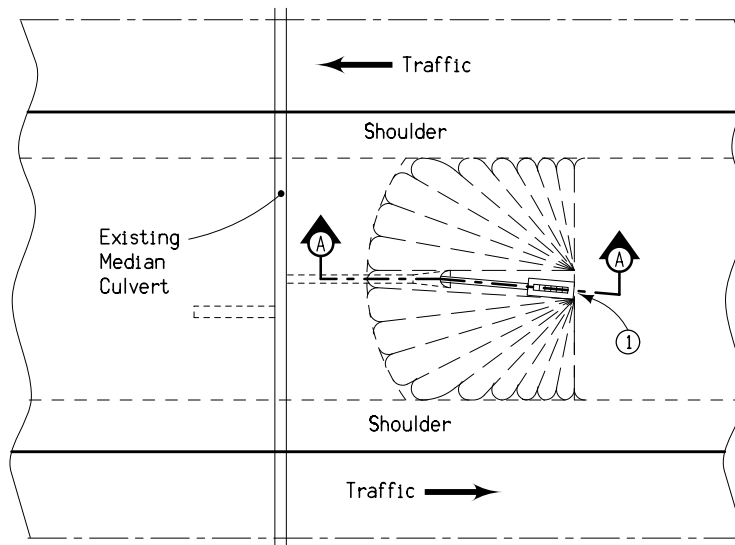
**CASE 'A'**  
Guardrail Installation between Dual Bridges



**SECTION A-A**



**CASE 'B'**  
Maintenance Turnaround



**CASE 'C'**  
Median Culvert

Construct the extension by placing the appropriate size of Unclassified Pipe into the existing culvert and apron. After the Unclassified pipe has been assembled at the proper angle and placed into the culvert, some adjusting may be required by rotating the Unclassified Pipe to fit the new flow line. Seal the area between the existing apron and Unclassified Pipe with concrete.

Construct the extension using Class 'C' concrete.

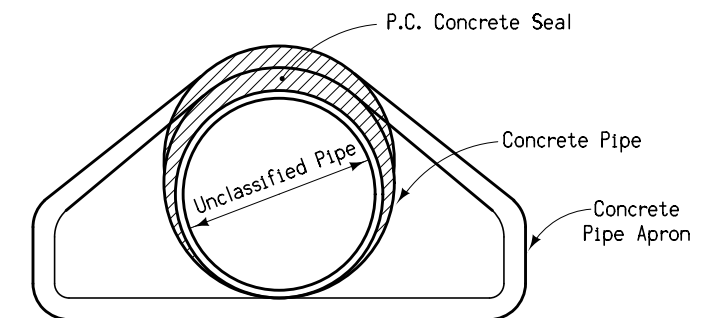
Excavating silt for pipe placement is incidental to pipe items.

Place a silt fence ditch check immediately upstream from the inlet of the culvert. See EC-201 for construction details.

① For details of Beveled Pipe and Guard, see DR-212.

Contract Items:

- Unclassified Roadway Pipe
- Beveled Pipe and Guard



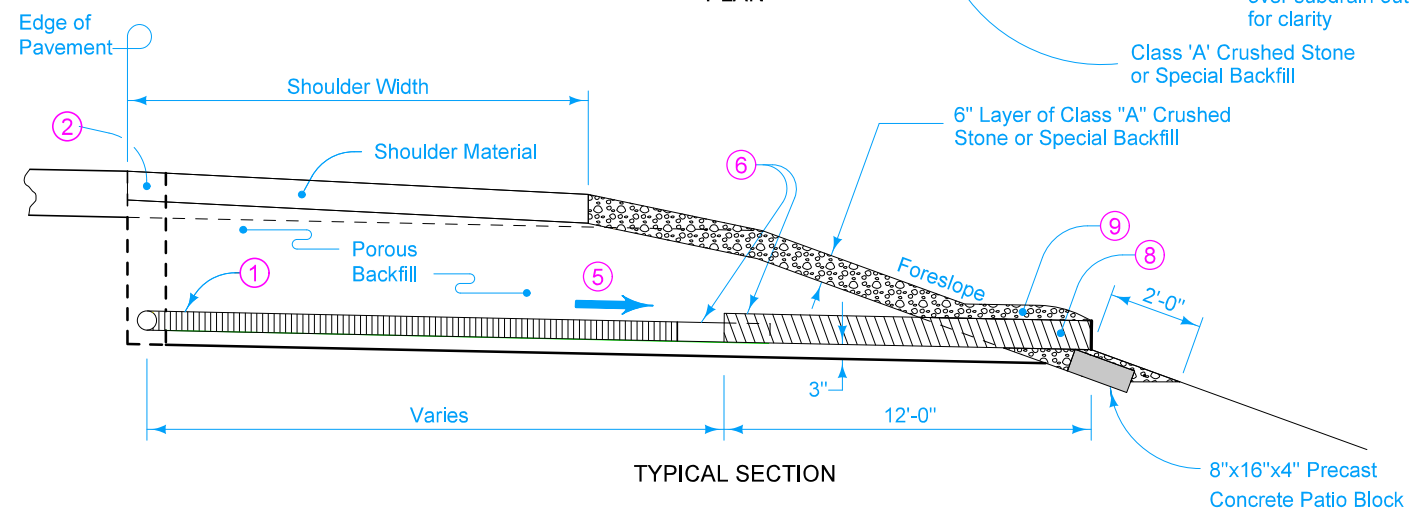
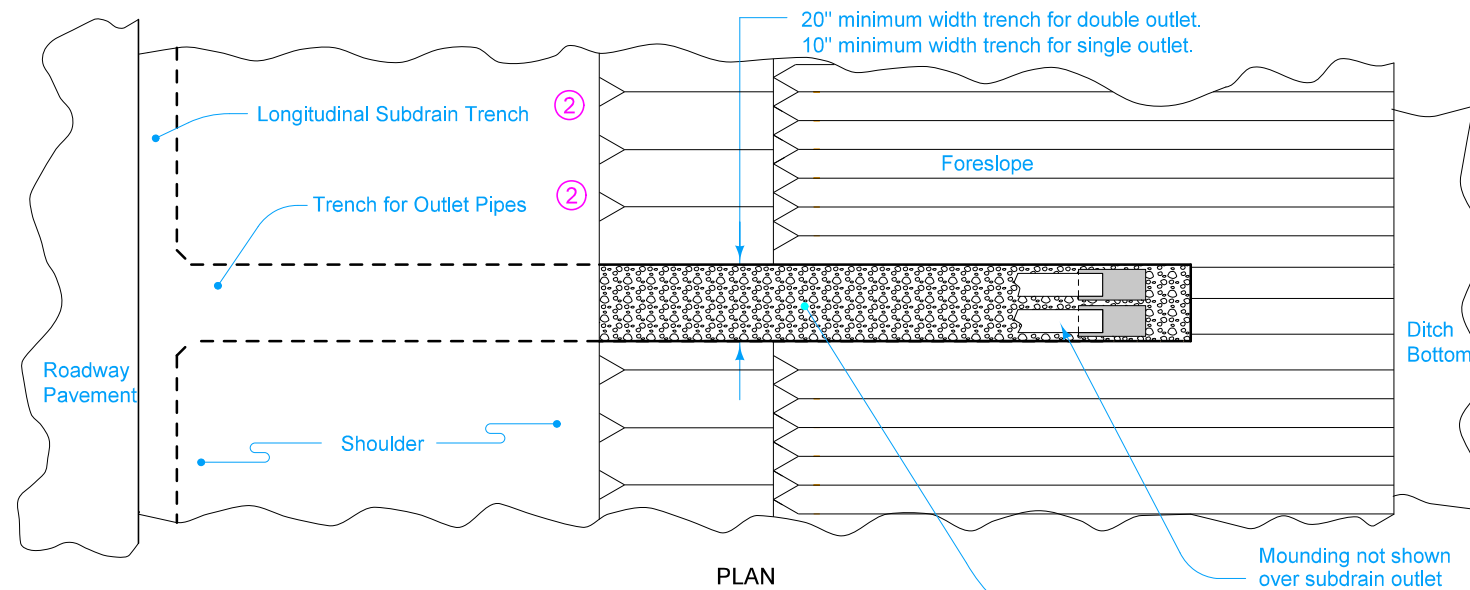
**SECTION B-B**

<b>ROAD DESIGN DETAIL</b>	REVISION	
	6	10-20-15
	500-6	
SHEET 1 of 1		

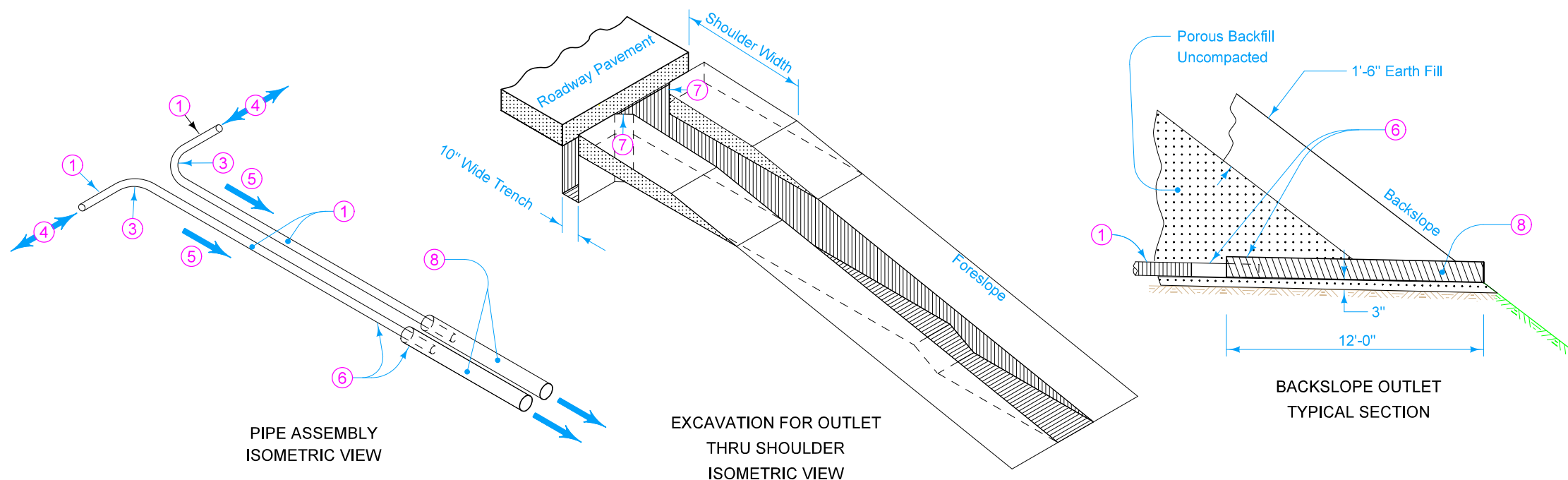
REVISIONS: Changed the reference from RF-27 to DR-212. Updated DOT logo. Revised general notes.

**MEDIAN CULVERT EXTENSIONS  
WITH BEVELED PIPE AND GUARD**





LONGITUDINAL AND TRANSVERSE OUTLETS



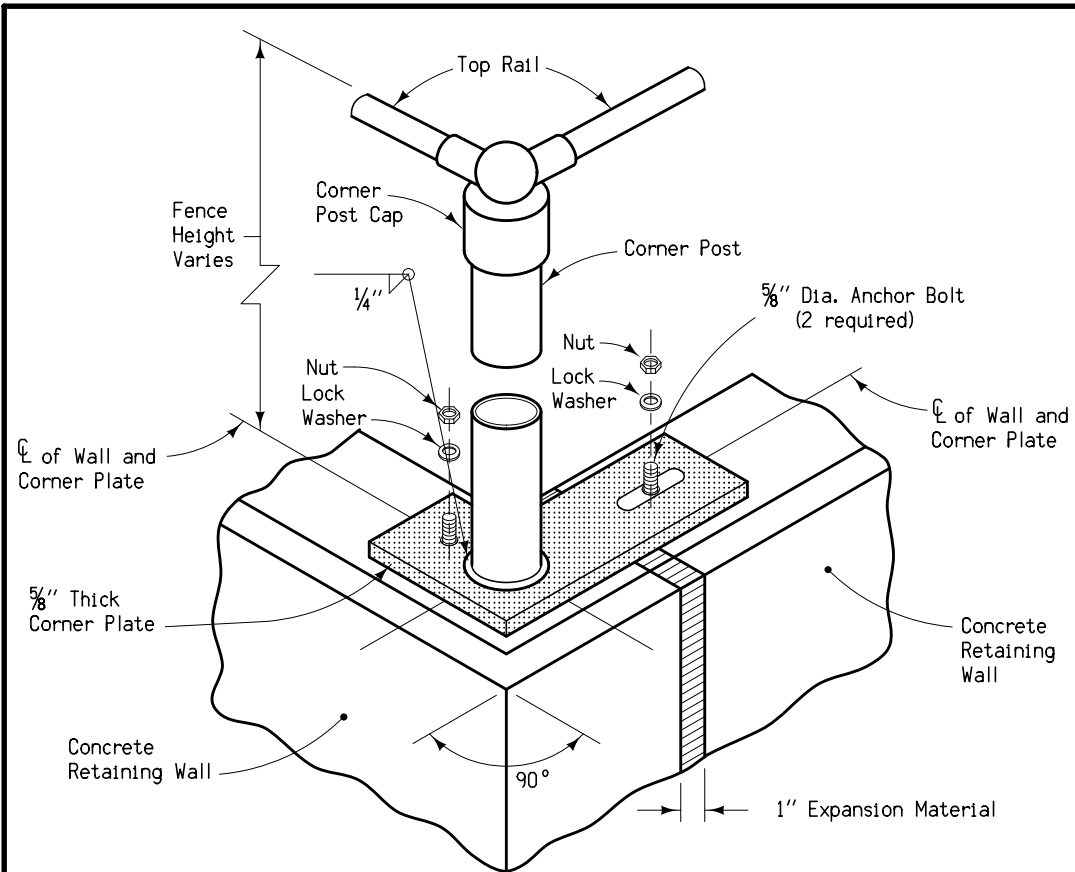
- ① Perforated Subdrain (Polyethylene Corrugated Tubing).
- ② On projects where existing shoulder material is removed, replace the shoulder material according to Article 2502.03, C of the Standard Specifications.
- ③ 'Y' or 'T' connection will not be allowed. Place subdrain on 1 foot minimum radius.
- ④ Direction of flow.
- ⑤ 6 inch minimum drop in elevation between longitudinal subdrain and outlet. 12 inch minimum drop for projects using recycled PCC subbase.
- ⑥ Corrugated metal pipe outlet 2 inches larger than subdrain pipe or corrugated double-walled PE or PVC pipe of the same diameter as the subdrain pipe with an appropriate coupler. If metal pipe is used, the pipes should be coupled in one of the following ways: (1) Use an inside fit reducer coupler (insert coupler a minimum of 12 inches into CMP); or (2) Insert 1 inch of the 4 inch subdrain into the 6 inch metal outlet pipe, then fully seal the entire opening with grout.
- ⑦ Bevel the trench to provide a minimum of 3 inches of porous backfill surrounding all portions of subdrain pipe.
- ⑧ Corrugated metal pipe outlet 2 inches larger than existing subdrain pipe, or corrugated double-walled PE or PVC pipe of the same diameter as the existing subdrain pipe.
- ⑨ Place class 'A' crushed stone or Special Backfill over outlet and carefully compact to avoid damaging outlet pipe.

Possible Contract Item:  
Subdrain Outlet, 500-10

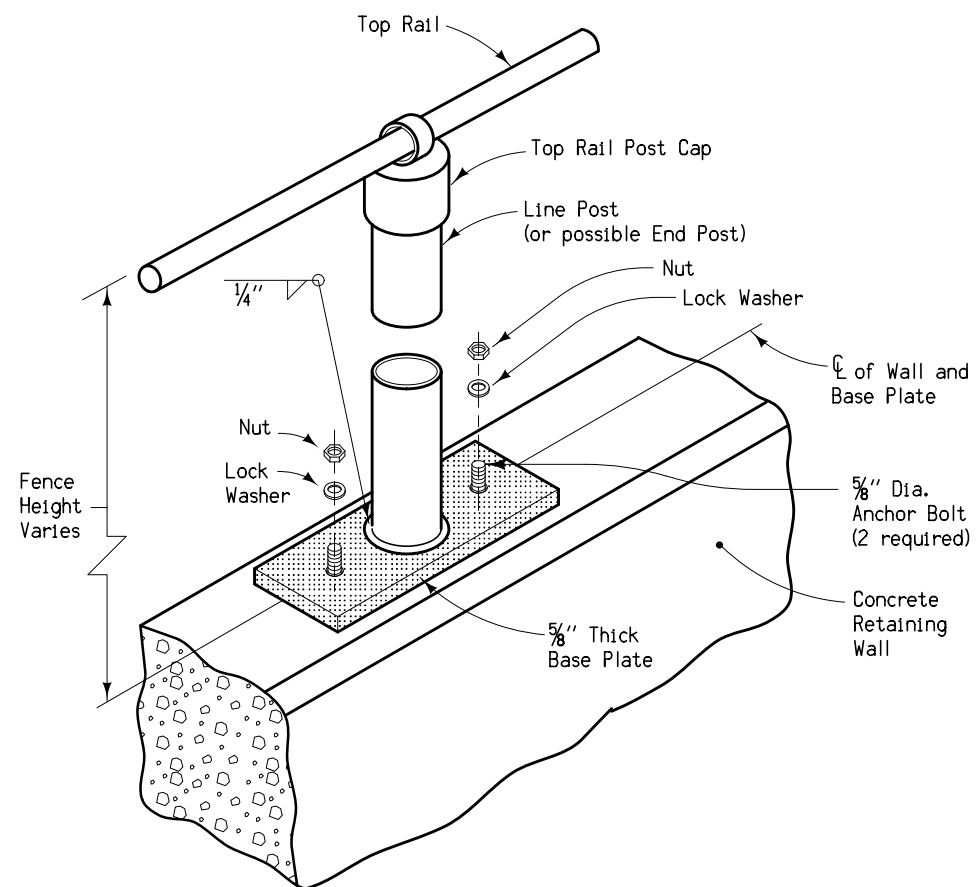
Possible Tabulations:  
104-5C  
104-6

	REVISION	
	NEW	10-17-17
<b>ROAD DESIGN DETAIL</b>		<b>500-10</b>
REVISIONS: New, replaced DR-304.		SHEET 1 of 1

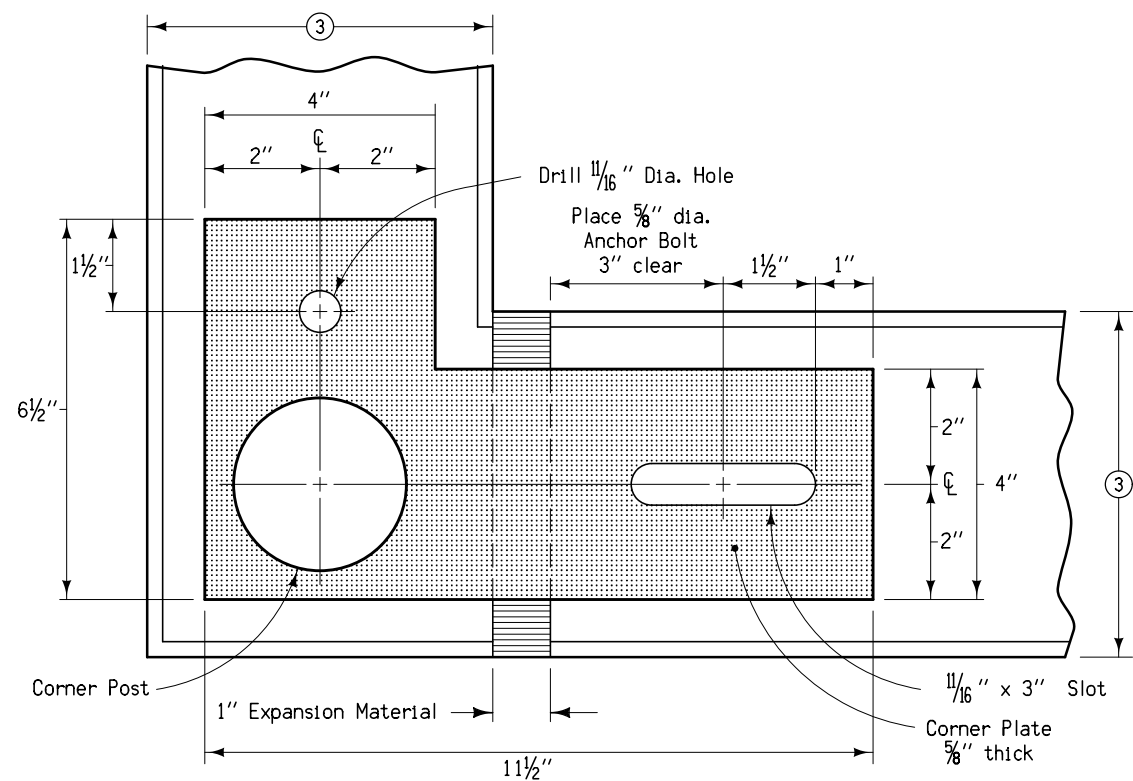
**OUTLETS  
FOR LONGITUDINAL, TRANSVERSE  
AND BACKSLOPE SUBDRAINS**



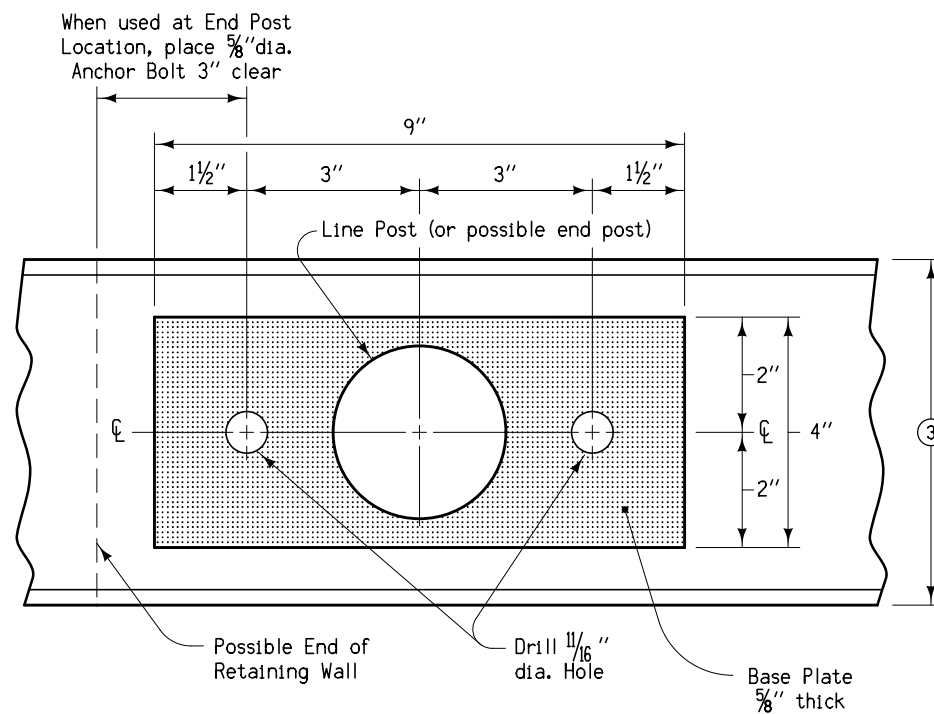
TYPICAL INSTALLATION CORNER PLATE



TYPICAL INSTALLATION BASE PLATE ②



PLAN OF CORNER PLATE ①



PLAN OF BASE PLATE

Construction of Chain Link Fence on Concrete Retaining Wall shall be in conformance with current Standard and Supplemental Specifications. Details shown on this sheet are typical. Alternate details may be submitted to the Engineer for approval prior to construction. Refer to project plans for details of particular fencing installations.

Anchor bolts (5/8" diameter) shall have a minimum pull out strength of 9000 pounds based on 3500 psi concrete, shall meet the requirements of I.D.O.T. Materials I.M. 453.09, and shall be galvanized and installed according to recommendations of the manufacturer.

Base Plates and Corner Plates shall be galvanized after welding and prior to installation.

Post size and spacing shall be as shown on MI-102.

Bottom tension wire, placement of stretcher bar clamps, fastening of chain link fabric to posts, top rail sleeve, etc., shall be as indicated on MI-102.

Brace rails and truss rods are not required where height of fabric is specified as 42 inches or less.

Grounding requirements shall be as determined by Section 2519 of the Standard Specifications.

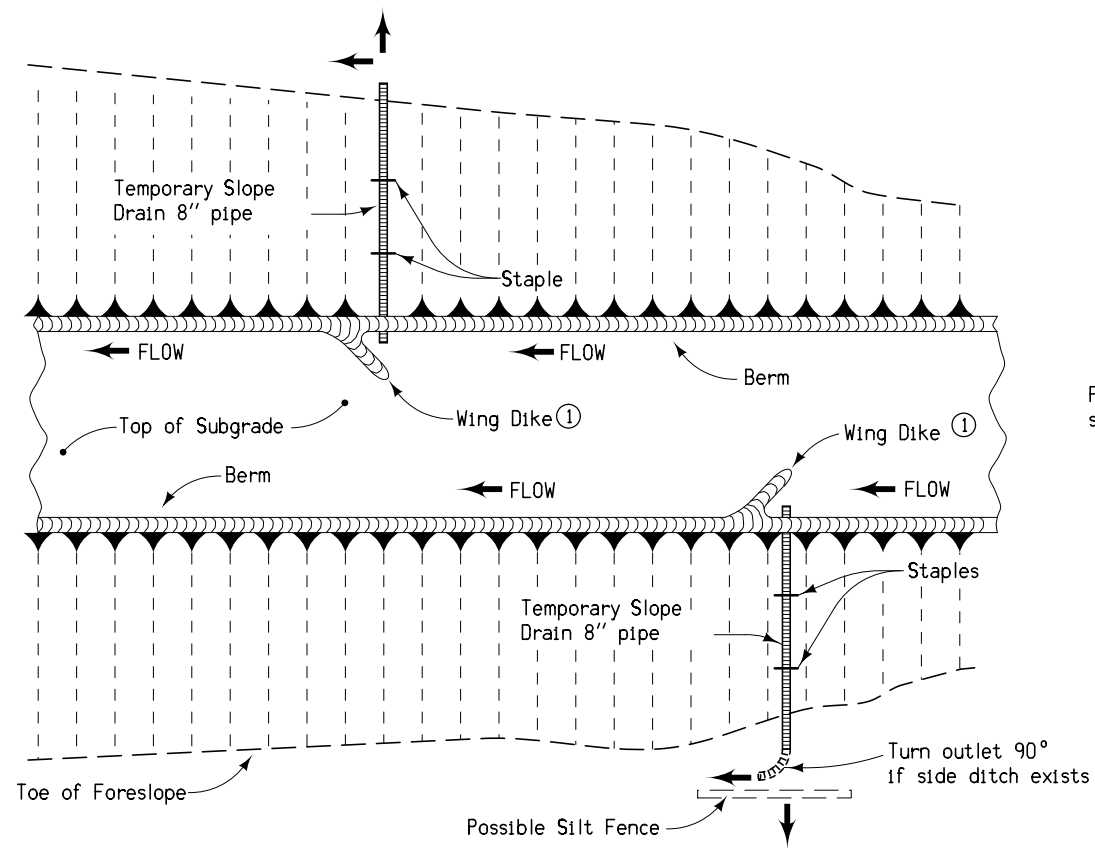
Chain link fabric shall be knuckled selvage at top and bottom of fence.

Price bid for "Chain Link Fence" shall be considered full compensation for fabrication and construction of fencing as detailed hereon, as required by project plans, and as per Section 2519 of the Standard Specifications.

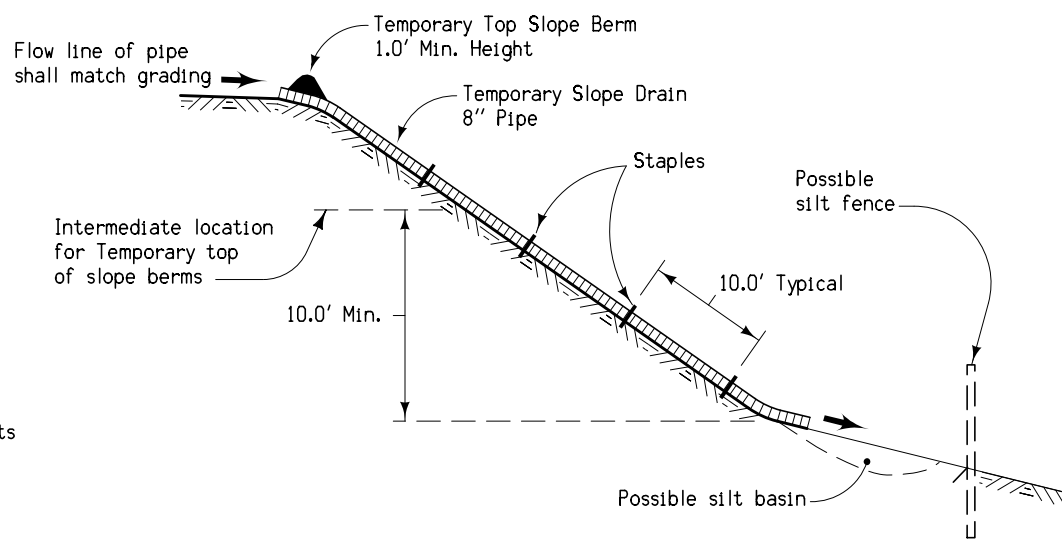
- ① The 11.5 inches length dimension for the Corner Plate is based on a wall width of 6 inches. In cases where wider wall widths are shown on project plans, the length dimension shall be increased to ensure 3 inches clearance for the anchor bolt.
- ② The Base Plate is shown mounted on a narrow width wall. Where a wider wall is shown on project plans, the base plate may be rotated 90 degrees when there is sufficient concrete to ensure a minimum of 3 inches clearance for anchor bolts.
- ③ Width of concrete retaining wall

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	2	04-20-10
	510-01	
SHEET 1 of 1		
REVISIONS: Updated references to renamed standards.		

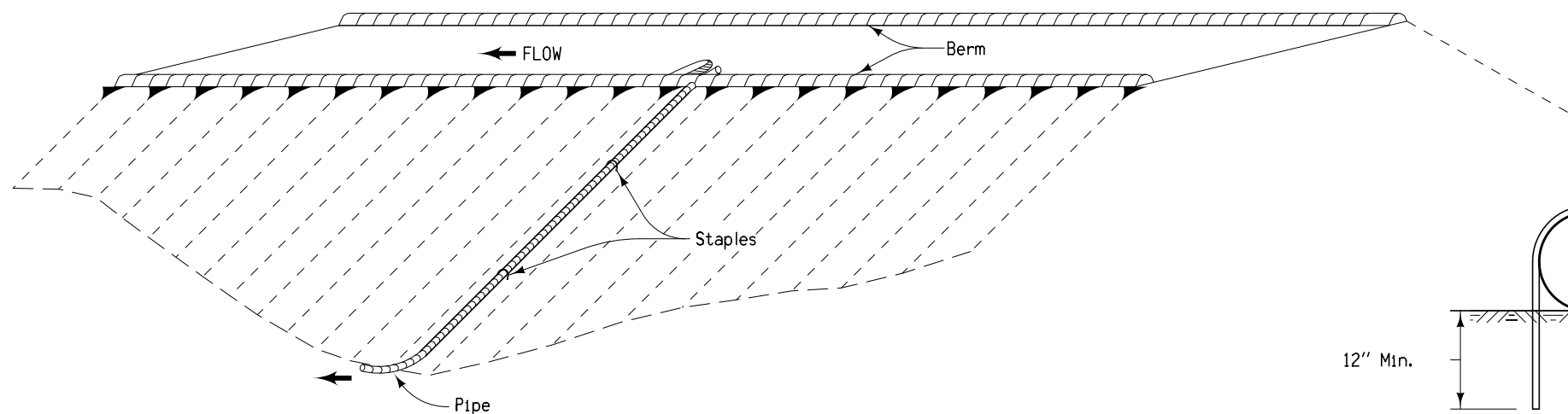
**CHAIN LINK FENCE  
ON CONCRETE RETAINING WALL**



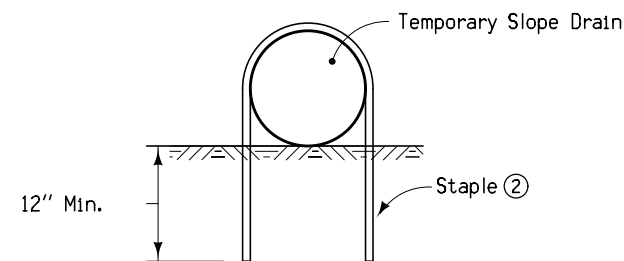
PLAN



TYPICAL SECTION



PERSPECTIVE



STAPLE DETAIL

GENERAL NOTES:

Details indicated hereon are for the installation of a temporary slope drain on the foreslope of the roadway fill. The intent of the temporary slope drain is to prevent foreslope erosion during construction and to minimize the water pollution which might be caused by soil erosion from the project.

At the completion of each day's grading, a temporary berm will be constructed on both sides of the subgrade. At points a maximum of 500' apart, at low points of vertical curves, and as determined by the Engineer, temporary intercepting wing dikes shall be graded and slope drains installed. All special grading work shall be considered incidental to other grading work on the project.

Foreslopes with a vertical height of ten feet or less shall not have temporary slope drains installed.

The temporary slope drain shall consist of a length of pipe capable of extending to the top of foreslope when all grading has been completed. The pipe shall be moved up the foreslope to the new temporary top of slope berm at the completion of each day's work. The pipe shall be Solid Tubing complying with all requirements of ASTM F 405, Standard Duty Tubing.

Method of measurement shall be along the centerline of pipe in its final position.

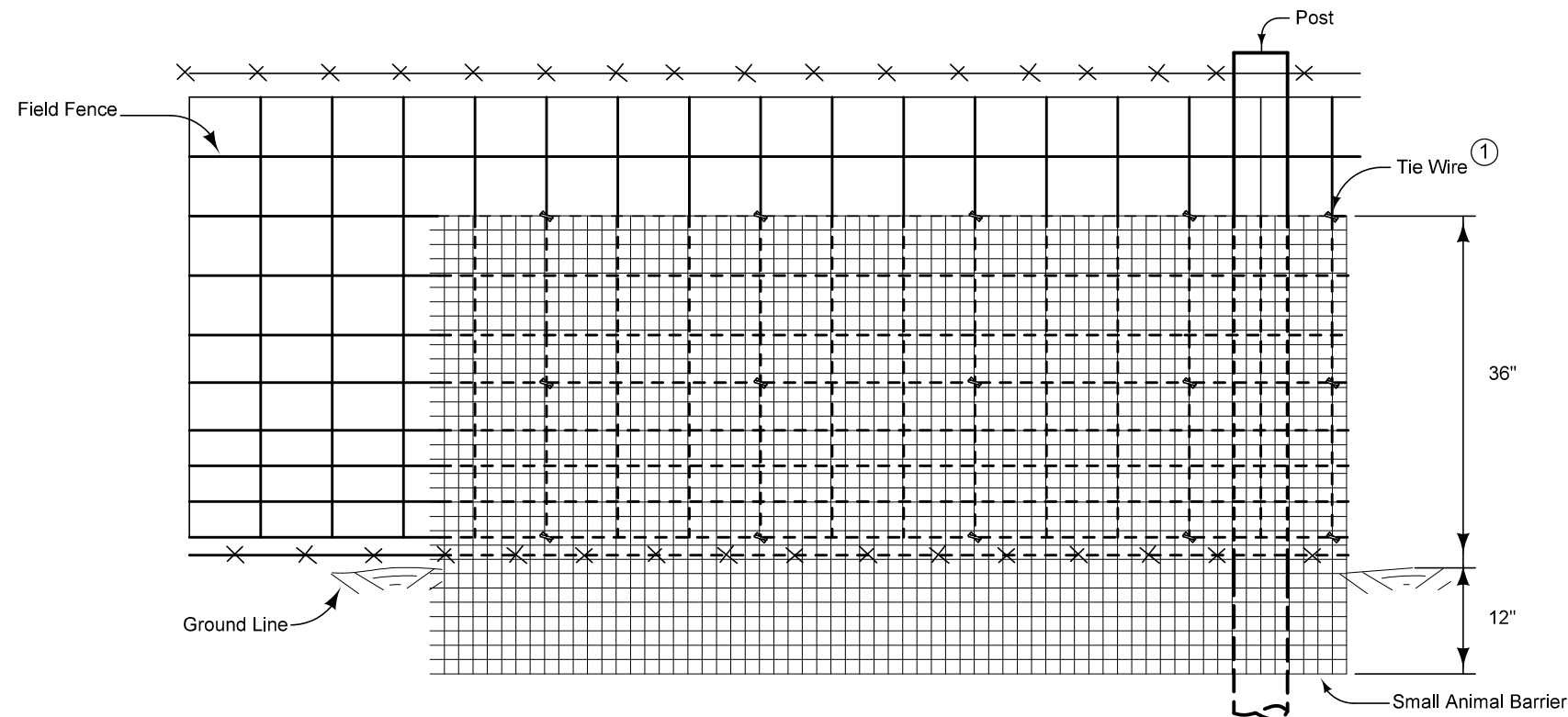
The price bid for "Temporary Slope Drain, As Per Plan", measured in lineal feet, shall be considered full compensation for the construction of all required temporary top of slope berms and for installing and maintaining the slope drain for the duration of the contract.

① Typical length of 10.0', 1.0' minimum height

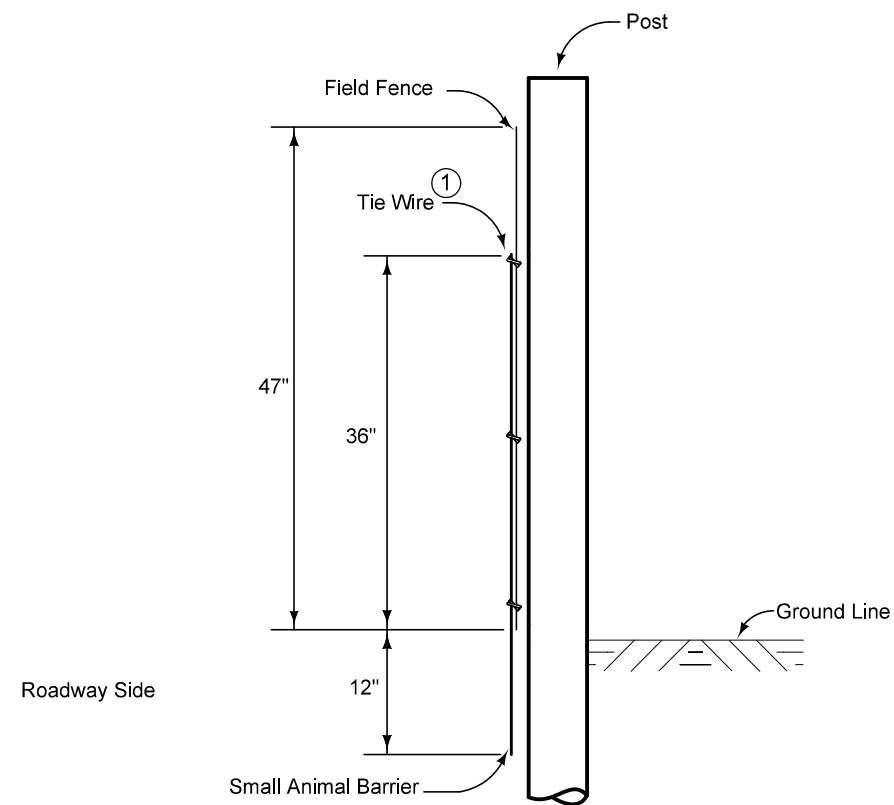
② Staple may be bent reinforcing bar No. 4 minimum, or alternate approved by the Engineer.

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	1	03-28-95
	<b>510-02</b>	
SHEET 1 of 1		
REVISIONS: Place in CADD.		

**DETAILS OF  
TEMPORARY SLOPE DRAIN**



FRONT VIEW



SIDE VIEW

Small Animal Barrier is used for preventing small mammals, reptiles and amphibians from migrating on to the highway right of way.

Contract item "Small Animal Barrier" includes chain link fence fabric, galvanized tie wires, 12 inch trench excavation, backfill and compaction around fence fabric, all materials, tools and labor required to construct barrier as detailed.

Construct Small Animal Barrier using 14 gage Chain Link Fence Fabric with a 1/2 inch grid Mesh spacing and a 48 inch total height. Use Chain Link Fabric per Standard Specification Section 4154 and install fencing per the Contract Documents.

Stretch Small Animal Barrier and mount on Field Fence using Galvanized Wire Ties and as described in Standard Specification Section 4154. Bury the bottom 12 inches of the Barrier below the finished grade to restrict burrowing under the barrier. Do not damage or deform the barrier fabric when backfilling and compacting trench material around the fabric. Overlap the ends of the barrier fabric roll a minimum of 6 inches and tie both ends to the Field Fence, leaving no gap between the fabric ends.

Measurement will be in linear feet of installed Small Animal Barrier and paid for at the contract unit price per linear feet.

- ① Place galvanized Tie Wires at the following three vertical locations: top of chain link fence fabric, bottom of field fence, approximate mid point between the top and bottom ties. Repeat attachment locations at 1'-6" intervals along the length of the barrier.

Possible Contract Items:  
 Field Fence  
 Field Fence Brace Panel  
 Small Animal Barrier

Possible Tabulation:  
 100-7

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	1	04-20-10
	<b>510-03</b>	
SHEET 1 of 1		

REVISIONS: Changed woven wire fabric to chain link.

**SUPPLEMENTAL DETAILS  
 OF FIELD FENCE  
 (SMALL ANIMAL BARRIER)**

# DESIGNER INFORMATION

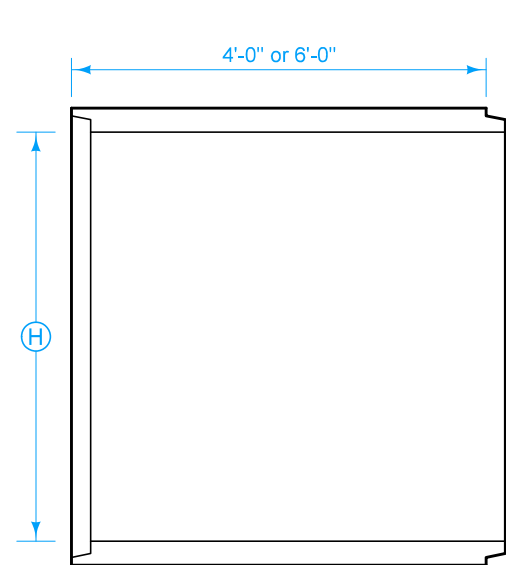
Furnish Precast Stock Pass complying with Section 2415 of the Standard Specifications. Install according to Section 2416 of the Standard Specifications.

Seal joints and install joint ties according to the manufacturer's recommendations.

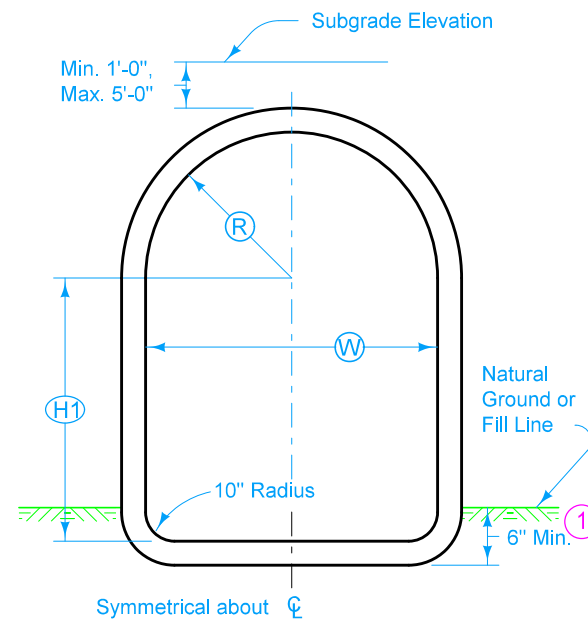
Details indicated are typical. Alternate designs or methods may be submitted to the Engineer for approval.

Payment is full compensation for furnishing and installing stock pass and apron.

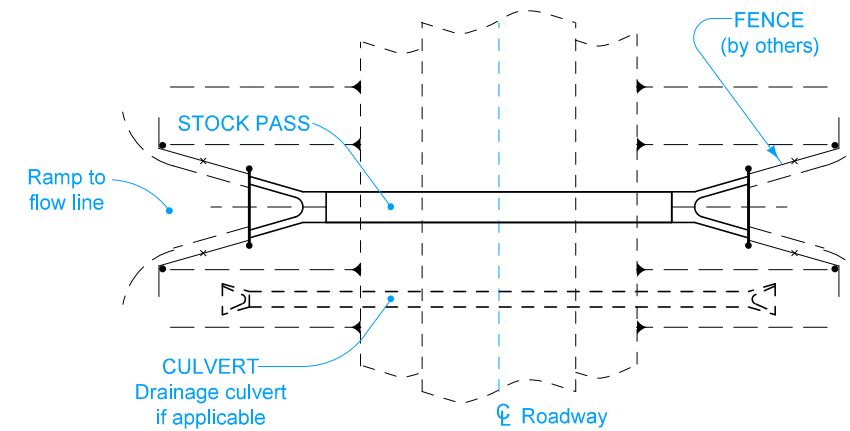
- ① Perform excavation below ground line using a template conforming to the shape of the stock pass.



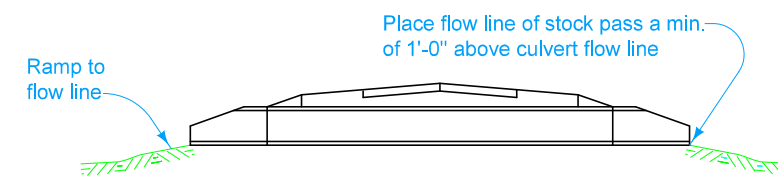
DETAIL OF INTERMEDIATE UNIT



END VIEW OF INTERMEDIATE UNIT



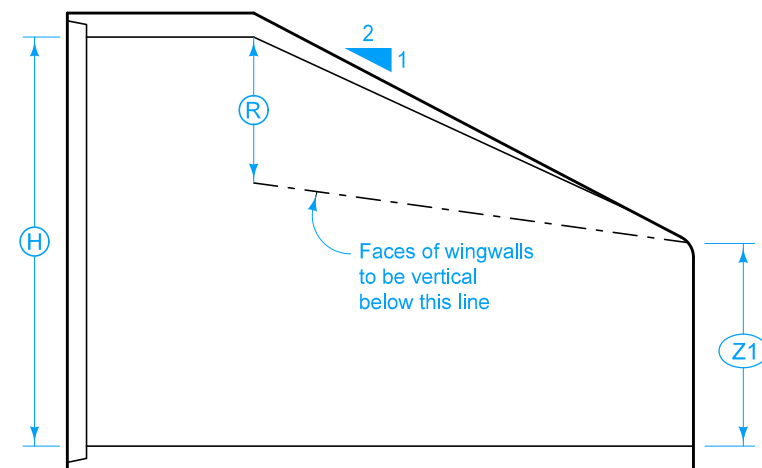
PLAN



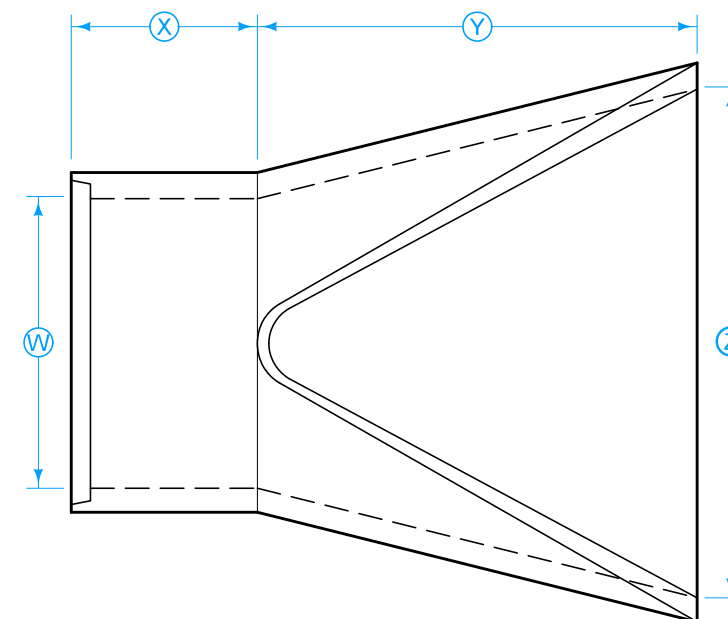
LONGITUDINAL SECTION

Structure	DIMENSIONS FOR APRON						
	W	H	R	X	Y	Z	Z1
4' x 6'	4'	6'	2'	3'-2"	7'	7'	2'-11"
5' x 7'	5'	7'	2'-6"	1'-9"	7'-5 <sup>1</sup> / <sub>2</sub> "	7'	3'-6"

Structure	DIMENSIONS FOR INTERMEDIATE UNIT			
	W	H	R	H1
4' x 6'	4'	6'	2'	4'
5' x 7'	5'	7'	2'-6"	4'-6"



APRON LONGITUDINAL SECTION

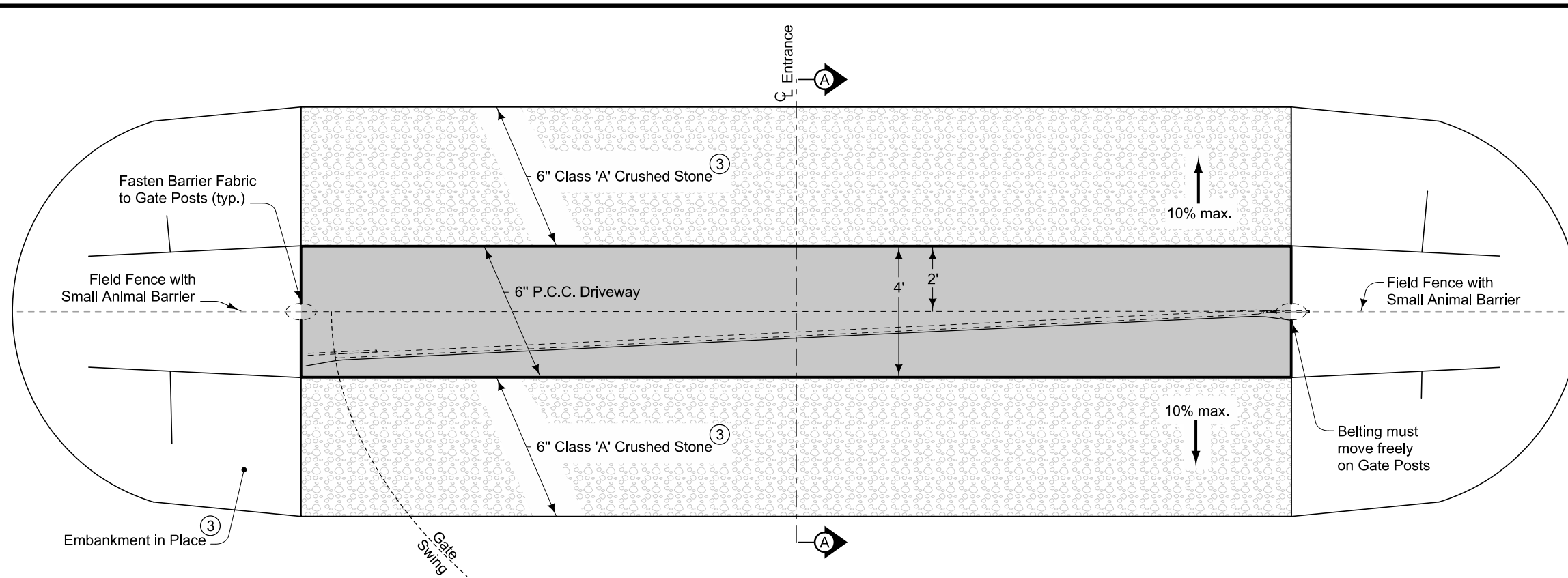


PLAN OF APRON

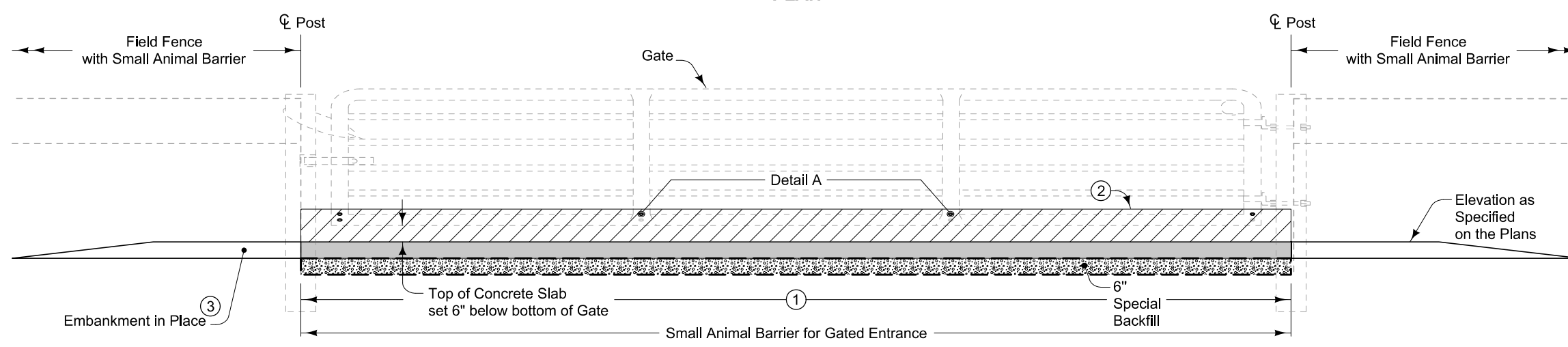
- Possible Contract Items:
- Stock Pass Apron, 4' x 6' Precast Concrete
  - Stock Pass Apron, 5' x 7' Precast Concrete
  - Stock Pass, 4' x 6' Precast Concrete
  - Stock Pass, 5' x 7' Precast Concrete

	REVISION	
	NEW	04-21-15
<b>ROAD DESIGN DETAIL</b>		<b>510-04</b>
REVISIONS: New. Replaces RF-8.		SHEET 1 of 1

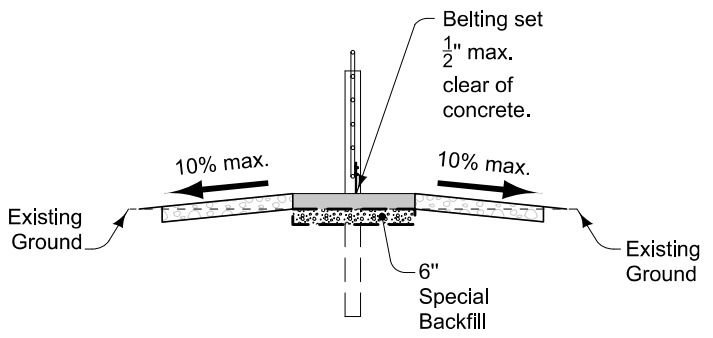
## PRECAST STOCK PASS EXTENSION



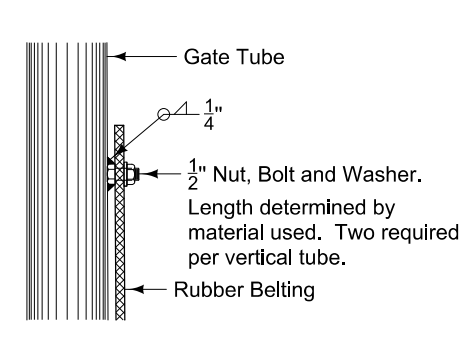
PLAN



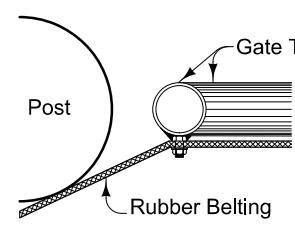
ELEVATION



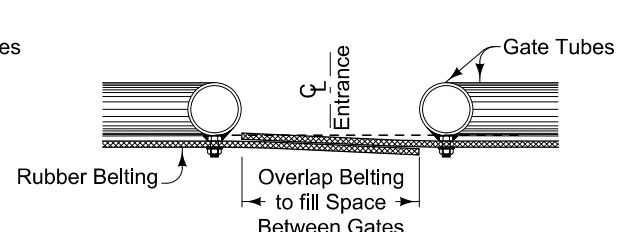
SECTION A-A



DETAIL 'A'



BRACE POST



BELTING OVERLAP

Construct "Small Animal Barrier for Gated Entrance" at specified locations to provide access through the "Small Animal Barrier".

Place "Portland Cement Concrete Driveway" to elevation specified on the plans.

Each "Small Animal Barrier for Gated Entrance" correctly installed will be counted for payment.

Payment will be the contract unit price for each "Small Animal Barrier for Gated Entrance" installed correctly.

Payment includes all materials, tools and labor required to construct "Small Animal Barrier for Gated Entrance" as detailed.

- ① P.C. Concrete Driveway: Gate Width + 12 inches by 4'-0" along centerline of entrance by 6 inches thick.
- ② Rubber Belting: 12 inches wide by 1/4 inch thick (min.) Fabric Reinforced Rubber Belting bolted to Gate as shown in Detail A. Length is Gate Width + 12 inches.
- ③ Transition into natural ground.

Possible Contract Item:  
Small Animal Barrier for Gated Entrance

Incidental to Small Animal Barrier for Gated Entrance:  
Driveway Surfacing, Class 'A' Crushed Stone  
Embankment In Place  
Portland Cement Concrete Driveway, 6 inch  
Rubber Belting  
Special Backfill

Possible Tabulation:  
100-7

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	NEW	10-19-10
	510-05	
SHEET 1 of 1		

REVISIONS: New.

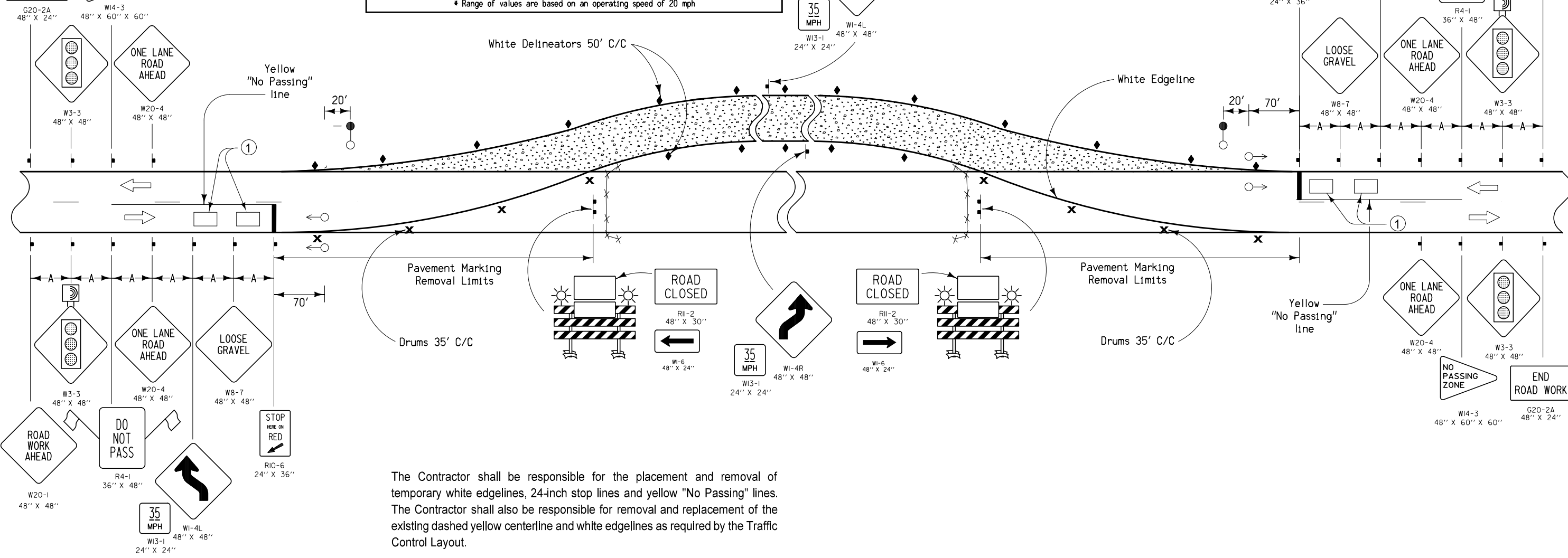
**SMALL ANIMAL BARRIER  
FOR GATED ENTRANCE**

**TWO-LANE ROADWAY**

SPEED LIMIT (mph)	Approximate Sign Spacing 'A'
35	250'
45	350'
55	500'

TIMING FOR ACTUATED SIGNALS (See notes 9, 10, and 11)			
Recommended Settings, secs.			
Distance Between Stop Lines	All Red (secs.)*	Distance Between Stop Lines	All Red (secs.)*
400'	14	800'	28
500'	17	900'	32
600'	21	1000'	35
700'	24	1100'	39

Initial = 12.0  
Extension = 2.5  
Maximum Green = 45.0  
Yellow = 3.0  
All Red = (see table)  
\* Range of values are based on an operating speed of 20 mph



**LEGEND**

- Traffic Sign
- Drum
- Type III Barricade
- Orange Plastic Safety Fence
- Traffic Signal
- Single White Delineators (mount back to back)
- Temporary Floodlighting
- Type 'A' Low-Intensity Flashing Warning Light
- Type 'B' High-Intensity Flashing Warning Light

The Contractor shall be responsible for the placement and removal of temporary white edgelines, 24-inch stop lines and yellow "No Passing" lines. The Contractor shall also be responsible for removal and replacement of the existing dashed yellow centerline and white edgelines as required by the Traffic Control Layout.

The Engineer may change the advisory speed if deemed appropriate. If reduced below 35 mph, the Reverse Curve signs shall be changed to Reverse Turn signs (W1-3LA or W1-3RA).

This layout is not appropriate when ADT (Average Daily Traffic) exceeds 3,000 vehicles or when the distance between stop lines exceeds 1,100 feet.

① A detection area shall be located near the stop line with the downstream edge positioned 6' from the stop line. A second detection area shall be located 100 to 150 feet in advance of the stop line. The size of the detection areas shall be approximately 6' x 10'. A single above-ground detector may be used to provide detection for both areas.

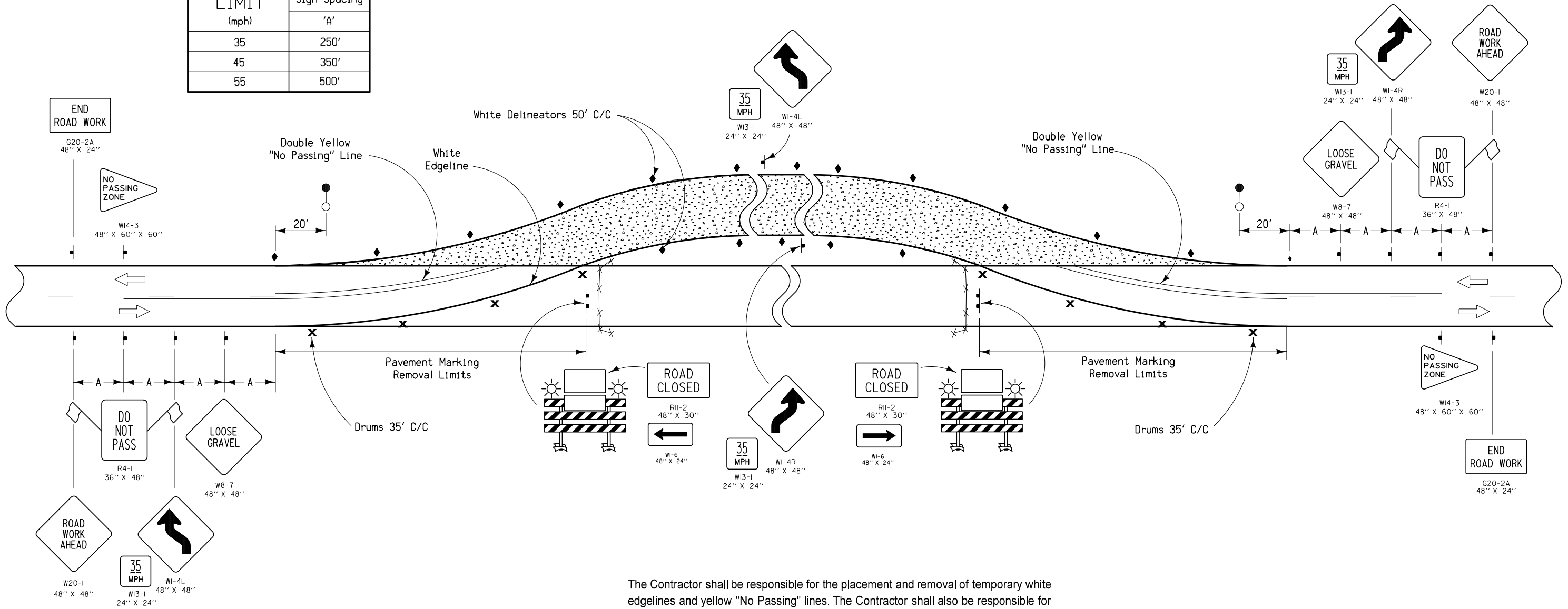
 <b>ROAD DESIGN DETAIL</b>	REVISION	
	NEW	10-19-06
	<b>520-54</b>	
SHEET 1 of 1		

REVISIONS: Replaced RS-11, as it is rarely used.

**TRAFFIC CONTROL LAYOUT  
FOR UNPAVED ON SITE DETOUR  
WITH ONE-LANE TRAFFIC**

**TWO-LANE ROADWAY**

SPEED LIMIT (mph)	Approximate Sign Spacing 'A'
35	250'
45	350'
55	500'



The Contractor shall be responsible for the placement and removal of temporary white edgelines and yellow "No Passing" lines. The Contractor shall also be responsible for the removal and replacement of the existing dashed yellow centerline and white edgelines as required by the Traffic Control Layout.

The Engineer may change the advisory speed if deemed appropriate. If reduced below 35 mph, the Reverse Curve signs shall be changed to Reverse Turn signs (W1-3LA or W1-3RA).

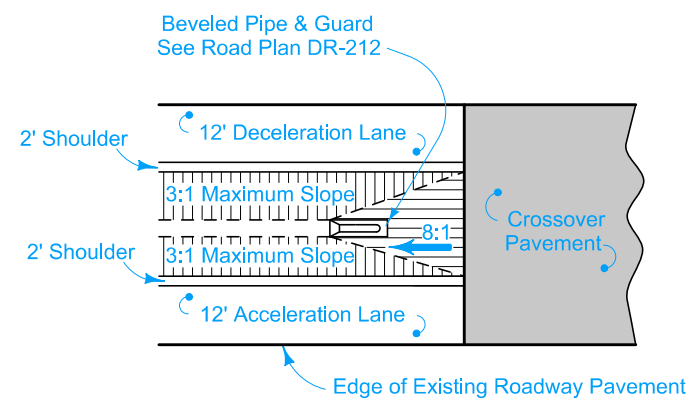
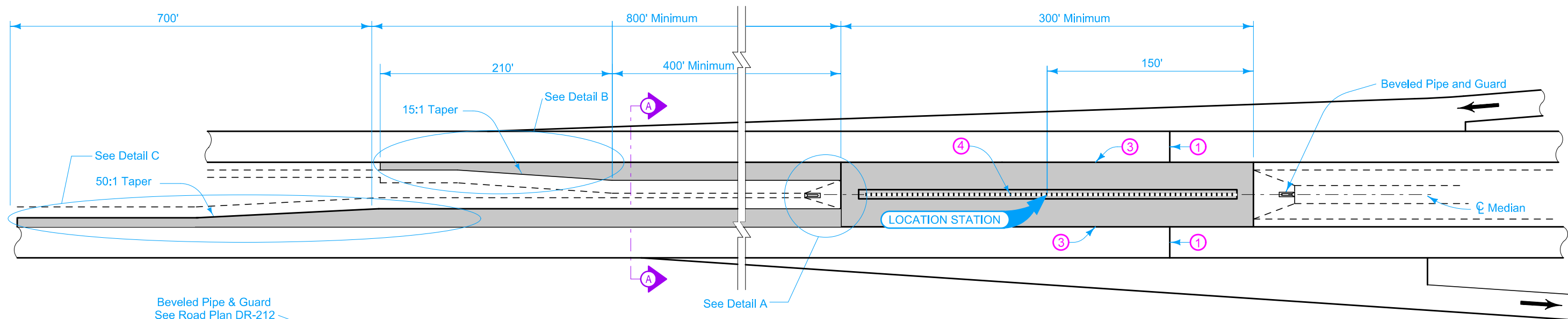
**LEGEND**

- ▬ Traffic Sign
- ✕ Drum
- ▬ Type III Barricade
- ⋈ Orange Plastic Safety Fence
- ←○ Traffic Signal
- ◆ Single White Delineators (mount back to back)
- Temporary Floodlighting
- ☀ Type 'A' Low-Intensity Flashing Warning Light
- ☀ Type 'B' High-Intensity Flashing Warning Light

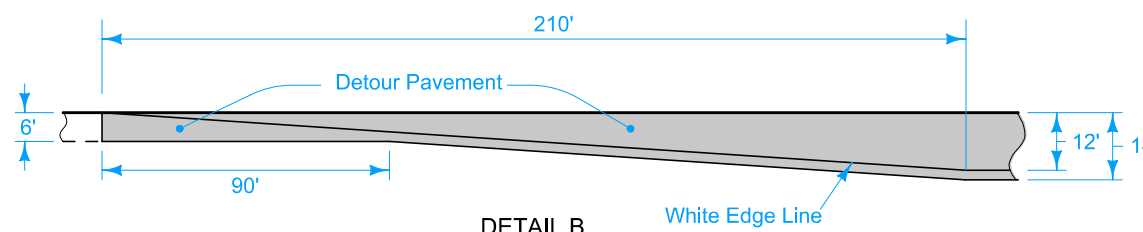
	REVISION	
	NEW	10-17-06
<b>ROAD DESIGN DETAIL</b>		<b>520-55</b>
REVISIONS: Replaced RS-9, as it is rarely used.		SHEET 1 of 1

**TRAFFIC CONTROL LAYOUT  
FOR UNPAVED ON SITE DETOUR  
WITH TWO-WAY TRAFFIC**

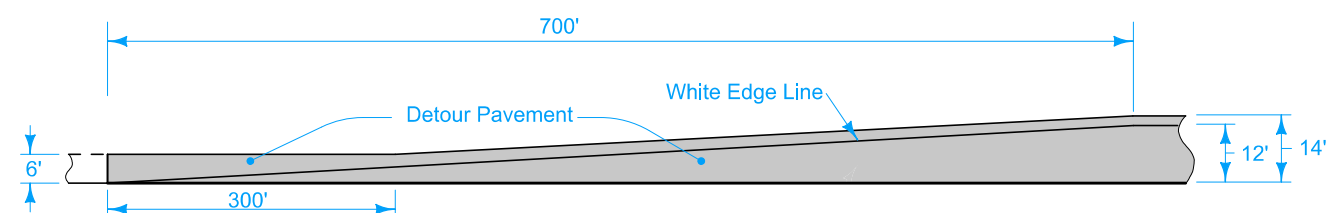




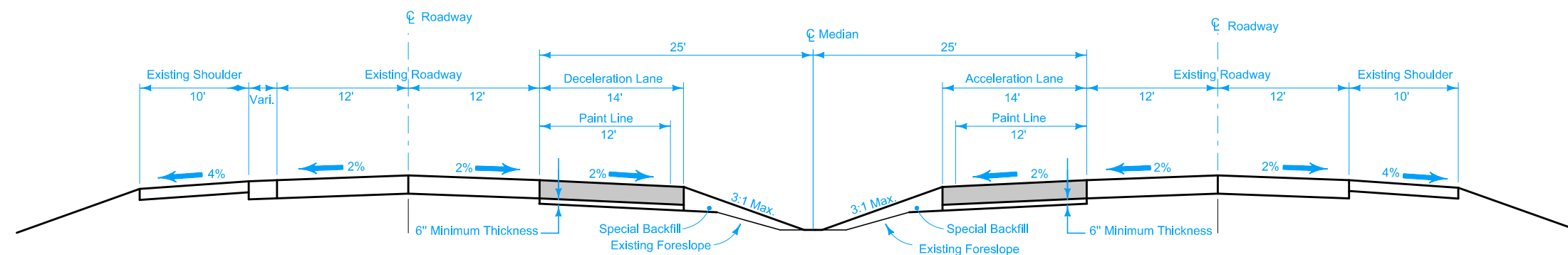
DETAIL A



DETAIL B



DETAIL C



SECTION A-A

The Engineer will determine the header location to accommodate the required staging activities.

- ① Possible location of staging header
- ② 8" PCC Detour Pavement or 10" HMA Detour Pavement. Refer to Section 2304 of the Standard Specifications.
- ③ 'B' Joint.
- ④ Slotted drain for median crossover. See DR-502

Possible Contract Items:	Unit	Quantity
Removal of Pavement*	Sq. Yds.	1720
Special Backfill	Tons	2140**
Detour Pavement	Sq. Yds.	4372***
18 inch Unclassified Roadway Pipe	Linear Ft.	335***

\*The removal of subbase material is incidental to the removal of pavement.

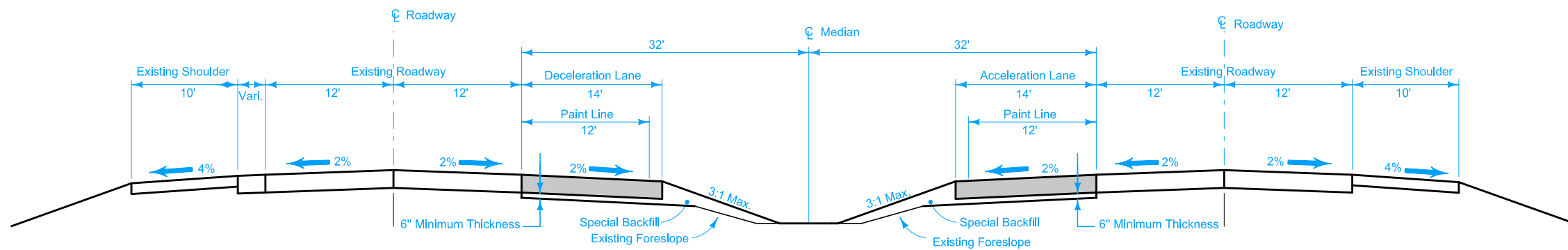
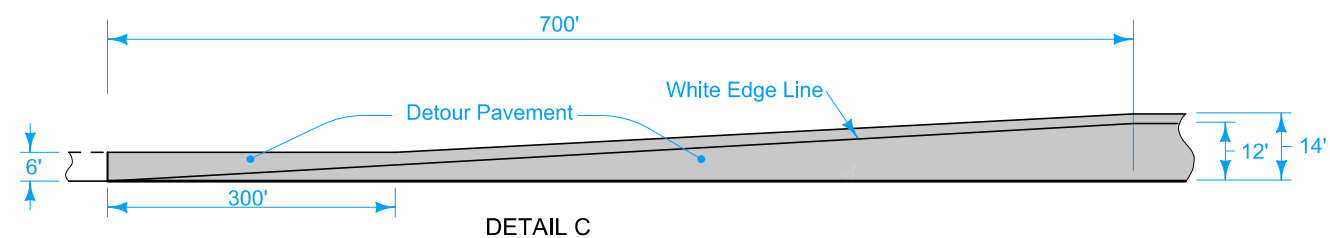
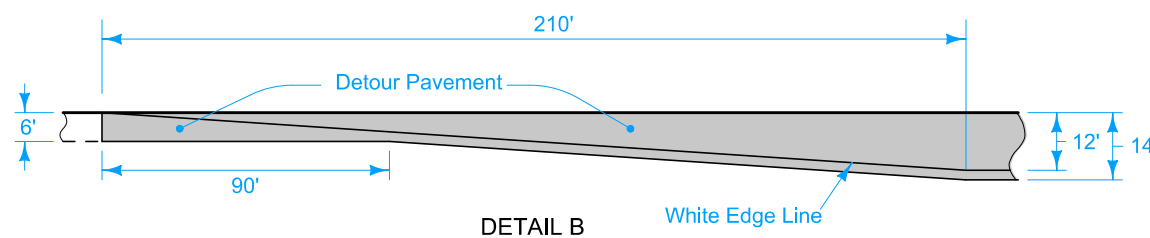
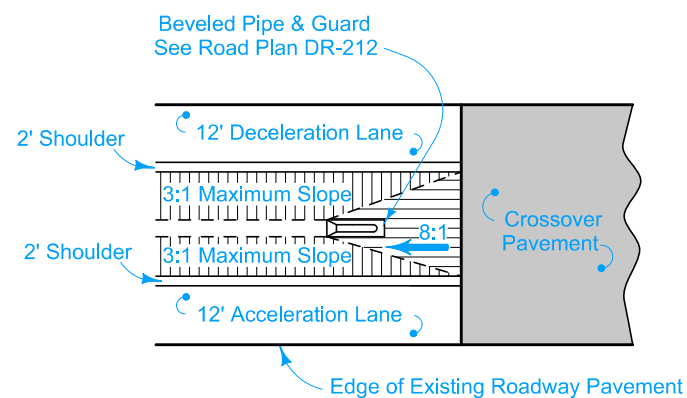
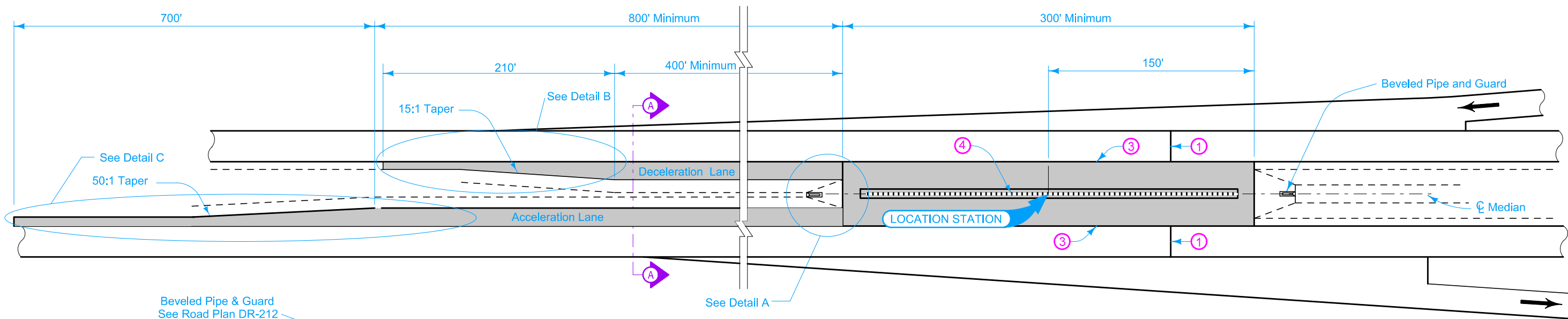
\*\*Quantities are based on the assumption the existing median ditch is 4 feet deep and foreslopes are 4:1.

\*\*\*Quantities are based on the assumption the median crossover is 300' in length

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	12	04-21-20
	<b>531-02</b>	
SHEET 1 of 1		

REVISIONS: Added reference to DR-502 for slotted drain. Replaced Section A-A and deleted Section B-B.

**MEDIAN CROSSOVER AT INTERCHANGE  
(50' MEDIAN)**



The Engineer will determine the header location to accommodate the required staging activities.

- ① Possible location of staging header
- ② 8" PCC Detour Pavement or 10" HMA Detour Pavement. Refer to Section 2304 of the Standard Specifications.
- ③ 'B' Joint.
- ④ Slotted drain for median crossover. See DR-502

Possible Contract Items:	Unit	Quantity
Removal of Pavement*	Sq. Yds.	1720
Special Backfill	Tons	2287**
Detour Pavement	Sq. Yds.	4838***
18 inch Unclassified Roadway Pipe	Linear Ft.	332***

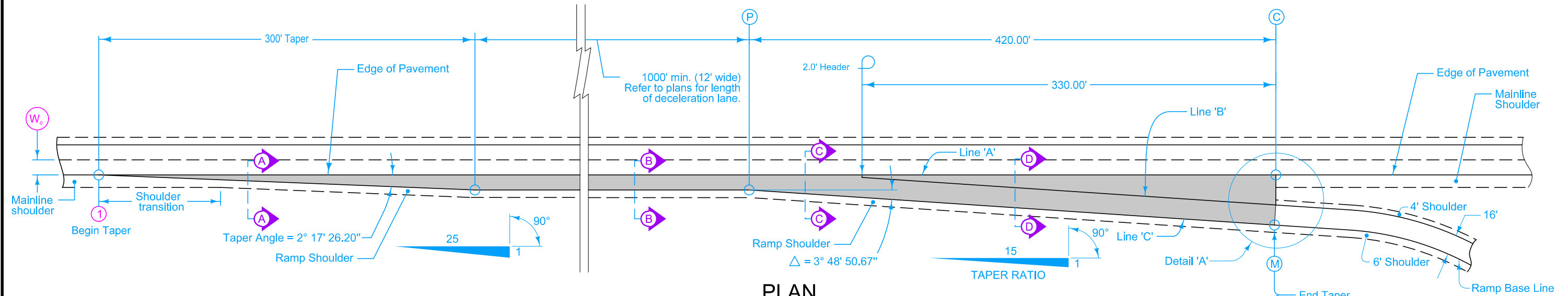
\*The removal of subbase material is incidental to the removal of pavement.

\*\*Quantities are based on the assumption the existing median ditch is 4 feet deep and foreslopes are 4:1.

\*\*\*Quantities are based on the assumption the median crossover is 300' in length

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	NEW	04-21-20
	<b>531-03</b>	
SHEET 1 of 1		
REVISIONS: New.		

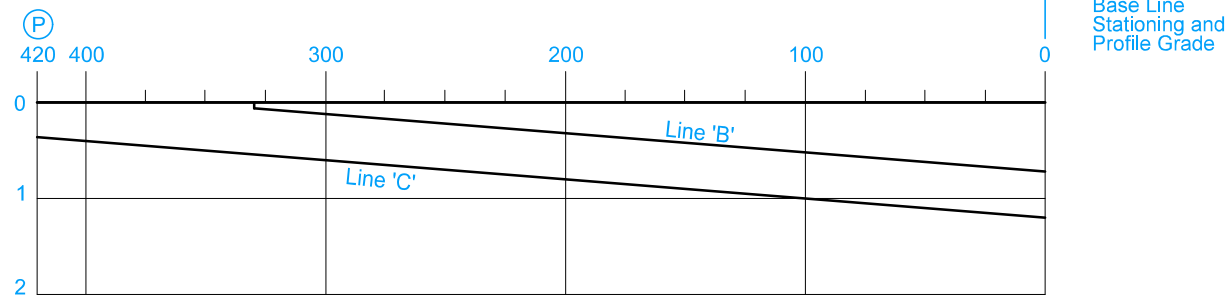
**MEDIAN CROSSOVER AT INTERCHANGE  
(64' MEDIAN)**



PLAN

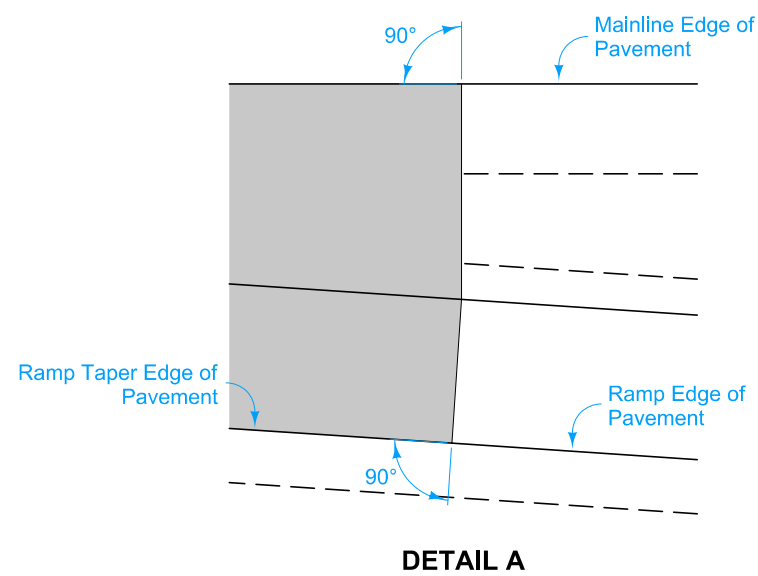
TABLE OF OFFSETS AND DROPS FOR 16' RAMP TAPER

DISTANCE (Ft.)	420	400	375	350	330	325	300	275	250	225	200	175	150	125	100	75	50	25	0
OFFSET (Ft.)	12.00	13.37	15.04	16.70	18.04	18.37	20.04	21.70	23.37	25.04	26.70	28.37	30.04	31.70	33.37	35.04	36.70	38.37	40.00
DROP (Ft.)	0.36	0.40	0.45	0.50	0.54	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20

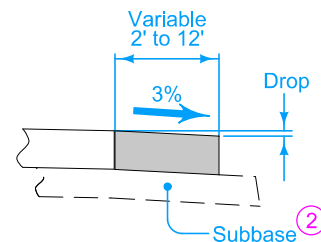


Note: The algebraic difference between the profile grade for ramp base line at (M) and relative profile grade of mainline at (C) is 0.20%

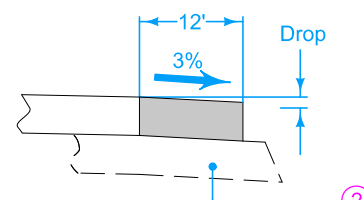
PROFILE



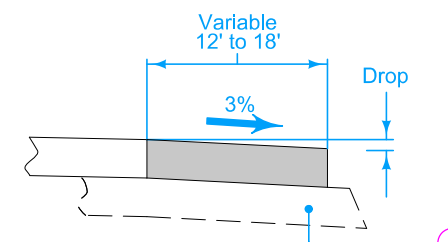
DETAIL A



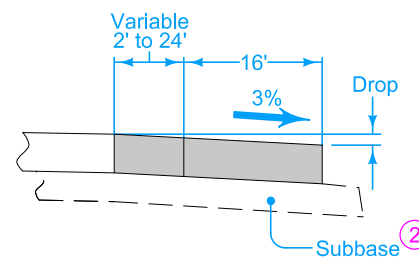
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

TABLE OF SHOULDER TRANSITION LENGTHS WITH 6' SHOULDER ON RAMP

$W_0$	Shoulder Width beyond Edge of Mainline Pavement		
	8'	10'	12'
12'	NA	100'	150'

NOTE:  $W_0$  is the width of the outside lane to the Edge of Pavement.

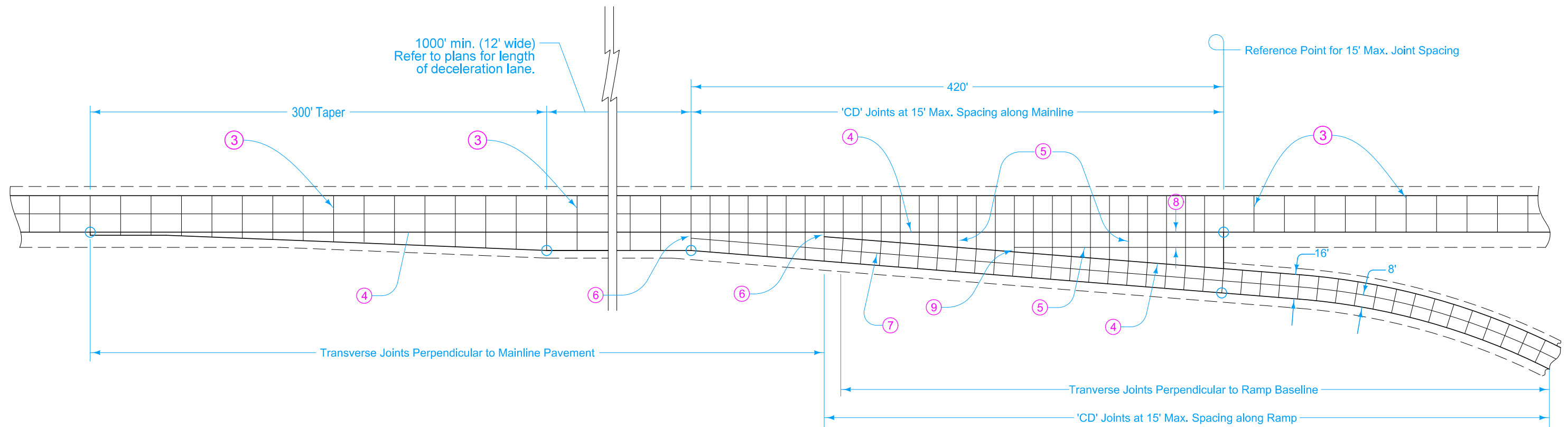
Construct ramp exit pavement the same thickness as mainline pavement.

For joint detail, see PV-101.

- ① For header construction detail at the end of taper, see Typical 7101 or Typical 7102.
- ② Construct subbase for ramp exit pavement the same thickness as mainline subbase.


	REVISION	
	2	04-21-20
	<b>533-01</b>	
SHEET 1 of 2		
REVISIONS: Removed MODIFIED from the detail.		

**PARALLEL DECELERATION TAPER  
FOR 16' RAMP  
(60 MPH DESIGN SPEED)**

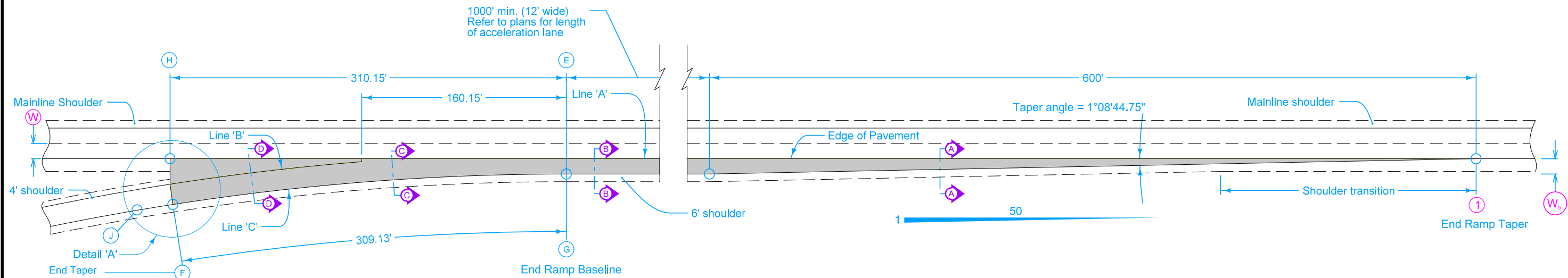


16' EXIT RAMP WITH PARALLEL DECELERATION LANE

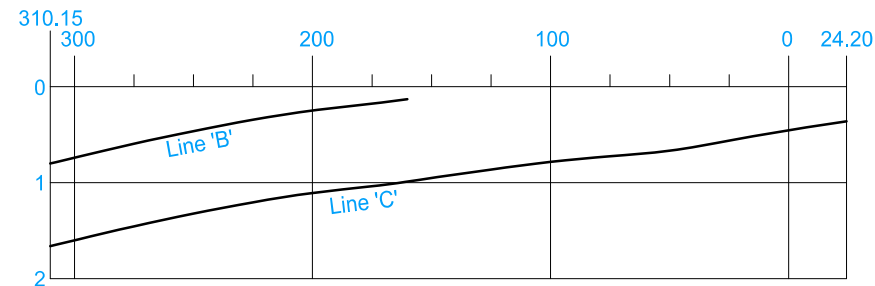
- ③ 'CD' Joints at 17' spacing.
- ④ 'BT-2' or 'KT-2' Joint.
- ⑤ 'C' Joint.
- ⑥ 'B' Joint. 2' minimum, 4' maximum.
- ⑦ 'L-2' Joint.
- ⑧ 10' minimum or equal to mainline shoulder width.
- ⑨ 'B' or 'C' Joint. 2' minimum. 4' maximum.

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	2	04-21-20
<b>533-01</b>		SHEET 2 of 2
REVISIONS: Removed MODIFIED from the detail.		

**PARALLEL DECELERATION TAPER  
FOR 16' RAMP  
(60 MPH DESIGN SPEED)**

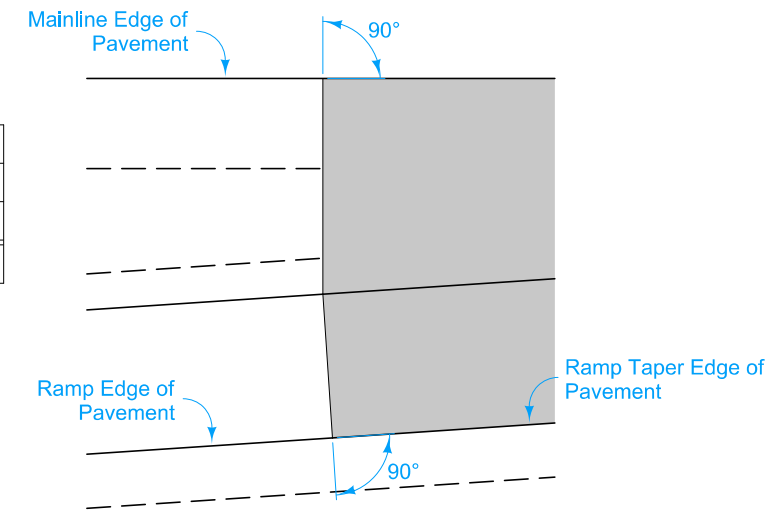


Pt. 'G' to Pt. 'J'  
 $\Delta = 8^\circ 51' 20.88''$   
 $T = 164.23'$   
 $L = 327.73'$   
 $E = 6.73'$   
 $R = 2000.00'$



NOTE: The algebraic difference between ramp profile grade at point (F) and relative profile grade of mainline at point (H) is 0.62%

W <sub>0</sub>	Shoulder Width beyond Edge of Mainline Pavement		
	8'	10'	12'
12'	NA	100'	150'



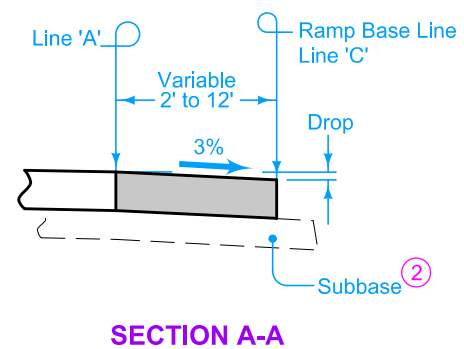
DETAIL A

Construct ramp exit pavement the same thickness as mainline pavement.

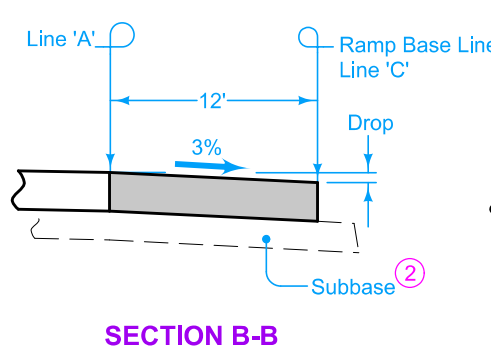
For joint detail, see PV-101.

- ① For header construction detail at the end of taper, see Typical 7101 or Typical 7102.
- ② Construct subbase for ramp exit pavement the same thickness as mainline subbase.

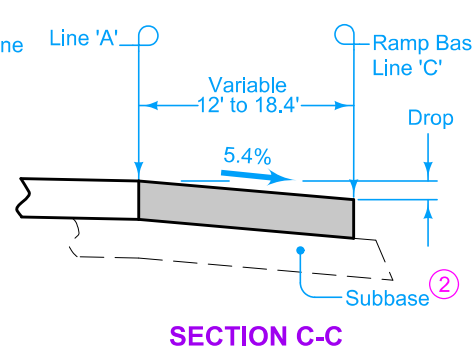
		DISTANCE FROM POINT (E) ALONG LINE 'A' (Ft.)																		
		310.15	300	275	250	225	204	200	175	160.15	150	125	100	75	50	25	0	24.2		
From Line 'A' To Line 'B'	OFFSET (Ft.)	20.00	18.45	14.84	11.56	8.60	6.30	5.95	3.61	2.37										
	SLOPE (%)	← Constant 4.0% Slope →										4.11	4.92	5.40						
	DROP (Ft.)	0.80	0.74	0.59	0.46	0.34	0.25	0.24	0.18	0.13										
From Line 'B' To Line 'C'	OFFSET (Ft.)	← Constant 16' Offset →																		
	SLOPE (%)	← Constant 5.4% Slope →																		
	DROP (Ft.)	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86										
From Line 'A' To Line 'C'	OFFSET (Ft.)										17.63	15.91	14.50	13.41	12.63	12.16	12.00	12.00		
	SLOPE (%)										5.40	5.40	5.40	5.40	5.40	4.59	3.78	3.00		
	DROP (Ft.)	1.66	1.60	1.45	1.32	1.20	1.11	1.10	1.04	0.99	0.95	0.86	0.78	0.72	0.68	0.56	0.45	0.36		
		DISTANCE FROM POINT (G) ALONG LINE 'C' (Ft.)																		
		309.13	298.73	273.67	248.66	223.68	202.73	198.74	173.83	159.04	150.14	125.08	100.04	75.02	50.01	25.00	0.00			



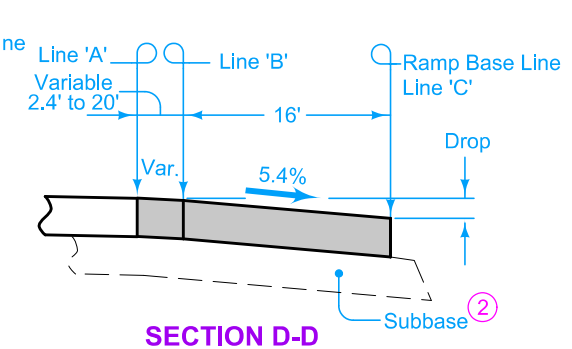
SECTION A-A



SECTION B-B

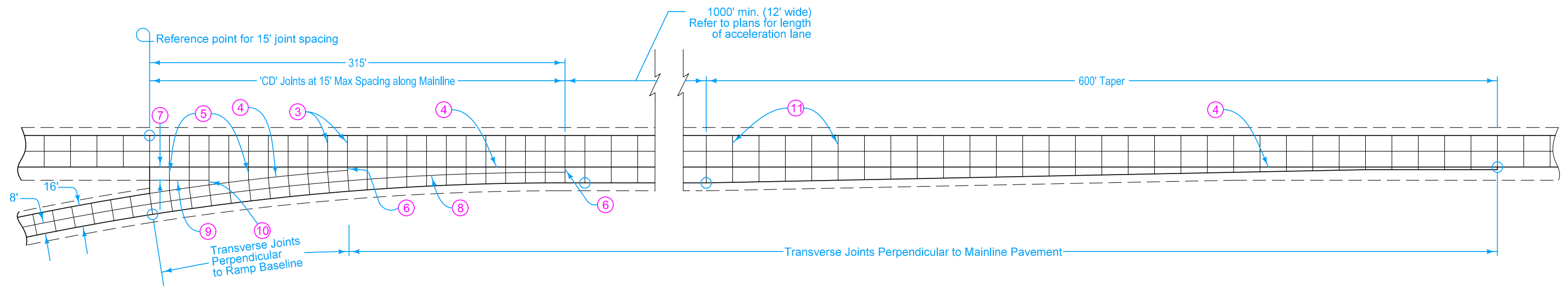


SECTION C-C



SECTION D-D

	REVISION	
	3	04-20-21
	<h2>533-02</h2>	
ROAD DESIGN DETAIL		
SHEET 1 of 2		
REVISIONS: Added Point J and Ramp Profile note.		
<h3>PARALLEL ACCELERATION TAPER FOR 16' RAMP (60 MPH DESIGN SPEED)</h3>		



- ③ 'CD' Joints at 15' spacing.
- ④ 'BT-2' or 'KT-2' Joint.
- ⑤ 'C' Joint.
- ⑥ 'B' Joint, 2' minimum, 4' maximum.
- ⑦ 10' minimum or equal to mainline shoulder width.
- ⑧ 'L-2' Joint.
- ⑨ 'C' Joint parallel to mainline pavement.
- ⑩ 'B' or 'C' Joint, 2' minimum, 4' maximum.
- ⑪ 'CD' Joints at 17' spacing.

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	3	04-20-21
	533-02	
SHEET 2 of 2		
REVISIONS: Added Point J and Ramp Profile note.		

PARALLEL ACCELERATION TAPER  
FOR 16' RAMP  
(60 MPH DESIGN SPEED)

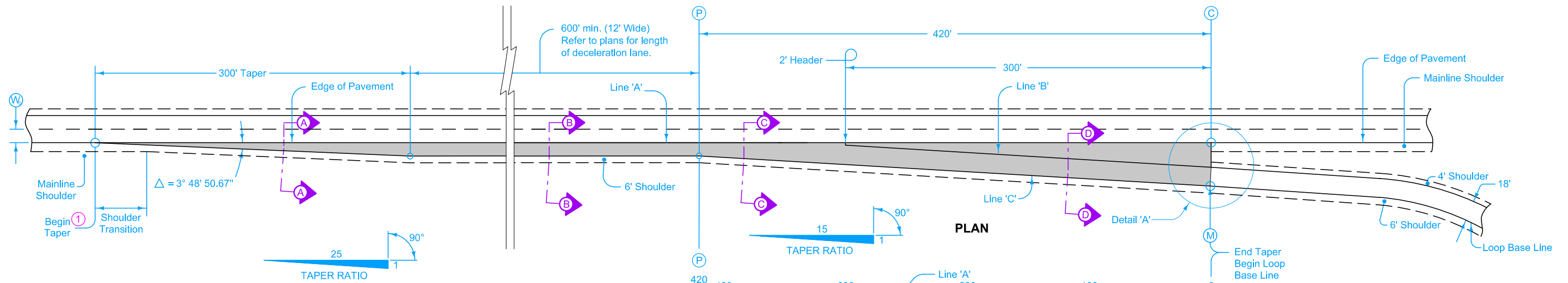
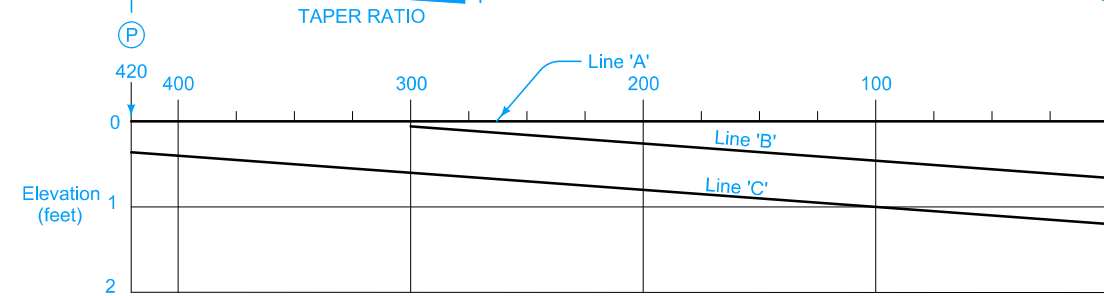


TABLE OF SHOULDER TRANSITION LENGTHS			
W	Shoulder Width beyond Edge of Mainline Pavement		
	8'	10'	12'
12'	NA	100'	150'

NOTE: W<sub>o</sub> is the width of the outside lane to the Edge of Pavement.



NOTE: The algebraic difference between profile grade for Loop Base Line at (M) and relative profile grade of Mainline at (C) is 0.2%.

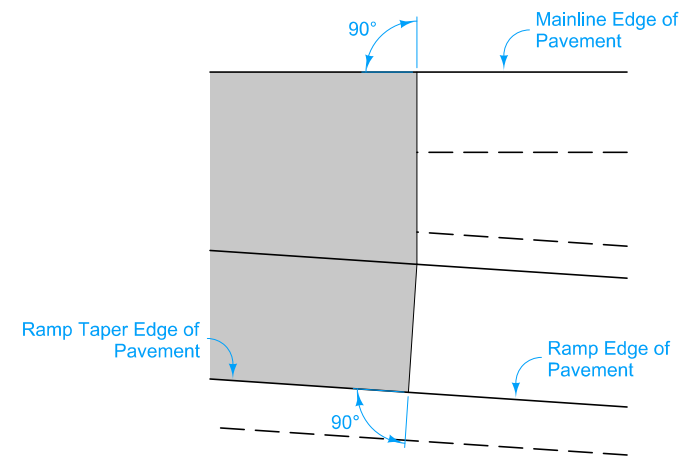


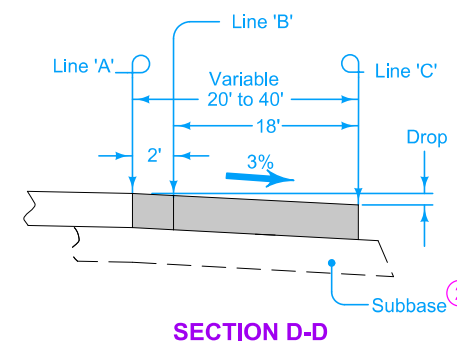
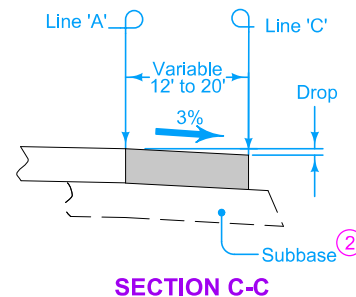
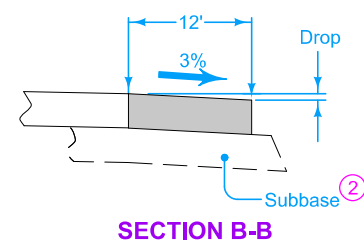
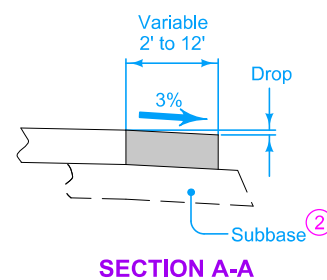
TABLE OF OFFSETS AND DROPS FOR 18' RAMP TAPER																			
DISTANCE FROM POINT (C) ALONG LINE 'A' (Ft.)		420	400	375	350	325	300	275	250	225	200	175	150	125	100	75	50	25	0
From Line 'A' To Line 'B'	OFFSET (Ft.)						2.00	3.67	5.33	7.00	8.67	10.33	12.00	13.67	15.33	17.00	18.67	20.33	22.00
	SLOPE (%)	← Constant 3.0% Slope →																	
	DROP (Ft.)						0.06	0.11	0.16	0.21	0.26	0.31	0.36	0.41	0.46	0.51	0.56	0.61	0.66
From Line 'B' To Line 'C'	OFFSET (Ft.)	← Constant 18' Offset →																	
	SLOPE (%)	← Constant 3.0% Slope →																	
	DROP (Ft.)						0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
From Line 'A' To Line 'C'	OFFSET (Ft.)	12.00	13.33	15.00	16.67	18.33													
	SLOPE (%)	← Constant 3.0% Slope →																	
	DROP (Ft.)	0.36	0.40	0.45	0.50	0.56	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20

Construct Loop exit pavement the same thickness as mainline pavement.

For joint details, see PV-101.

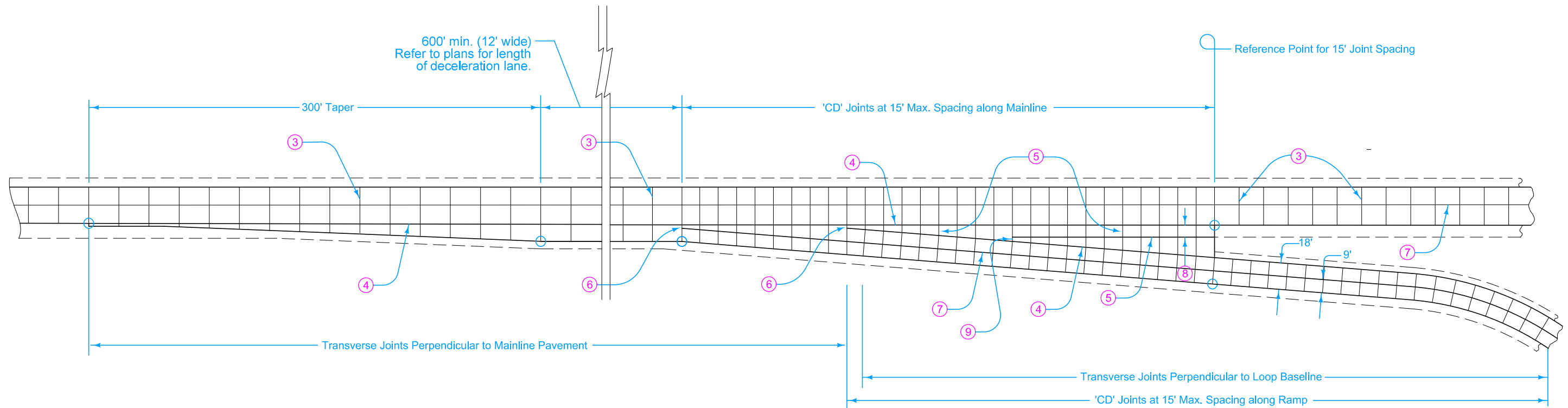
① For header construction details at the beginning of taper, see Typical 7101 or Typical 7102.

② Construct subbase for ramp exit pavement the same thickness as mainline subbase.




<p><b>IOWA DOT</b></p> <p><b>ROAD DESIGN DETAIL</b></p> <p>REVISIONS: Removed MODIFIED from the detail.</p>	REVISION	
	2	04-21-20
	<p><b>533-03</b></p> <p>SHEET 1 of 2</p>	

**PARALLEL DECELERATION TAPER FOR 18' EXIT LOOP (60 MPH DESIGN SPEED)**



**18' EXIT LOOP WITH PARALLEL DECELERATION LANE**

- ③ 'CD' Joints at 17' spacing.
- ④ 'BT-2' or 'KT-2' Joint.
- ⑤ 'C' Joint.
- ⑥ 'B' Joint. 2' minimum, 4' maximum.
- ⑦ 'L-2' Joint.
- ⑧ 10' minimum or equal to mainline shoulder width.
- ⑨ 'B' or 'C' Joint. 2' minimum. 4' maximum.

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	2	04-21-20
	533-03	
SHEET 2 of 2		
REVISIONS:    Removed MODIFIED from the detail.		
PARALLEL DECELERATION TAPER FOR 18' EXIT LOOP (60 MPH DESIGN SPEED)		



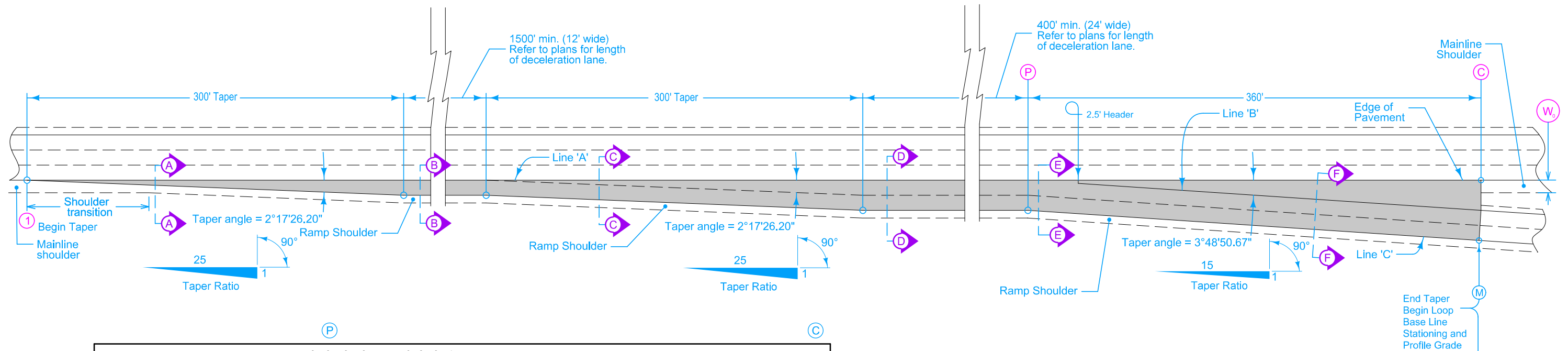
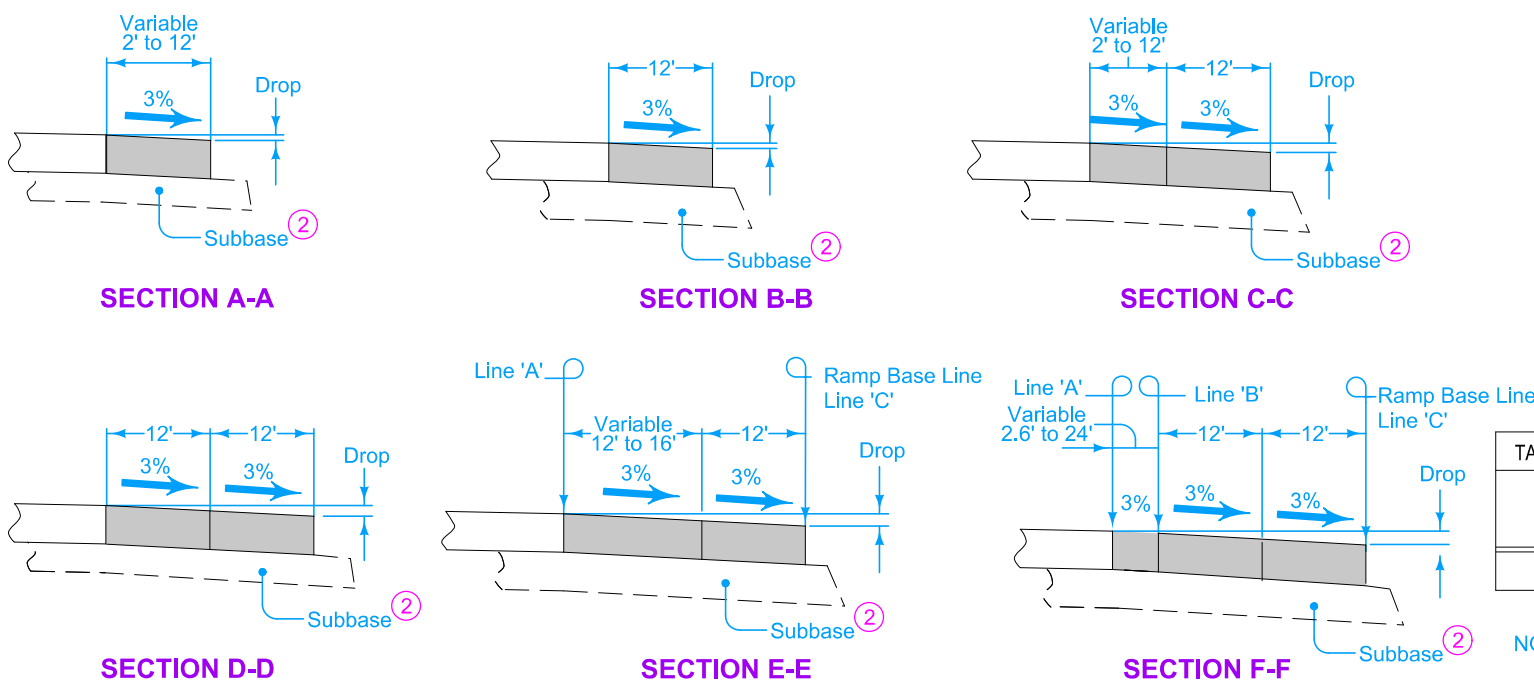
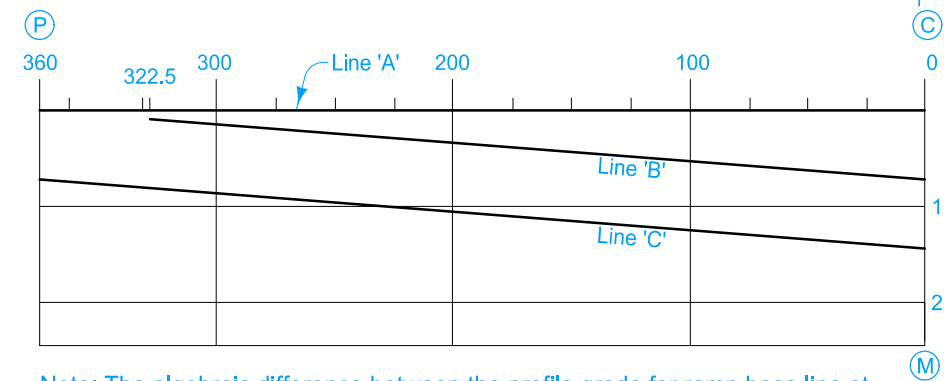


TABLE OF OFFSETS AND DROPS FOR 24' RAMP TAPER

DISTANCE FROM POINT (P) ALONG LINE 'A' (Ft.)		360	350	325	322.5	300	275	250	225	200	175	150	125	100	75	50	25	0	
From Line 'A' To Line 'B'	OFFSET (Ft.)				2.5	4.00	5.67	7.33	9.00	10.67	12.33	14.00	15.67	17.33	19.00	20.67	22.33	24.00	
	SLOPE (%)				Constant 3.0% Slope														
	DROP (Ft.)				0.08	0.12	0.17	0.22	0.27	0.32	0.37	0.42	0.47	0.52	0.57	0.62	0.67	0.72	
From Line 'B' To Line 'C'	OFFSET (Ft.)				Constant 24' Offset														
	SLOPE (%)				Constant 3.0% Slope														
	DROP (Ft.)				0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
From Line 'A' To Line 'C'	OFFSET (Ft.)	24.00	24.72	26.39															
	SLOPE (%)	3.00	3.00	3.00															
	DROP (Ft.)	0.72	0.74	0.79	0.80	0.84	0.89	0.94	0.99	1.04	1.09	1.14	1.19	1.24	1.29	1.34	1.39	1.44	



Construct ramp exit pavement the same thickness as mainline pavement.

For joint detail, see PV-101.

① For header construction detail at the end of taper See Typical 7101 or Typical 7102.

② Construct subbase for ramp exit pavement the same thickness as mainline subbase.

TABLE OF SHOULDER TRANSITION LENGTHS WITH 6' SHOULDER ON RAMP

W <sub>o</sub>	Shoulder Width beyond Edge of Mainline Pavement		
	8'	10'	12'
12'	NA	100'	150'

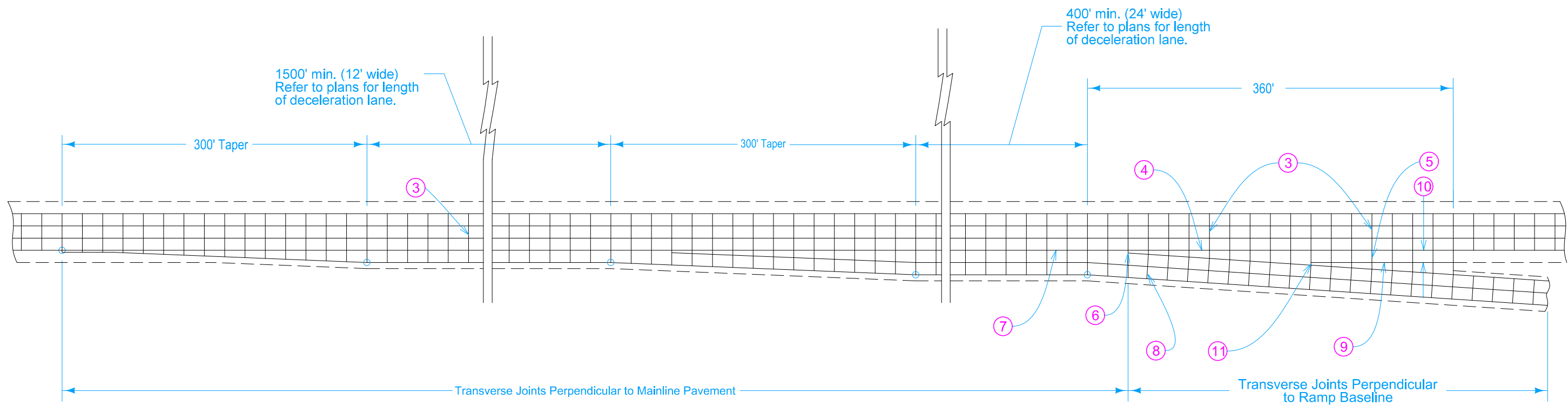
NOTE: W<sub>o</sub> is the width of the outside lane to the Edge of Pavement.

## PROFILE

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	4	10-18-22
	533-04	
SHEET 1 of 2		


REVISIONS: Revised header dimension for consistency.

## PARALLEL DECELERATION TAPER FOR 24' RAMP (60 MPH DESIGN SPEED)

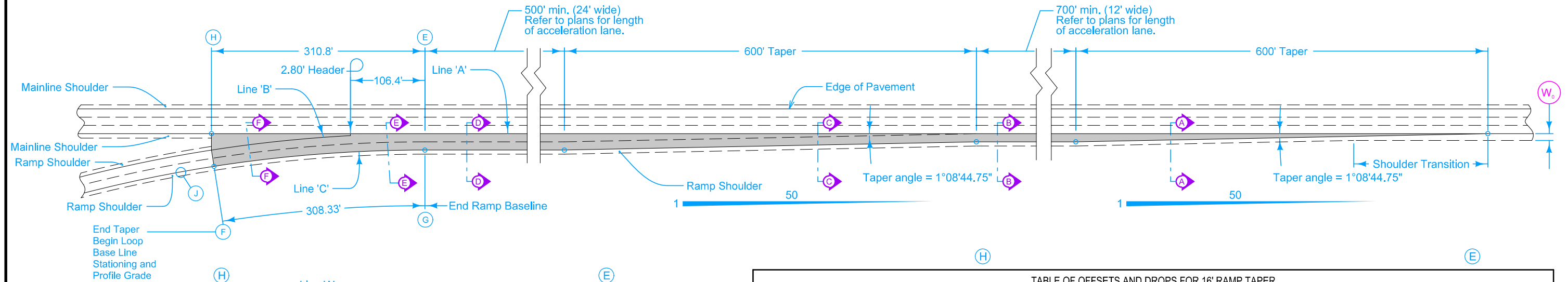


## 24' EXIT RAMP WITH PARALLEL DECELERATION LANE

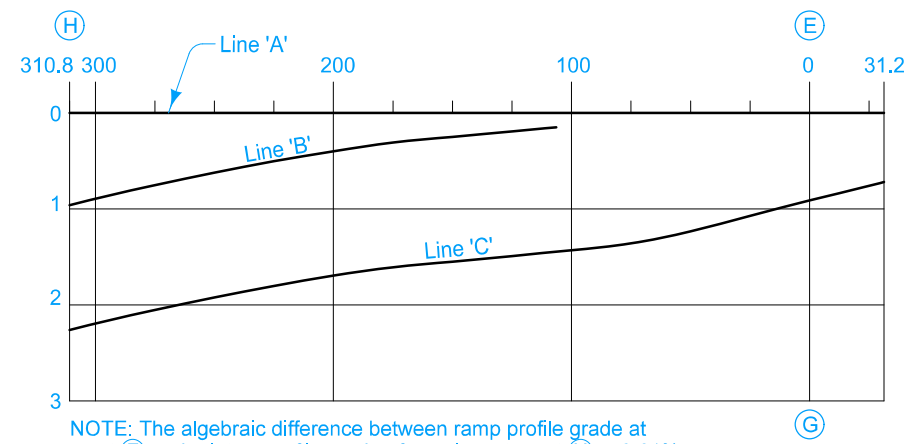
- ③ 'CD' Joints at 17' spacing.
- ④ 'BT-2' or 'KT-2' Joint.
- ⑤ 'C' Joint.
- ⑥ 'B' Joint. 2' minimum, 4' maximum.
- ⑦ 'L-2' Joint.
- ⑧ Construct transverse joints on the exit ramp taper perpendicular to the ramp baseline where the gore area is 4 feet or greater.
- ⑨ 'C' Joint parallel to mainline pavement.
- ⑩ 10' minimum or equal to mainline shoulder width.
- ⑪ 'B' or 'C' Joint. 2' minimum, 4' maximum.

	REVISION	
	4	10-18-22
	<b>533-04</b> SHEET 2 of 2	
REVISIONS: Revised header dimension for consistency.		

**PARALLEL DECELERATION TAPER  
FOR 24' RAMP  
(60 MPH DESIGN SPEED)**

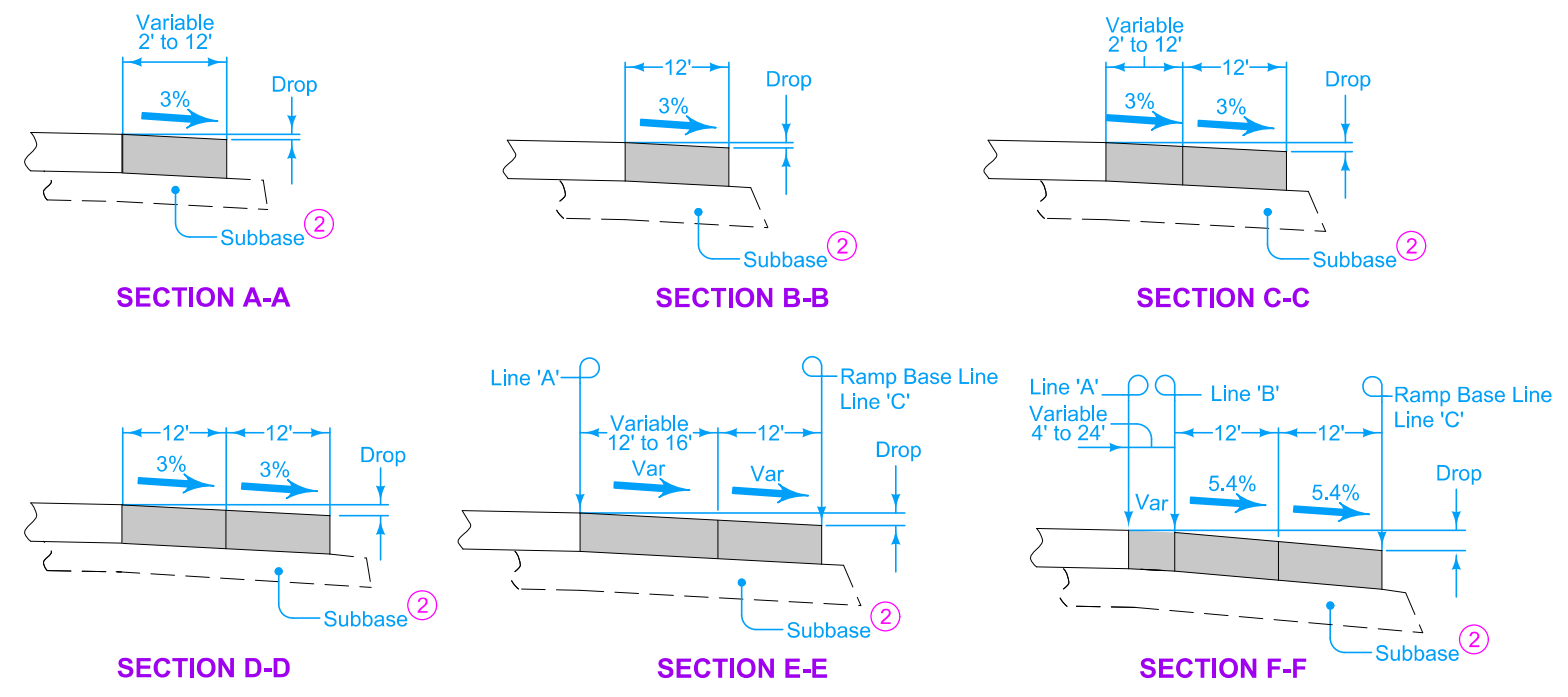


Pt. 'G' to Pt. 'J'	
$\Delta$	= $09^{\circ}31'13.98''$
T	= 166.55'
L	= 332.33'
E	= 6.92'
R	= 2000.00'



NOTE: The algebraic difference between ramp profile grade at point (F) and relative profile grade of mainline at point (H) is 0.61%

TABLE OF OFFSETS AND DROPS FOR 16' RAMP TAPER																					
DISTANCE FROM POINT (H) ALONG LINE 'A' (Ft.)		310.8	300	275	250	225	200	175	150	125	106.4	100	75	65	50	25	0	25	31.2		
From Line 'A' To Line 'B'	OFFSET (Ft.)	24.00	22.36	18.77	15.50	12.55	9.91	7.58	5.57	3.86	2.80										
	SLOPE (%)	Constant 4.0% Slope										4.51	5.02	5.40							
	DROP (Ft.)	0.96	0.89	0.75	0.62	0.50	0.40	0.30	0.25	0.19	0.15										
From Line 'B' To Line 'C'	OFFSET (Ft.)	Constant 24' Offset																			
	SLOPE (%)	Constant 5.4% Slope																			
	DROP (Ft.)	Constant 1.30' Drop																			
From Line 'A' To Line 'C'	OFFSET (Ft.)											26.50	25.41	25.06	24.63	24.16	24.00	24.00	24.00		
	SLOPE (%)											5.40	5.40	5.40	5.04	4.41	3.78	3.15	3.00		
	DROP (Ft.)	2.26	2.19	2.05	1.92	1.80	1.69	1.60	1.55	1.49	1.45	1.43	1.37	1.35	1.24	1.07	0.91	0.76	0.72		
DISTANCE FROM POINT (F) ALONG LINE 'C' (Ft.)		308.30	297.54	272.58	247.67	202.79	197.95	173.14	148.36	123.60	105.21	100.04	75.02	65.01	50.01	25.00	0.00				



- Construct ramp entrance pavement the same thickness as mainline pavement.
- For joint detail, see PV-101.
- ① For header construction detail at the end of taper See Typical 7101 or Typical 7102.
- ② Construct subbase for ramp entrance pavement the same thickness as mainline subbase.

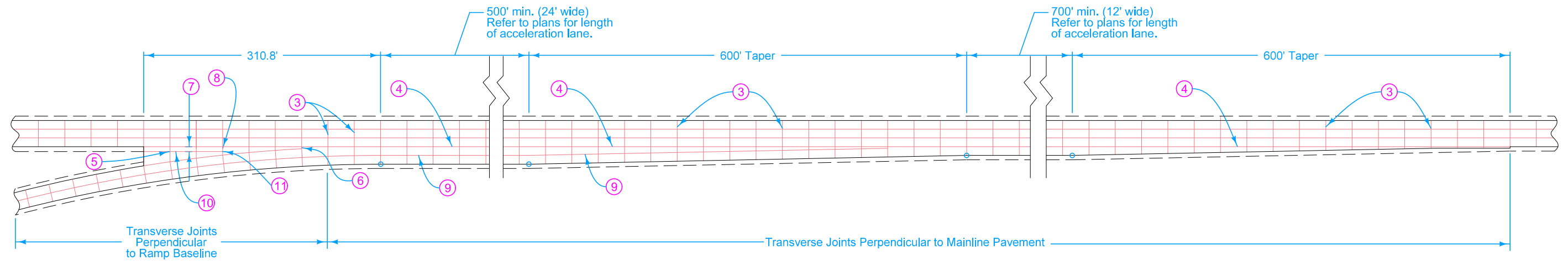
TABLE OF SHOULDER TRANSITION LENGTHS WITH 6' SHOULDER ON RAMP			
W <sub>0</sub>	Shoulder Width beyond Edge of Mainline Pavement		
	8'	10'	12'
12'	NA	200'	300'

NOTE: W<sub>0</sub> is the width of the outside lane to the Edge of Pavement.


 <b>ROAD DESIGN DETAIL</b>	REVISION	
	3	04-20-21
	<b>533-05</b>	
SHEET 1 of 2		

REVISIONS: Added Point J and Ramp Profile note.

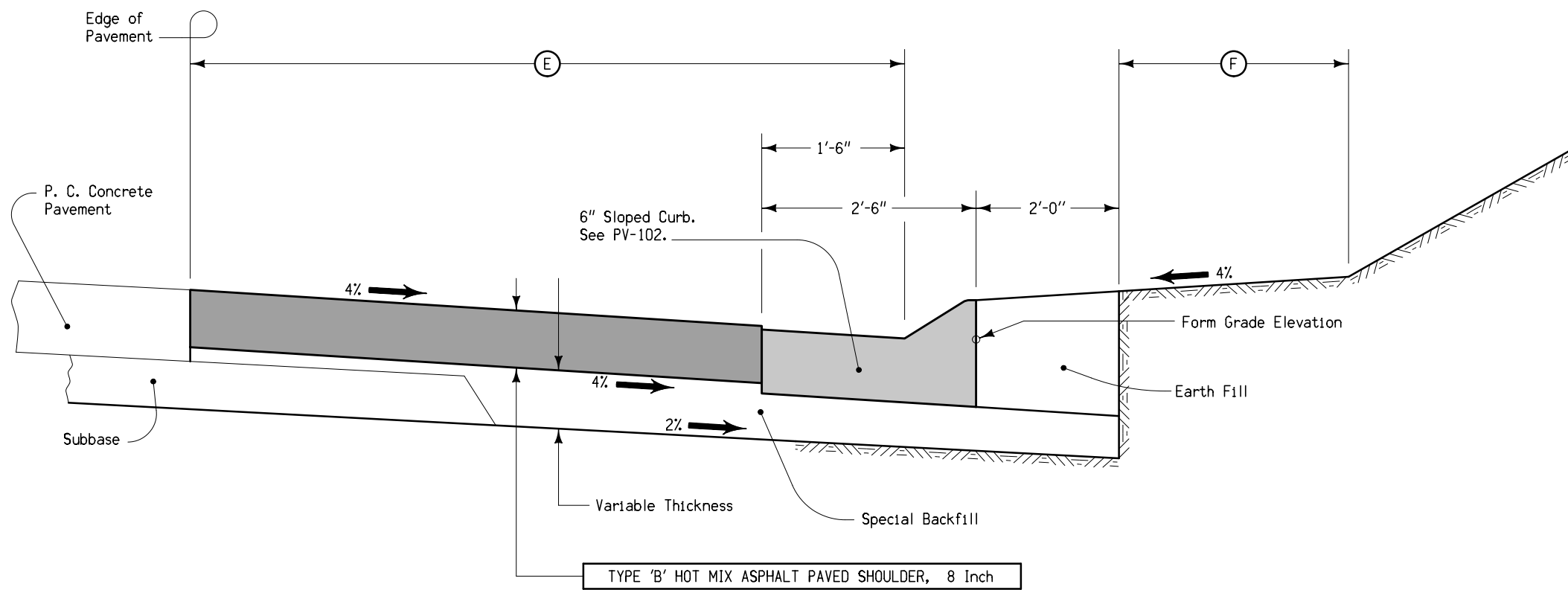
**PARALLEL ACCELERATION TAPER FOR 24' RAMP (60 MPH DESIGN SPEED)**



- ③ 'CD' Joints at 17' spacing.
- ④ 'BT-2' or 'KT-2' Joint.
- ⑤ 'C' Joint.
- ⑥ 'B' Joint. 2' minimum, 4' maximum.
- ⑦ 10' minimum or equal to mainline shoulder width.
- ⑧ Construct transverse joints through the gore perpendicular to mainline pavement.
- ⑨ 'L-2' Joint.
- ⑩ 'C' Joint parallel to mainline pavement.
- ⑪ 'B' or 'C' Joint. 2' minimum, 4' maximum.

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	3	04-20-21
	<b>533-05</b> SHEET 2 of 2	
REVISIONS: Added Point J and Ramp Profile note.		

**PARALLEL ACCELERATION TAPER  
 FOR 24' RAMP  
 (60 MPH DESIGN SPEED)**



**TYPICAL SECTION  
HOT MIX ASPHALT PAVED SHOULDER  
WITH 6" SLOPED CURB AND GUTTER UNIT**

Design Quantity Table ①					
⑤ Feet	Hot Mix Asphalt				P. C. Concrete Curb And Gutter Unit Cu. Yds.
	Surface Area Sq. Yds.	Hot Mix Asphalt Tons ②	Tack Coat Gallons ③	Asphalt Binder Tons	
6	44.44	19.33	3.19	1.160	9.38
8	66.67	29.00	4.31	1.740	9.38
10	88.89	38.67	5.42	2.320	9.38

Slopes, dimensions, and quantities indicated hereon are for a normal section as shown and are for design purposes. Shoulder construction details may be modified through superelevated curves or other areas specifically designated by the Engineer. Refer to Typical Cross Sections and Standard Road Plans for superelevation.

Accomplish any special shaping of subgrade necessary, prior to construction of paved shoulders, as directed by the Engineer. Dispose of material removed due to this special shaping as directed by the Engineer.

Payment for special backfill will be based on a nominal 6 inch thickness. The thickness may be exceeded at the Contractor's option. However, the Contractor will not be compensated for any additional amount.

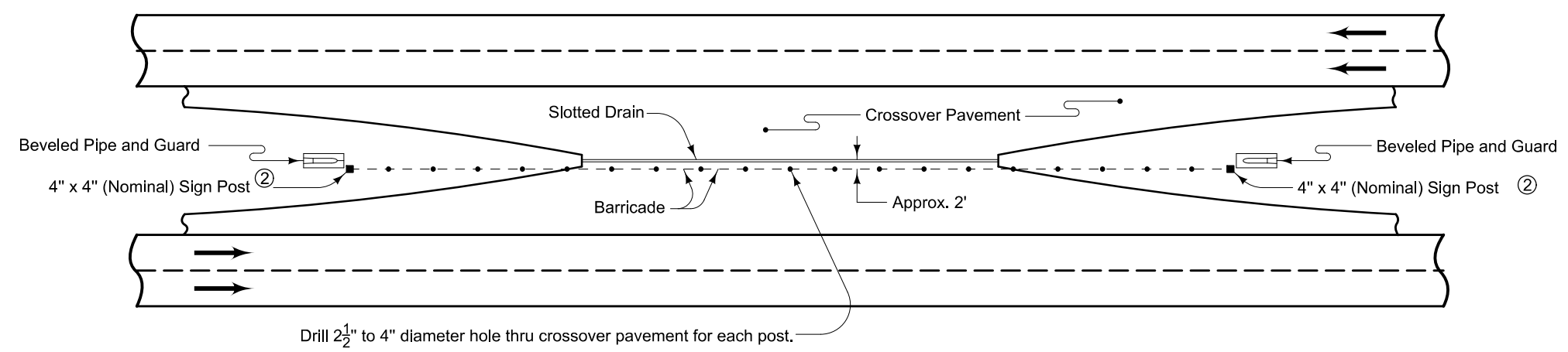
- ① Quantities shown are for one shoulder per station. Rates of application may be adjusted at the time of construction if so directed by the Engineer.
- ② Quantities shown are based on a design weight of 145 lbs / cu. ft. for Hot Mix Asphalt Mixture (1,000,000 ESAL), Base Course, 3/4" mix, with an asphalt content of 6 percent.
- ③ Includes quantities for tack coating vertical face of adjacent pavement prior to placement of any base material. Tack coat estimated at one (1) application at 0.05 gal. per sq. yd.

<b>ROAD DESIGN DETAIL</b>	REVISION	
	13	04-16-13
	<b>535-3</b>	
SHEET 1 of 1		

REVISIONS: Modified note. Updated reference to sloped curb. Changed dimension regarding curb.

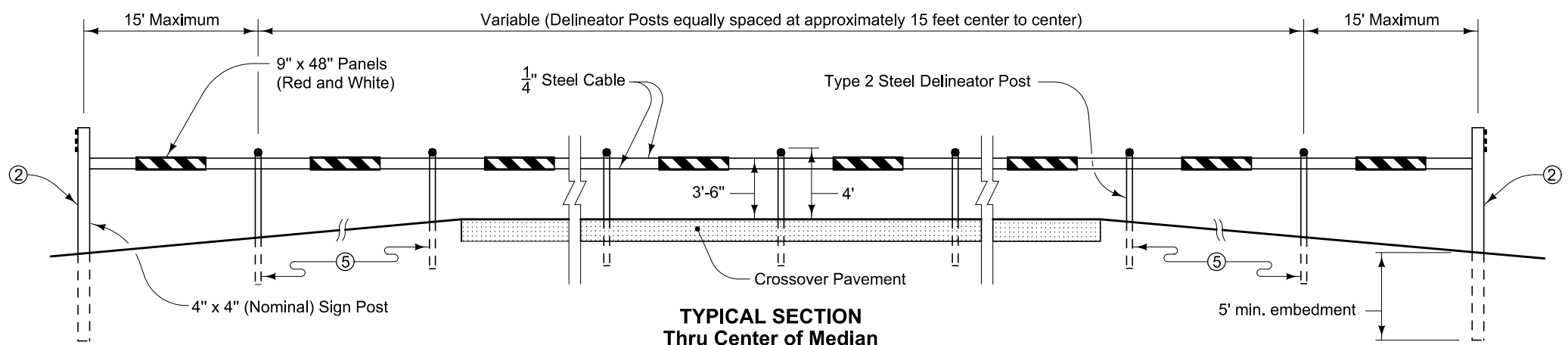
**PAVED SHOULDER  
HOT MIX ASPHALT WITH  
6" SLOPED CURB AND GUTTER UNIT**

The price bid for "Crossover Barricade", each, is considered full compensation for furnishing all materials and work necessary to construct the barricade as detailed hereon.



Drill 2 1/2" to 4" diameter hole thru crossover pavement for each post.

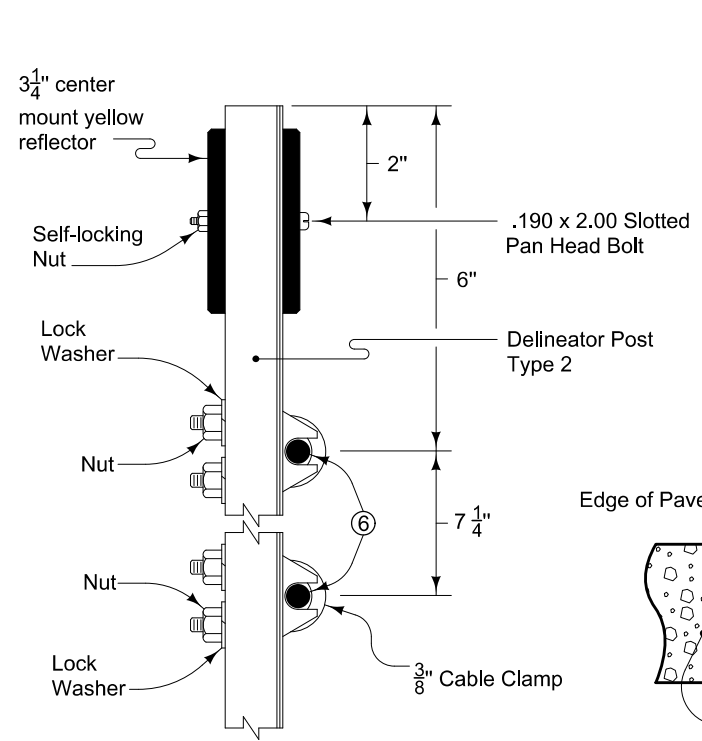
**PLAN VIEW**



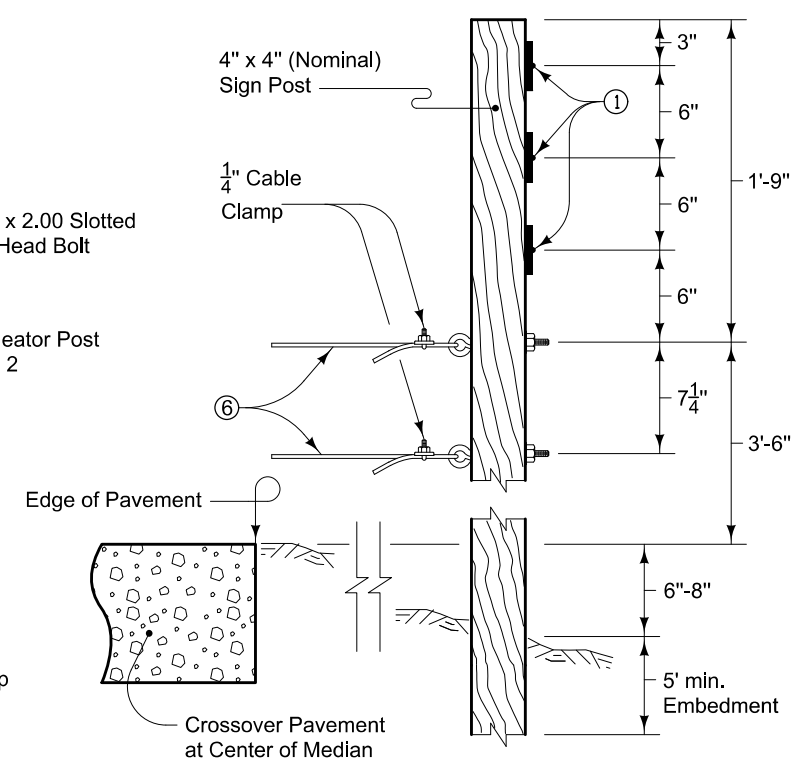
**TYPICAL SECTION  
Thru Center of Median**

- ① 3 1/4" center mount yellow reflector, attached to sign post with 0.190 x 1.25 slotted pan head screws.
- ② Extend the barricade to within 2 feet from the top end of the concrete collar.
- ③ 0.125 inch aluminum panel with Type III or IV retroreflective sheeting on both sides.
- ④ ReflectORIZED red stripes on both sides shall slope from upper left to lower right of panel.
- ⑤ Embed all delineator posts a minimum of 2'-6".
- ⑥ 1/4" inch diameter steel cable.

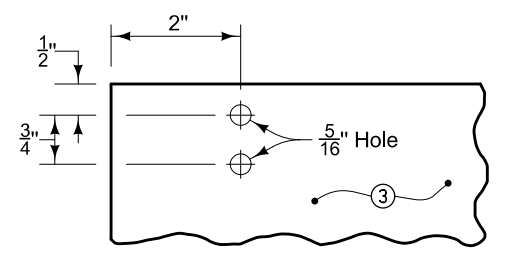
Quantities for Standard Road Plans			Items
PV-500	PV-503	PV-506	
25	19	18	Type 2 Steel Delineator Posts
2	2	2	4" x 4" (Nominal) Sign Post
56	44	42	3 1/4" Yellow Reflectors, center mounted
25	19	18	0.190 x 2.00 slotted pan head bolts and self-locking nuts
6	6	6	0.190 x 1.25 slotted pan head screws
26	20	19	9" x 48" Aluminum panels (red on white)
50	38	36	3/8" Cable clamps, lock washers and nuts
104	80	76	1/4" Cable clamps, neoprene washers and self-locking nuts
4	4	4	3/8" x 6" Eye bolts, washers and nuts
4	4	4	1/4" Cable clamps
820'	640'	610'	Approximate length of 1/4" diameter Steel Cable
405'	315'	300'	Distance from Sign Post to Sign Post based on Note ②



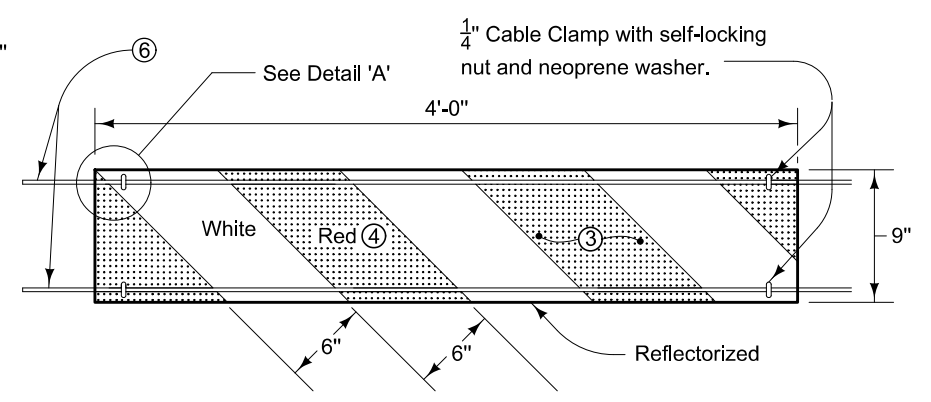
**DELINEATOR POST  
ATTACHMENT DETAILS**



**SIGN POST ATTACHMENT DETAILS**



**TYPICAL HOLE LOCATION  
DETAIL 'A'**

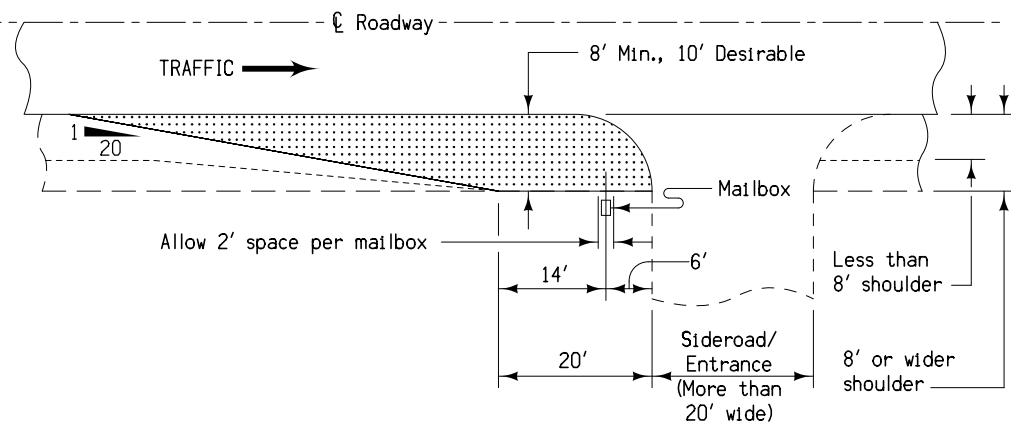


**PANEL ATTACHMENT DETAILS**

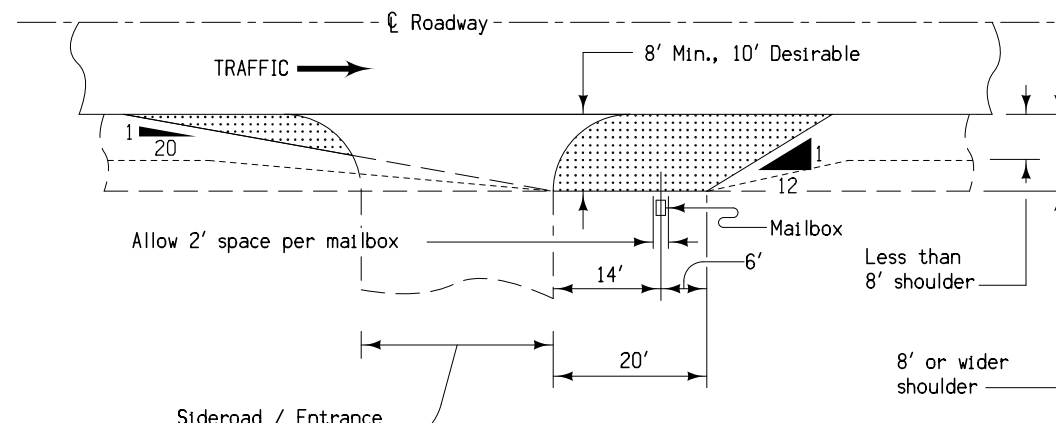
 <b>ROAD DESIGN DETAIL</b>	REVISION	
	9	10-19-10
	540-13	
SHEET 1 of 1		

REVISIONS: Changed RV designation to PV.

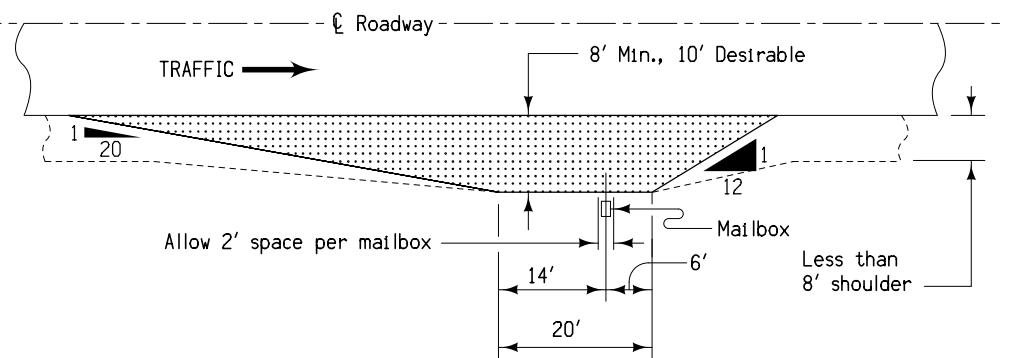
**DETAILS OF BARRICADE  
AT CROSSOVER**



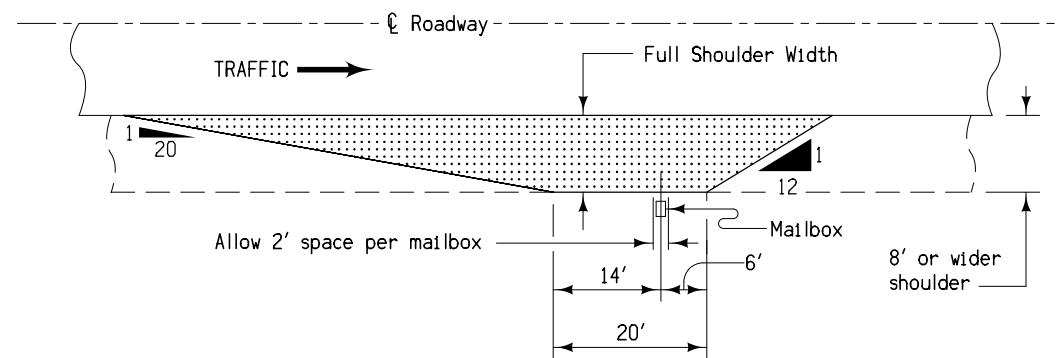
**PLAN VIEW**  
**Approach Side of Entrance**



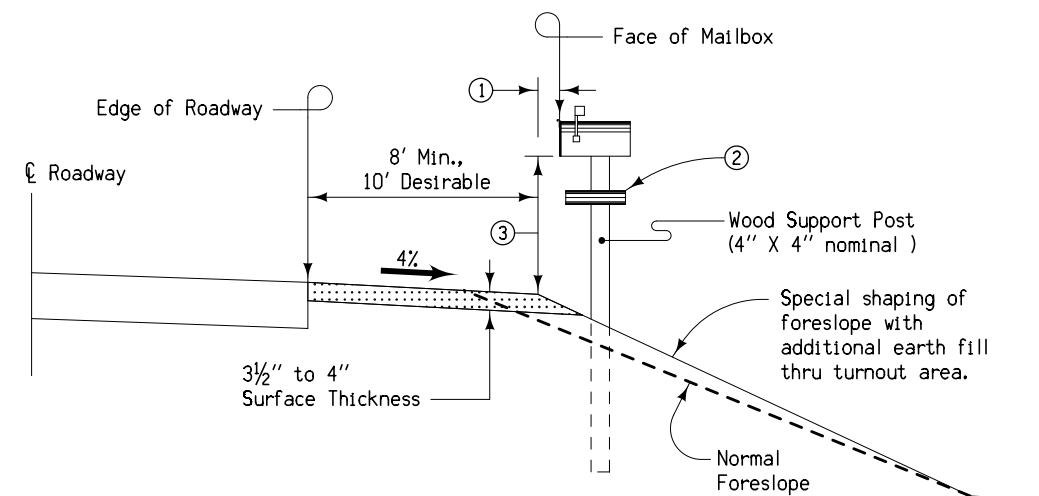
**PLAN VIEW**  
**Trailing Side of Entrance**



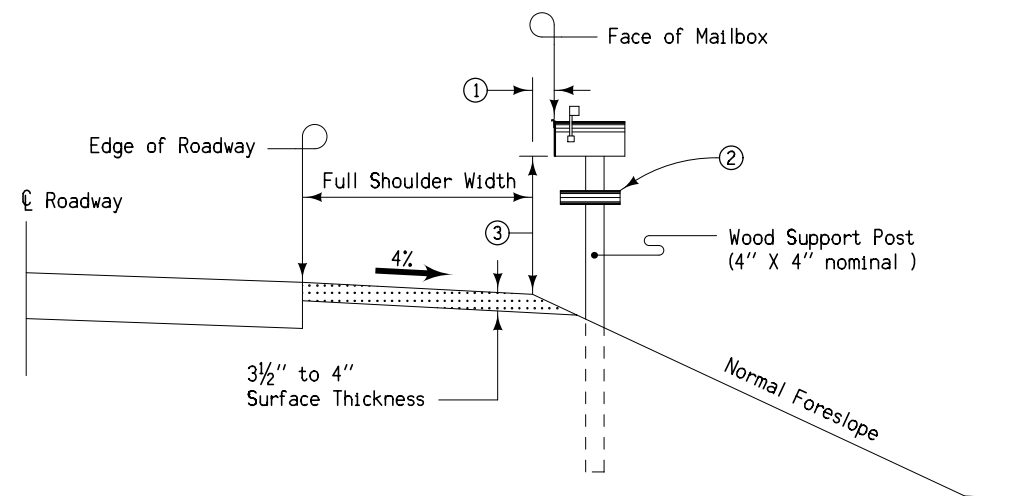
**PLAN VIEW**  
**Shoulder Width Less than 8'**



**PLAN VIEW**  
**Shoulder Width 8' or More**



**TYPICAL SECTION**  
**Shoulder Width Less than 8'**



**TYPICAL SECTION**  
**Shoulder Width 8' or More**

**GENERAL NOTES:**

Refer to "Policies and Procedures Manual", Policy 610.09, Mailboxes and Newspaper Receptacles on Primary Roads.

Mailbox turnouts shall be full shoulder width with a minimum width of 8 feet. On shoulders less than 8 feet, build fillet to obtain a minimum width of 8 feet.

For multiple mailbox installations in one turnout, the taper dimensions will remain the same. The dimensions from centerline of mailbox located at either end will remain the same and 2 feet will be allowed for each mailbox in the installation.

When the mailbox owner's driveway is on the right hand side of the road, as the mail carrier travels, the box would preferably be placed near the driveway as shown on this sheet. With these types of placement, the driveway will serve as part of the mailbox turnout.

Requests, by the property owner, for the location of mailbox turnouts other than at driveways shall be approved by the Engineer in charge of construction and the U.S. Postal Authorities.


Mailbox(s) shall be installed with the face (door) no closer to the roadway than the shoulder line. Support post shall be in the foreslope with the inside edge at least one (1) foot outward from the shoulder line.

**SURFACING QUANTITY**

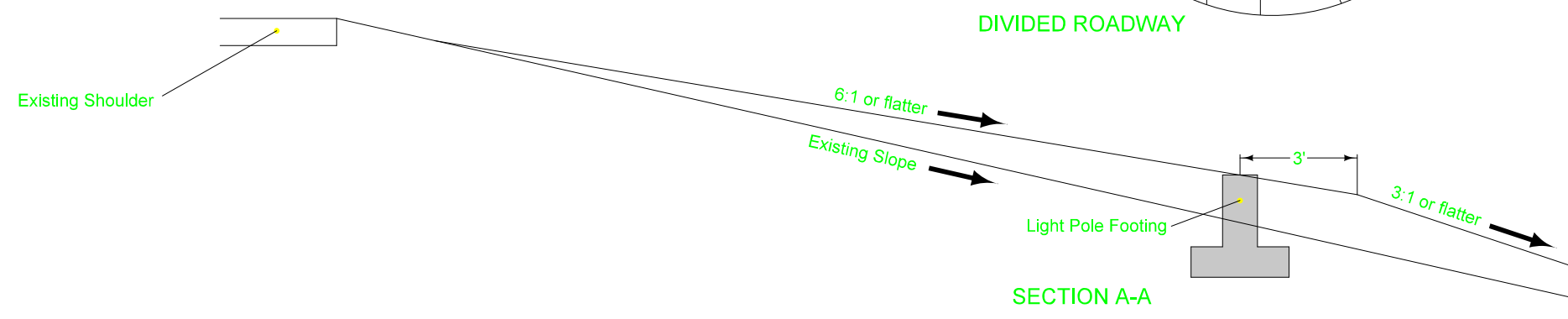
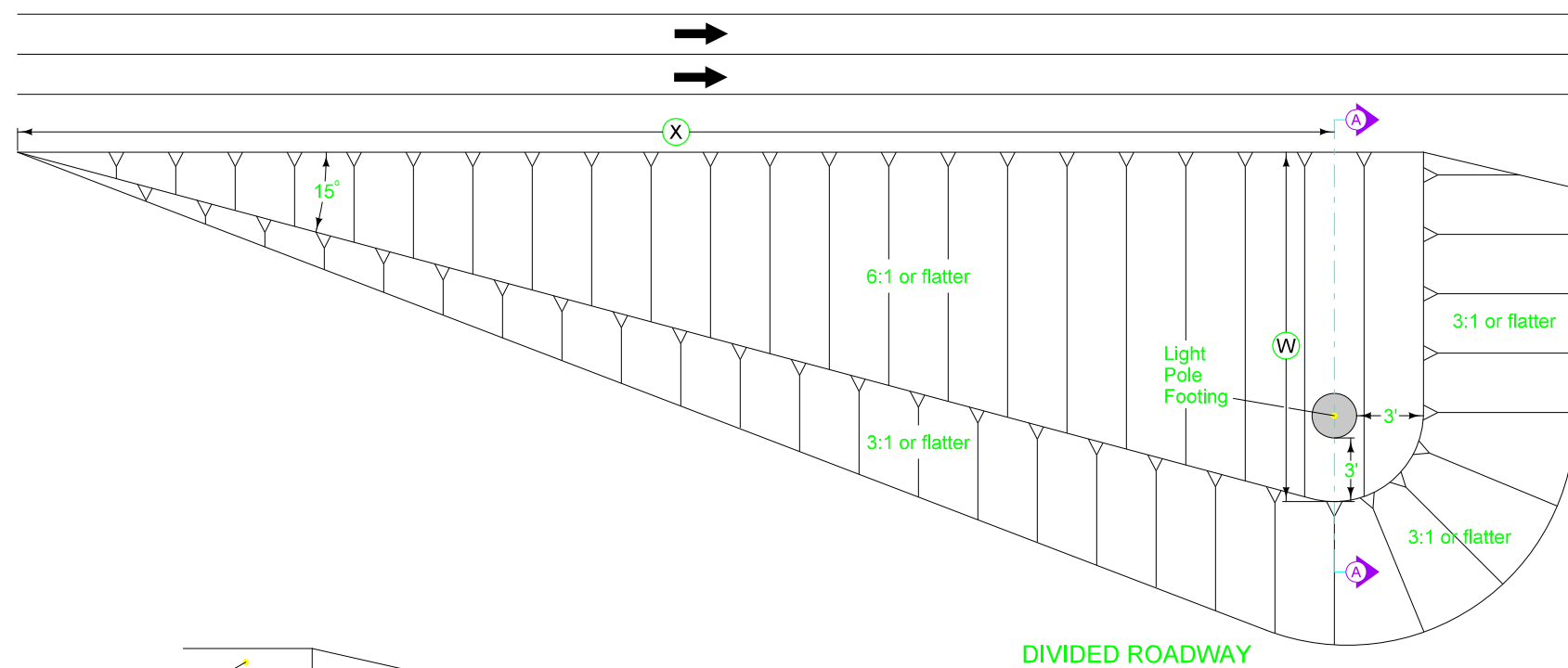
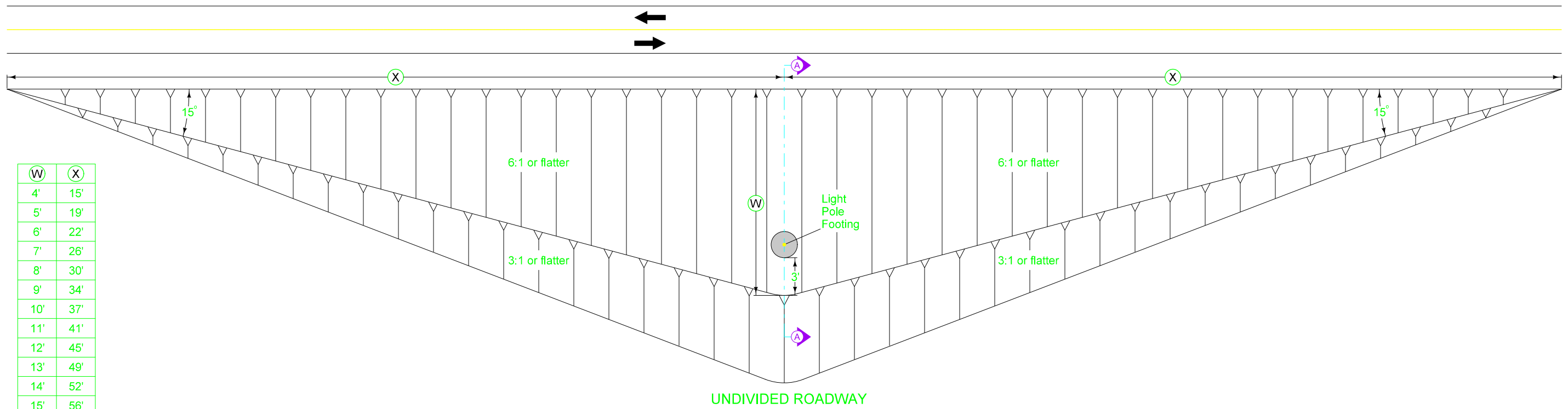
Surfacing of mailbox turnouts is based on a 5 inch design depth (loose volume) which will, under normal conditions, compact to 3.5" to 4" actual depth. A width of 8 feet will require approximately 18.3 cubic yards and 10 foot width will require approximately 27.8 cubic yards of surfacing. Quantities are given for a single mailbox installation 276 to 340 feet in length. Where multiple installations or installations at driveways are encountered, quantities will vary as directed by the Engineer.


Payment for construction of mailbox turnouts will be as specified elsewhere in the contract documents.

- ① 8" to 12" preferred, 0" minimum.
- ② Metal tube / box for delivery of local advertisements, newspapers etc.
- ③ Mounting height per U.S. Postal Regulations (42" to 48" above mail stop surface).

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	1	03-28-95
	560-2	
SHEET 1 of 1		
REVISIONS: Place in CADD.		

**DETAILS OF  
MAILBOX TURNOUTS  
(GRANULAR SURFACED)**



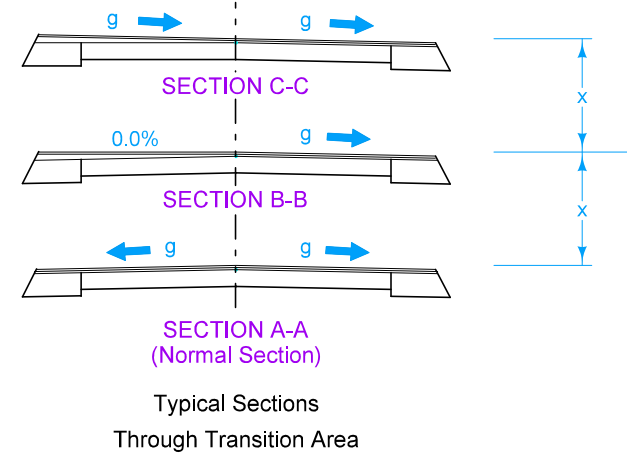
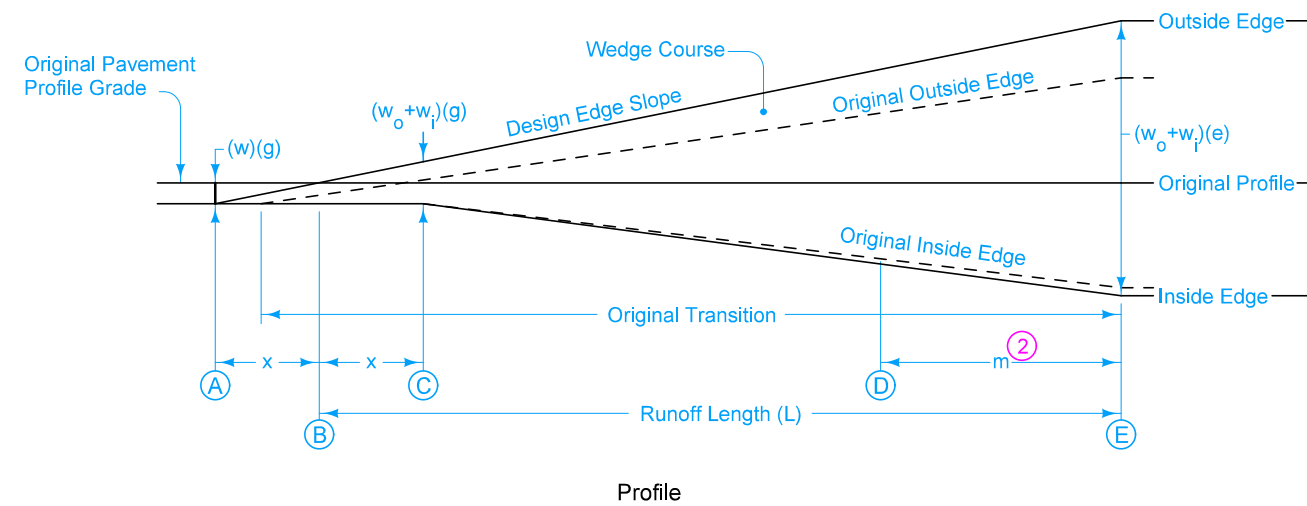
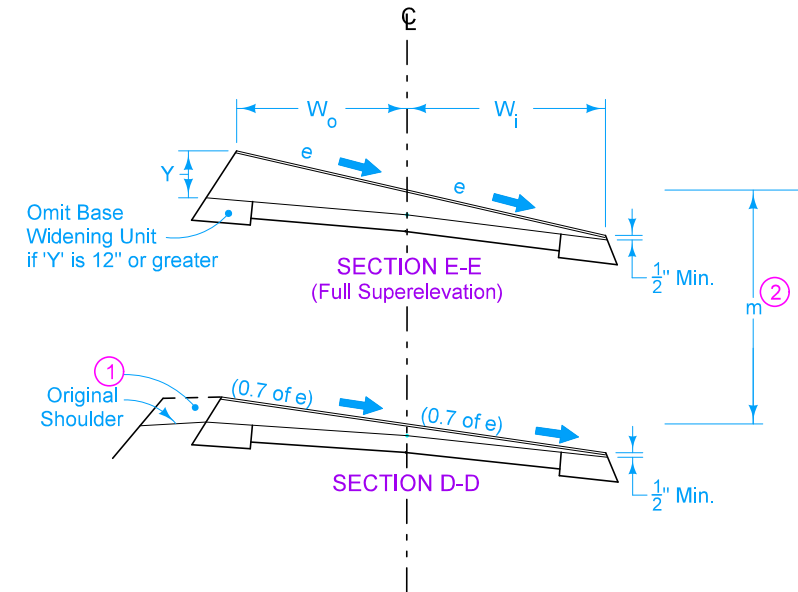
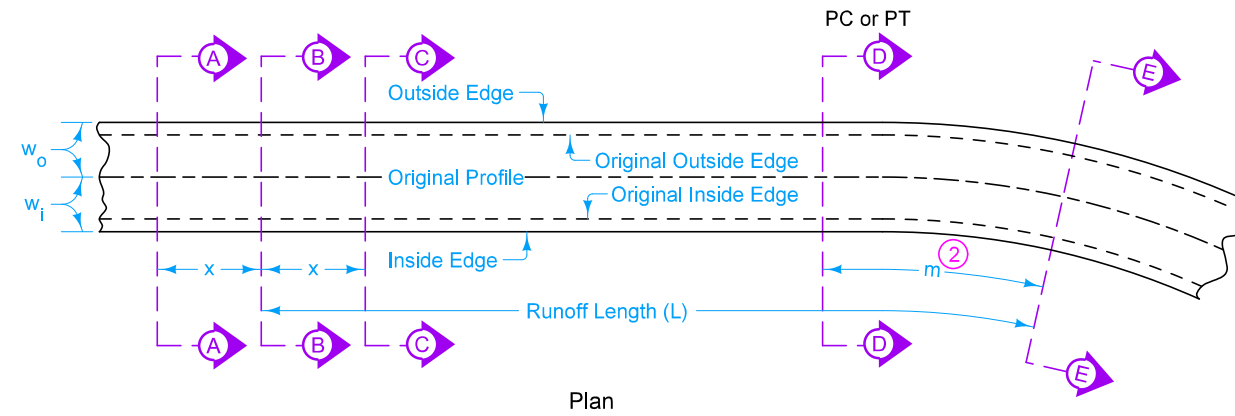
 <b>ROAD DESIGN DETAIL</b>	REVISION
	NEW 10-16-12
	<b>560-3</b>
REVISIONS: New.	SHEET 1 of 1
<b>GRADING BLISTER AT LIGHT POLE FOOTING</b>	




Refer to curve data contained in the project plans for tangent runout length (x), runoff length (L), transition applied within curve length (m), rotation width (w), total thickness of wedge and surface mat (Y), normal cross-slope (g), existing cross slope at PC/PT (E), and full superlevation (e).

- ① See other drawings for shoulder details.
- ②  $m = 30\%$  of Runoff Length (L). If the existing cross slope at the PC/PT exceeds 70% of the proposed 'e', determine the value of 'm' using the following formula:

$$m = L - \left[ \frac{(L)(E)}{(e)} \right]$$



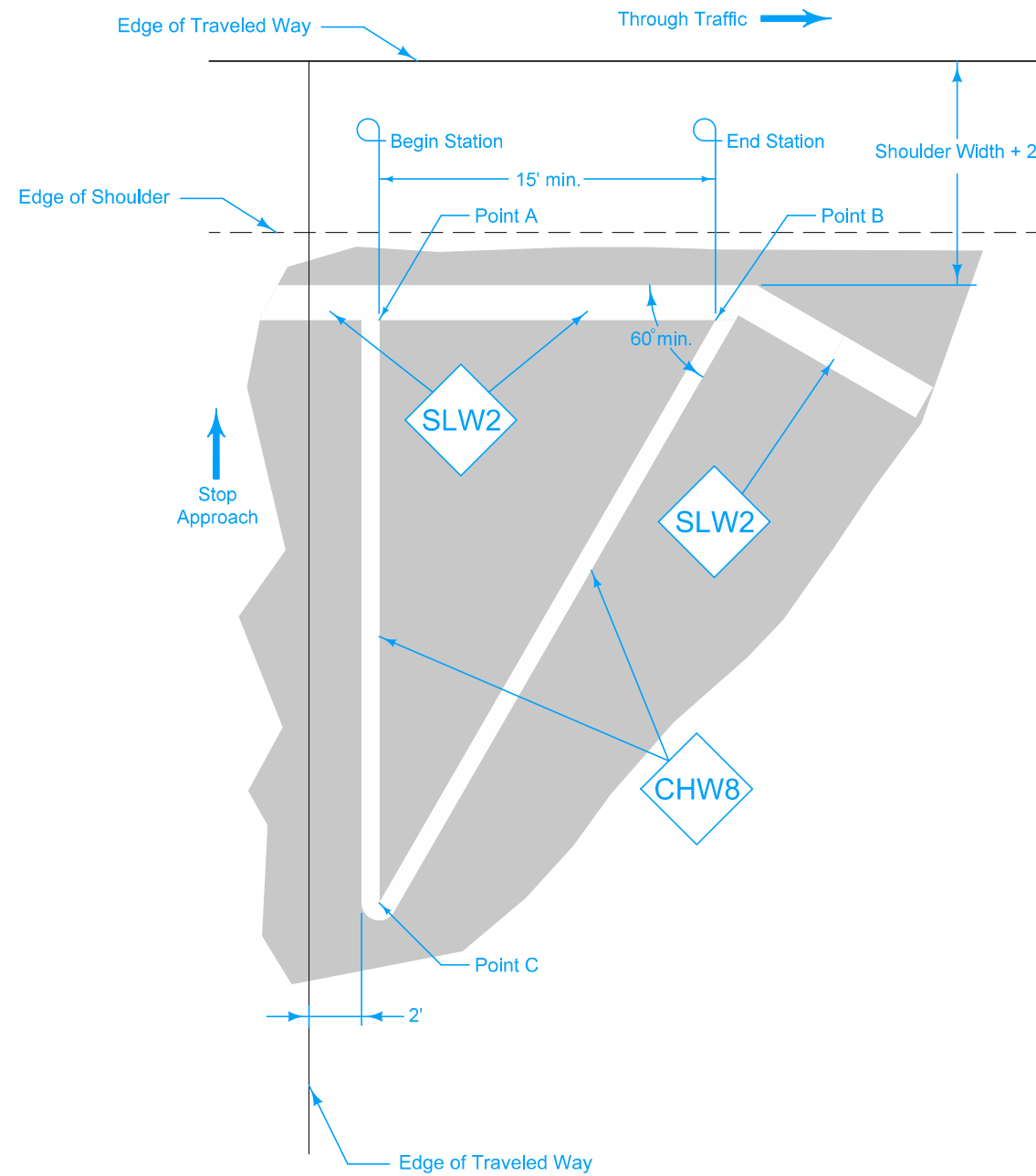
Possible Contract Items:  
 Base Widening, various  
 HMA Mixture, Wedge, Leveling or Strengthening Course  
 Possible Tabulation:  
 101-8

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	NEW	10-21-14
560-4		SHEET 1 of 1
REVISIONS: New. Replaces RR-25.		

**HMA WEDGE FOR SUPERELEVATION**

For pavement marking line types, see [PM-110](#).

For stop line information, see [PM-120](#).



Possible Contract Item:  
Pavement Marking Line Items

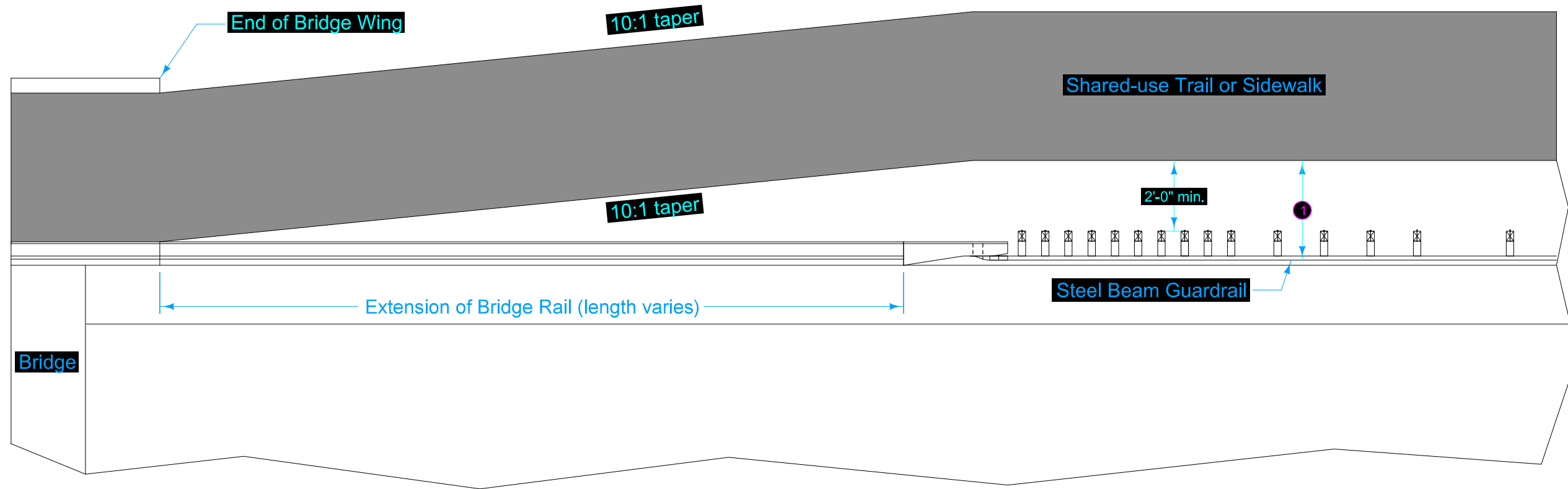
Possible Tabulations:  
101-10  
108-22

	REVISION	
	1	10-19-21
<b>ROAD DESIGN DETAIL</b>	<b>560-5</b>	
	SHEET 1 of 1	
REVISIONS: Changed yield line to stop line.		

**PAINTED ISLANDS**

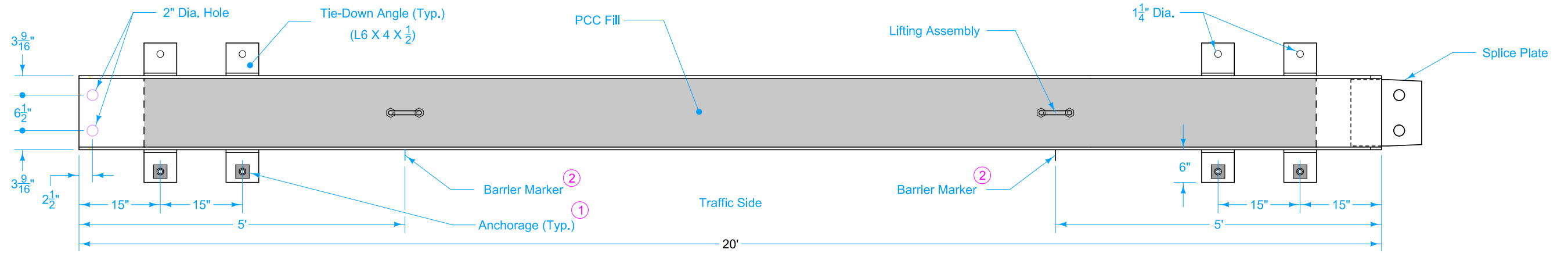
1 Refer to table below for minimum distance between face of guardrail and edge of Shared-use Trail or Sidewalk.

Posted Speed Limit (mph)	Minimum Distance (feet)
<45	4
45 or greater	5

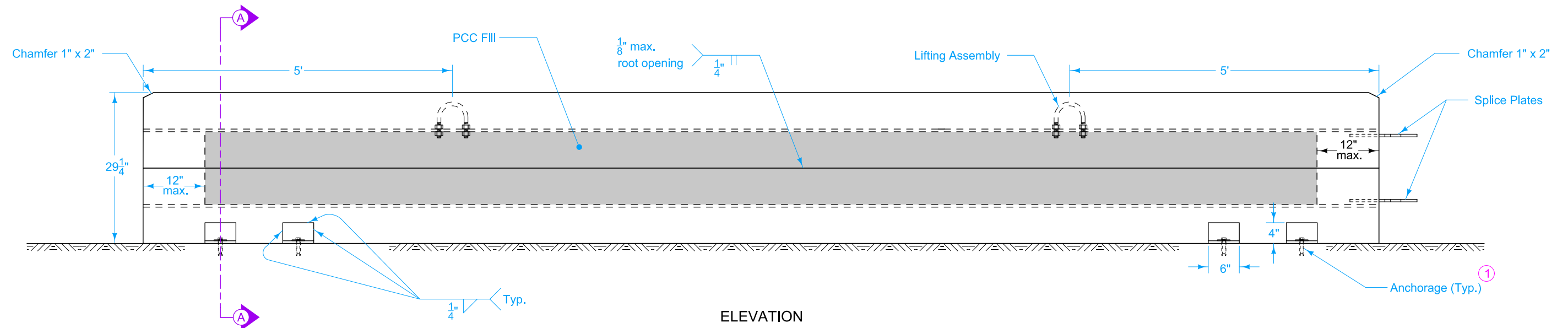


	REVISION	
	NEW	10-18-16
	<b>560-6</b>	
ROAD DESIGN DETAIL		SHEET 1 of 1
REVISIONS: New.		

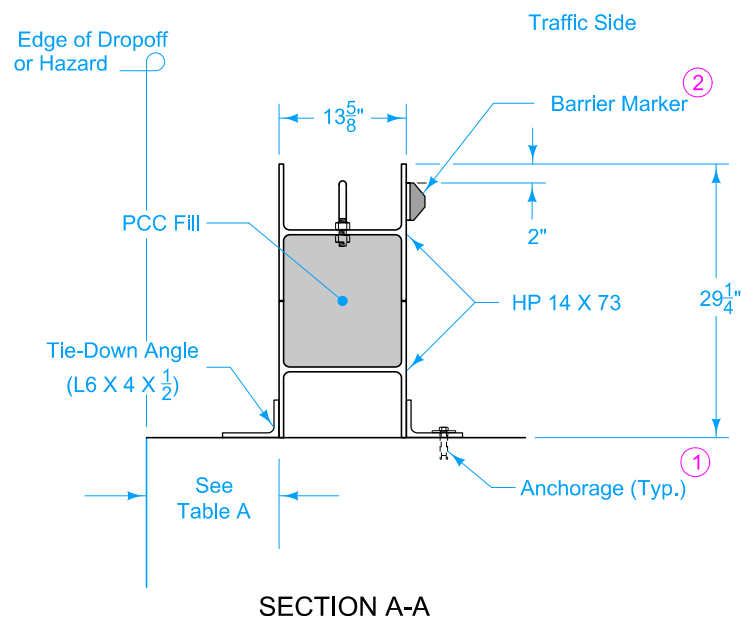
**SHARED-USE TRAIL OR SIDEWALK  
BEHIND STEEL BEAM GUARDRAIL  
AT BRIDGE APPROACH**



PLAN



ELEVATION



SECTION A-A

Use steel meeting the requirements of ASTM A36.

Use an Iowa DOT Construction Specification mix or a commercial ready-mix with a minimum  $f'_c = 2500$  psi. Deposit by a method approved by the Engineer. Limits of the fill shown are approximate and may be rough or slumped depending on the method of bulkheading.

Provide for an approved monitoring schedule with a person on call and available 24 hours a day, each day of the week, to realign barrier which has been struck. Initiate within one hour of notification of need.

Unless stated otherwise, the barrier rail sections remain the property of the Contractor. Remove from the site upon completion of work.

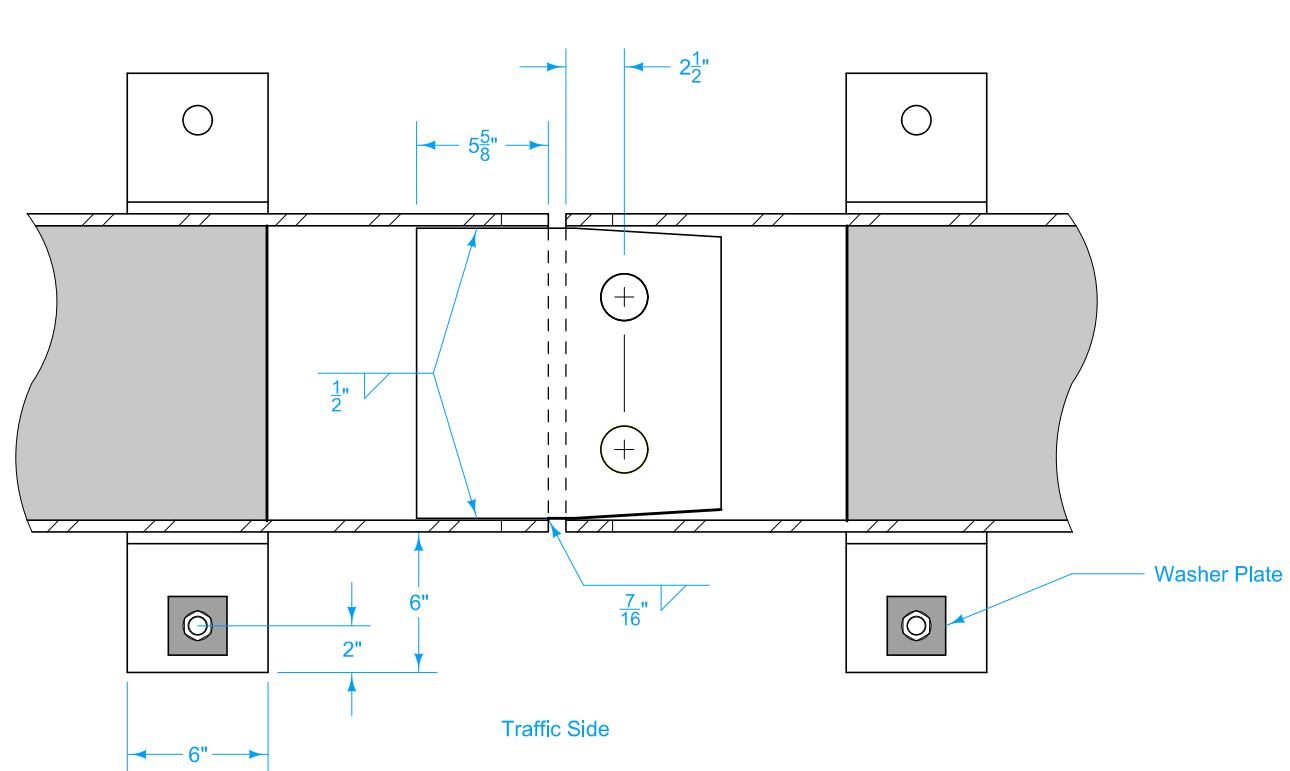
- ① Anchorage for use on bridge decks or PCC pavement only. When installed in one-way traffic situations use and install anchorage on traffic side of barrier only. Anchorage consisting of a washer plate as shown, a 3/4" dia. x 1 3/4" long ASTM A307 Grade B heavy hex bolt, and a 3/4" Red Head Multi-Set II drop-in anchor (or approved equivalent). Following removal of anchorage, fill all holes with an approved non-shrink grout. The cost of anchorage, when required, is to be in the price bid for "Temporary Barrier Rail, Steel."
- ② Furnish and install Barrier Markers. Place Markers as shown on this sheet and attach to the barrier in a manner approved by the manufacturer. Place Markers to face oncoming traffic. Use a color to match the adjacent edge line. Maintain the markers and promptly repair or replace damaged or missing units. Include all costs for furnishing, installing and maintaining markers in the price bid for "Temporary Barrier Rail, Steel."

Possible Contract Item:  
Temporary Barrier Rail, Steel

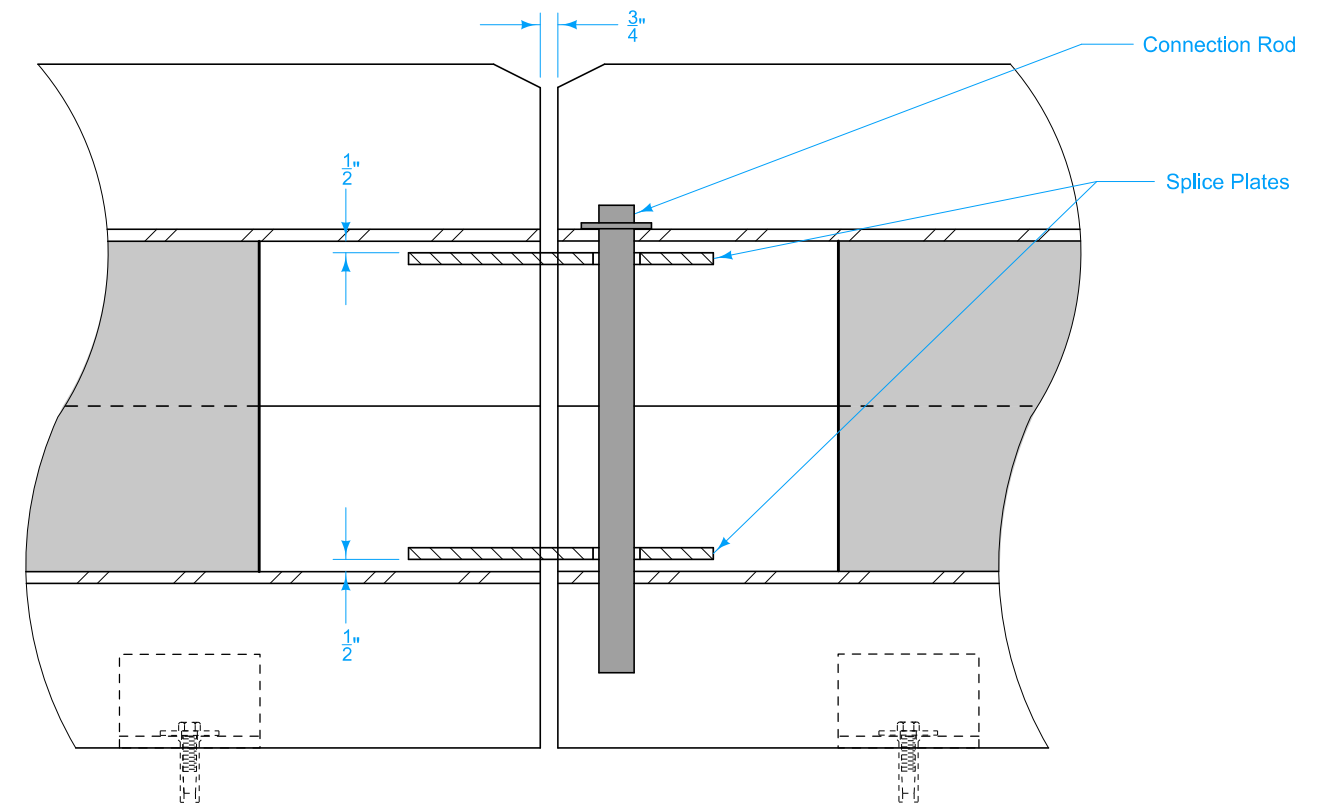
Possible Tabulation:  
108-33

	REVISION	
	NEW	10-15-19
<b>ROAD DESIGN DETAIL</b>		<b>560-07</b>
REVISIONS: New.		SHEET 1 of 2

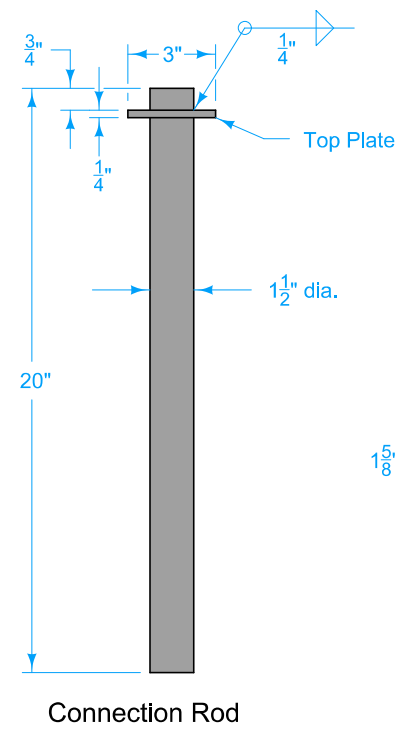
**TEMPORARY BARRIER RAIL  
(STEEL)**



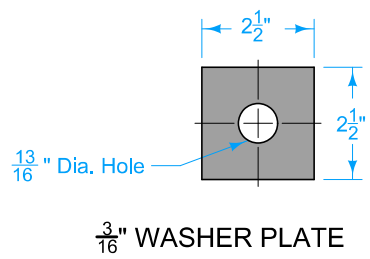
BARRIER CONNECTION  
TOP SECTION



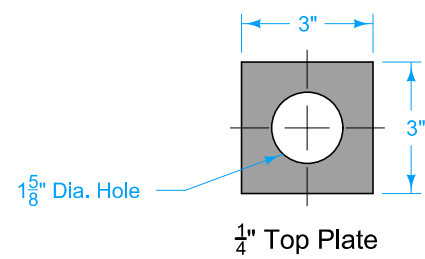
BARRIER CONNECTION  
SIDE SECTION



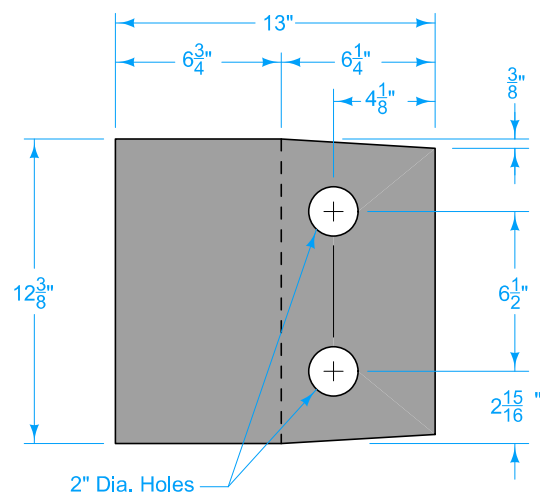
CONNECTION ROD ASSEMBLY



3/16" WASHER PLATE



1/4" Top Plate

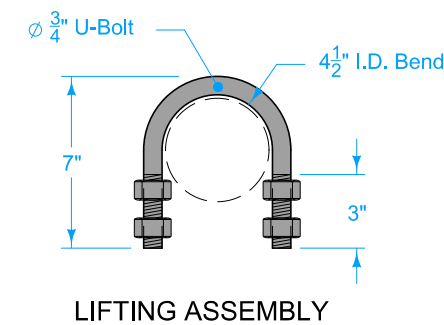


1/2" SPLICE PLATE

TABLE A  
ANCHORAGE REQUIREMENTS

Obstacle	Dropoff Depth	Min. offset where TBR is Anchored	
		where Unanchored	where TBR is Anchored
Dropoff*	from pavement ≤ 24"	10"	6"
	> 24"	18"	6"
Fixed vertical object	from bridge ≤ 3"	1"	N/A
	> 3"	18"	6"

\* A dropoff is a slope of 2H:1V or steeper



LIFTING ASSEMBLY

**IOWA DOT**

**ROAD DESIGN DETAIL**

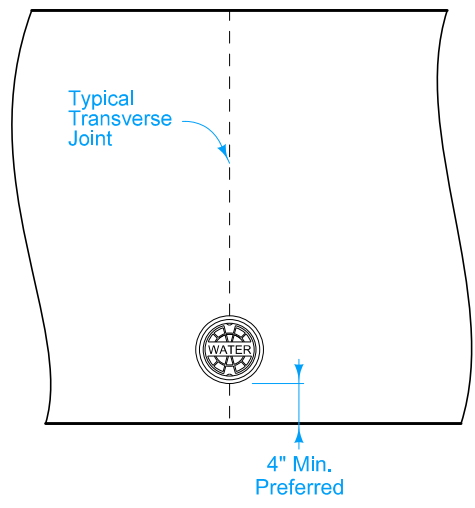
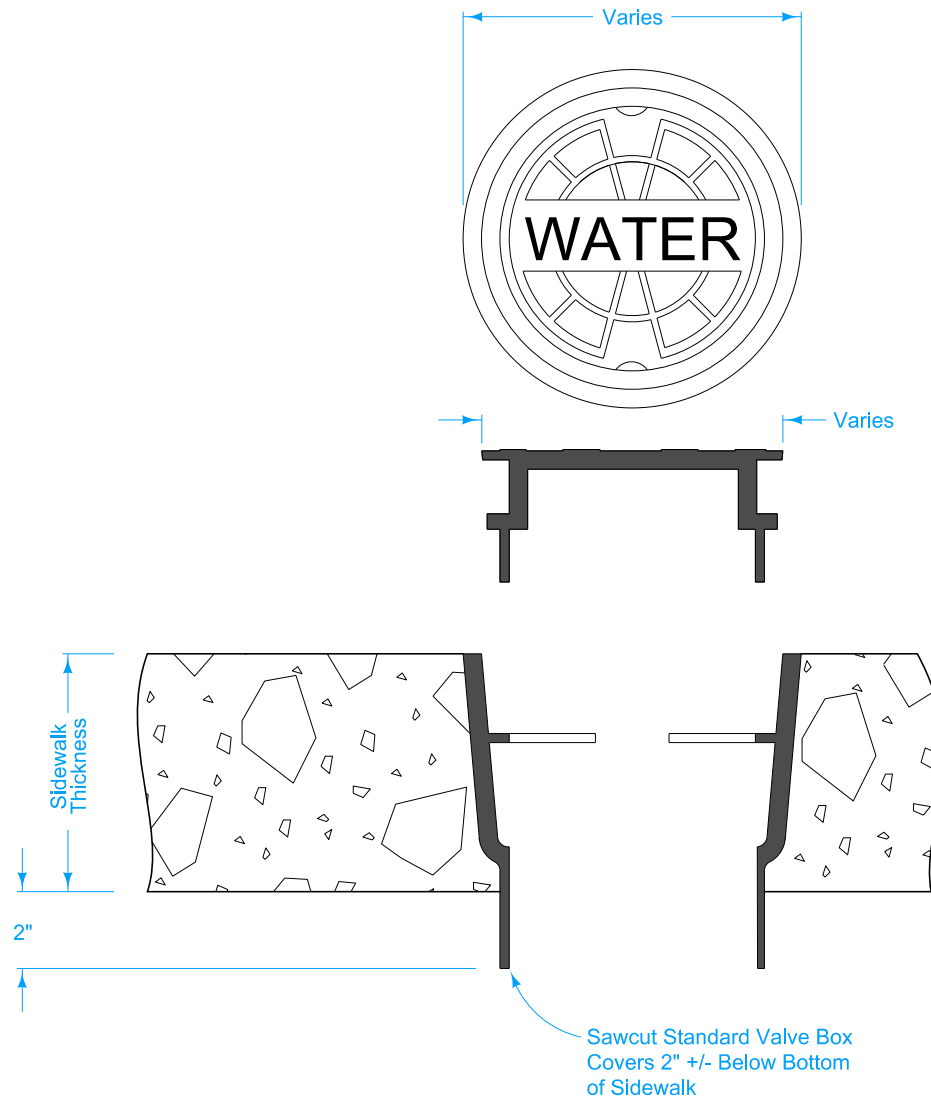
REVISIONS: New.

REVISION	
NEW	10-15-19
<b>560-07</b>	
SHEET 2 of 2	

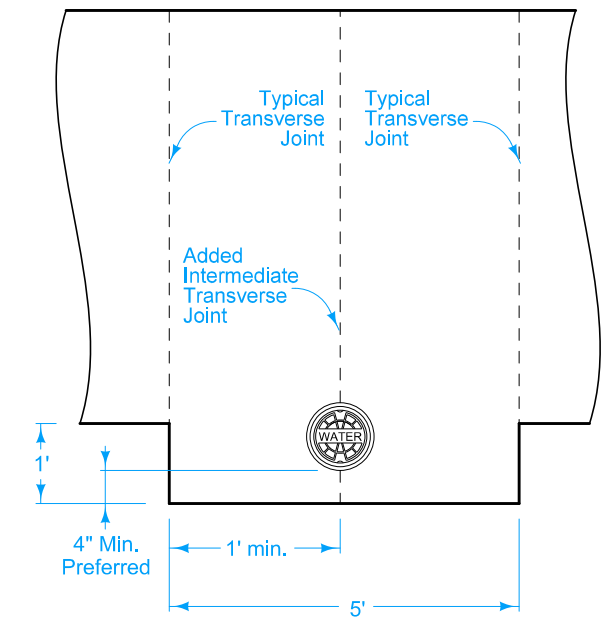
TEMPORARY BARRIER RAIL  
(STEEL)

For a double curb stop cover, use the same cover shown.

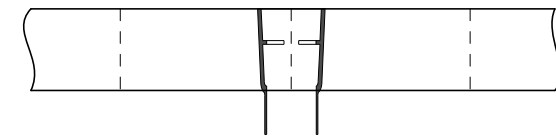
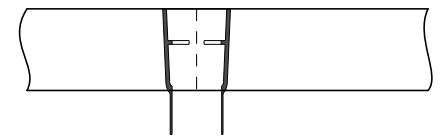
The elevation of the shut-off cover may need to be staggered in order to pass heads through the lower flange or supporting seat.



CASE 1



CASE 2



Possible Contract Item:  
Water Service Curb Stop, Cover Only

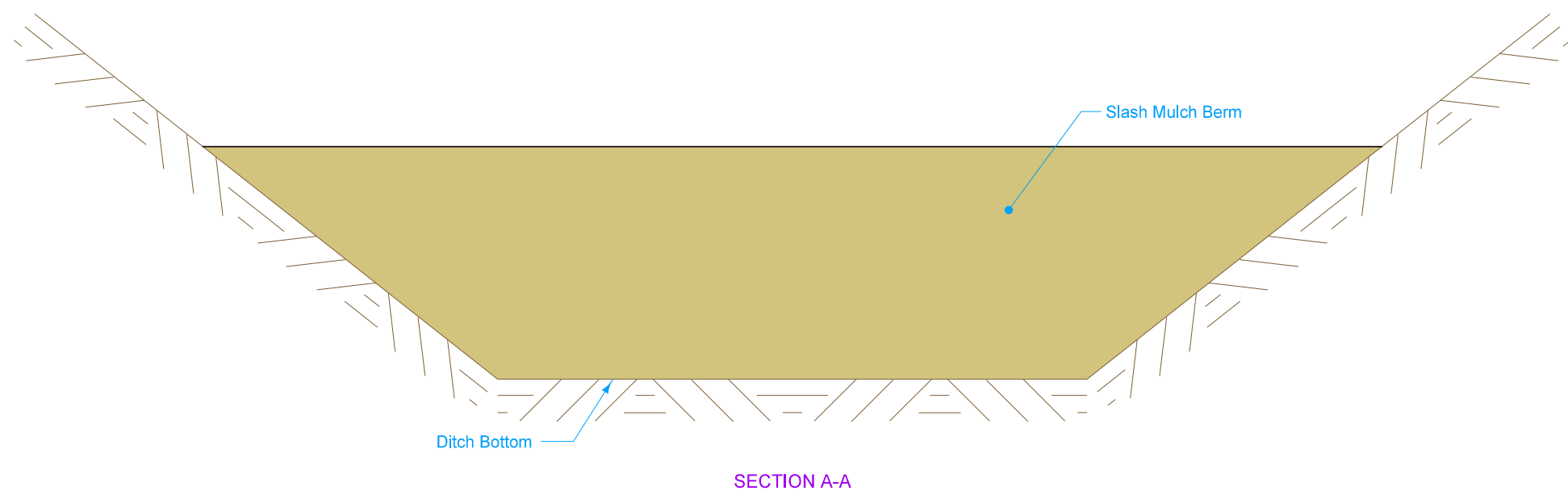
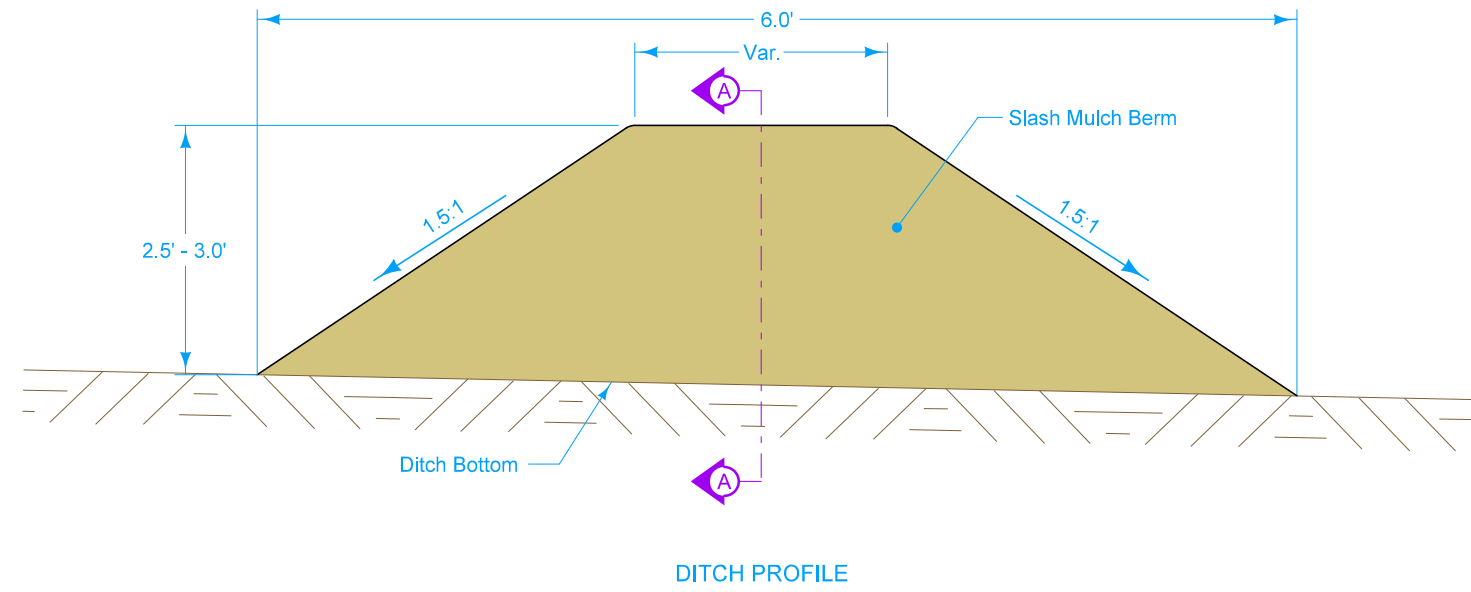
 <b>ROAD DESIGN DETAIL</b>	REVISION	
	NEW	10-15-19
	560-8	
SHEET 1 of 1		
REVISIONS:    New.		

WATER SERVICE  
CURB STOP COVER  
LOCATED IN SIDEWALK

# DESIGNER INFORMATION

Slash mulch consists of waste material from clearing and grubbing. Use material with a maximum length of 20 inches and maximum width of 2 inches for individual pieces. Material will be accepted based on visual inspection.

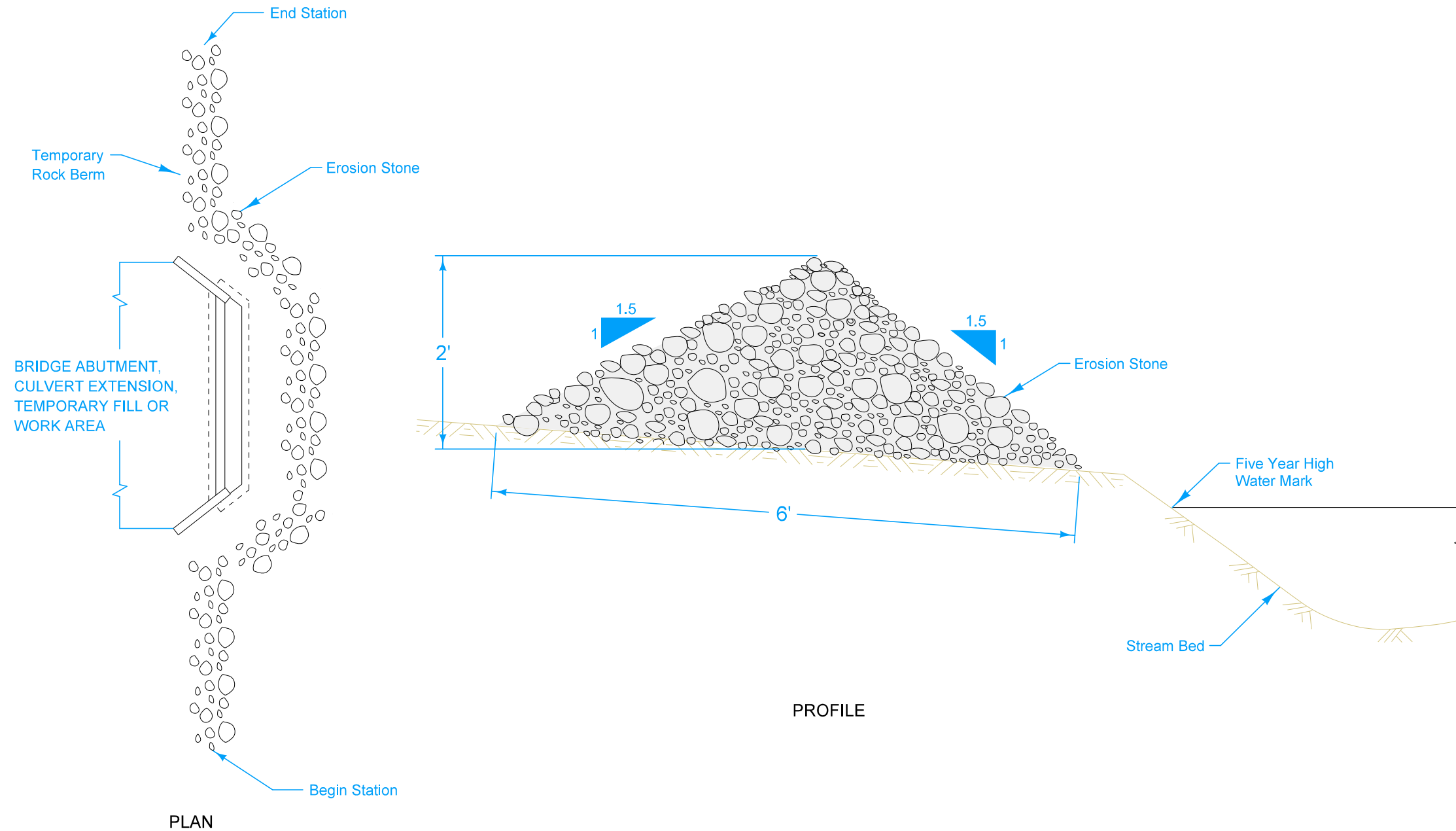
Dispose of the slash mulch berm material off the project unless the Engineer approves a suitable site within the project limits.



	REVISION	
	1	10-18-16
<b>ROAD DESIGN DETAIL</b>		<b>570-1</b>
		SHEET 1 of 1
REVISIONS: Corrected typo from 'much' to 'mulch' in general notes.		

**SLASH MULCH BERM**

Place Erosion Stone as near to the five year high water mark as possible while not allowing it to enter the stream bed.  
Remove Erosion Stone after project completion.



Possible Contract Item:  
Erosion Stone

Possible Tabulation:  
100-23

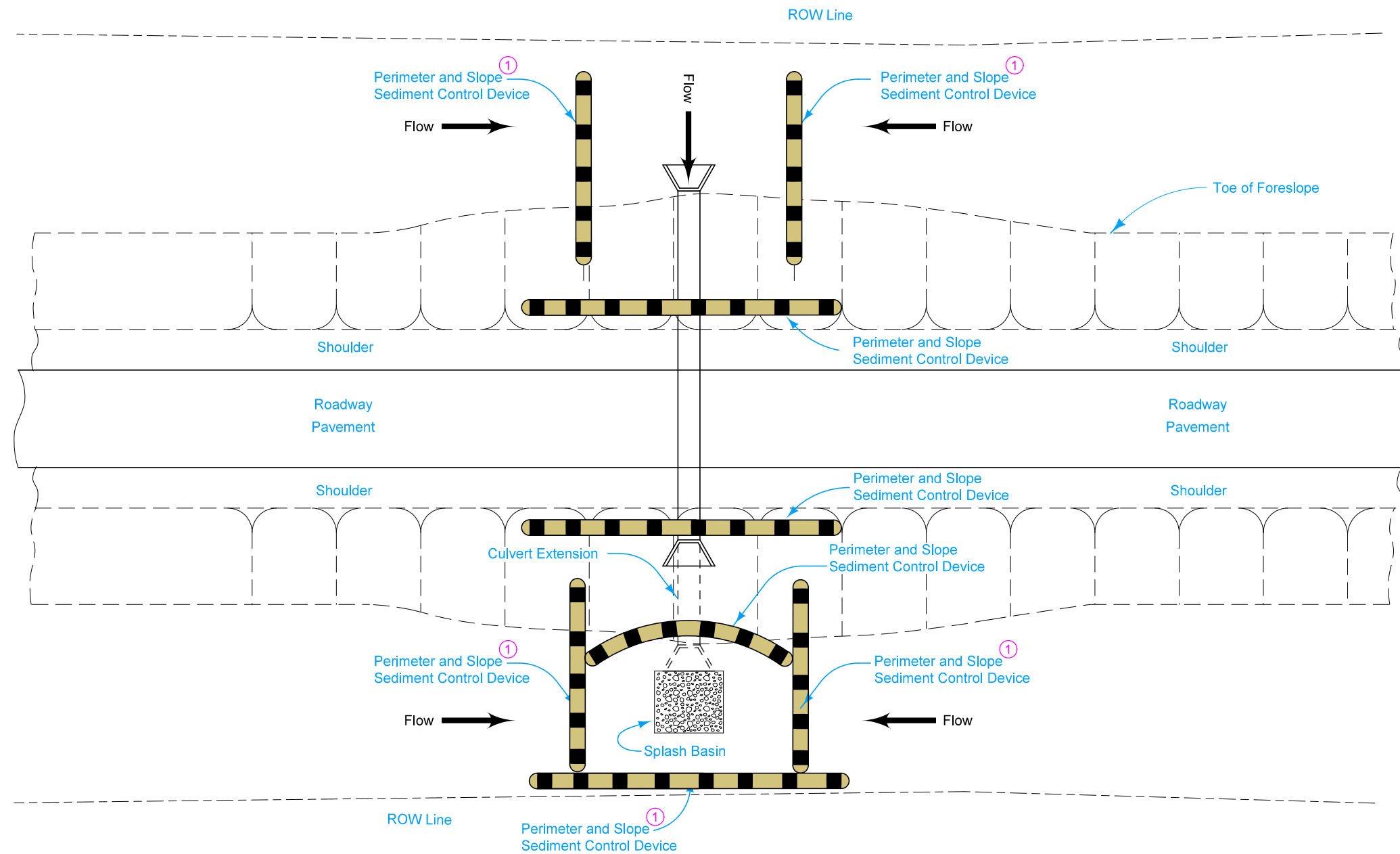
<b>IOWA DOT</b>	REVISION	
	NEW	10-17-17
<b>ROAD DESIGN DETAIL</b>		<b>570-8</b>
REVISIONS: New.		SHEET 1 of 1

**TEMPORARY ROCK BERM  
FOR SEDIMENT CONTROL**



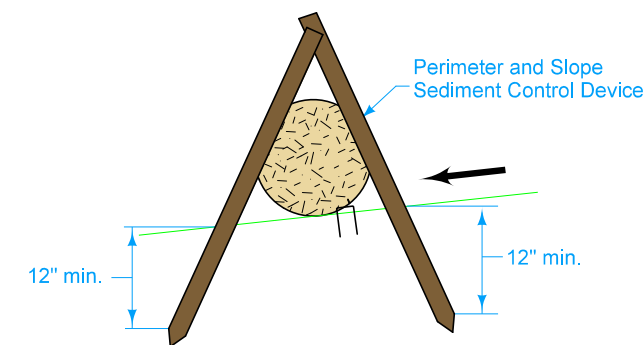
See Standard Road Plans EC-201, EC-204, and EC-301 for installation details.

① Silt Fence for Ditch Check may be substituted at no additional cost to the Contracting Authority.



Possible Contract Items:  
 Perimeter and Slope Sediment Control Device  
 Erosion Stone  
 Class E Revetment  
 Engineering Fabric

Possible Tabulations:  
 100-19  
 100-23  
 100-34

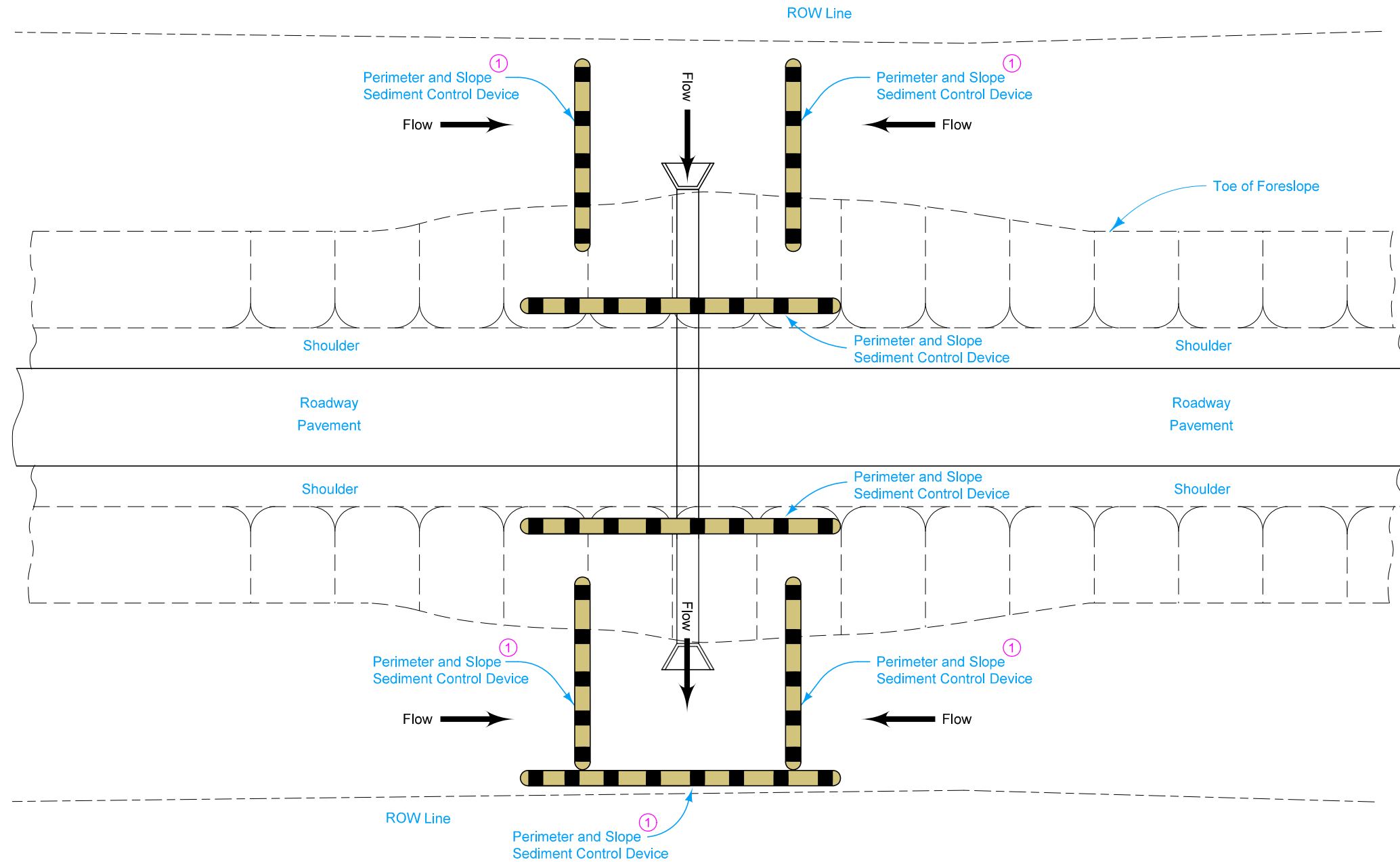


	REVISION	
	1	10-19-21
<b>ROAD DESIGN DETAIL</b>		<b>570-11</b>
REVISIONS: Added cross section for staking details.		SHEET 1 of 1

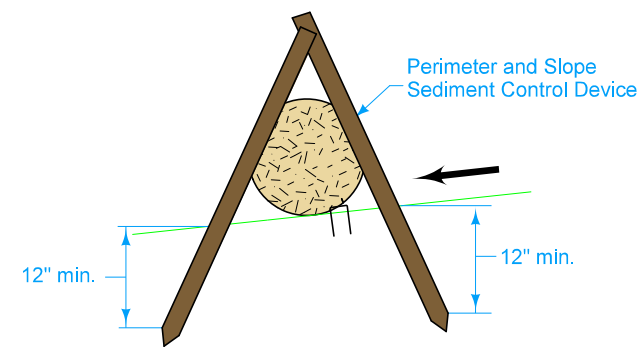
**TEMPORARY SEDIMENT CONTROL  
 FOR CULVERT EXTENSION WITH  
 EXPOSED SOIL**

See Standard Road Plans EC-201 and EC-204 for installation details.

① Silt Fence for Ditch Check may be substituted at no additional cost to the Contracting Authority.



NON-CONTINUOUS FLOW CULVERT



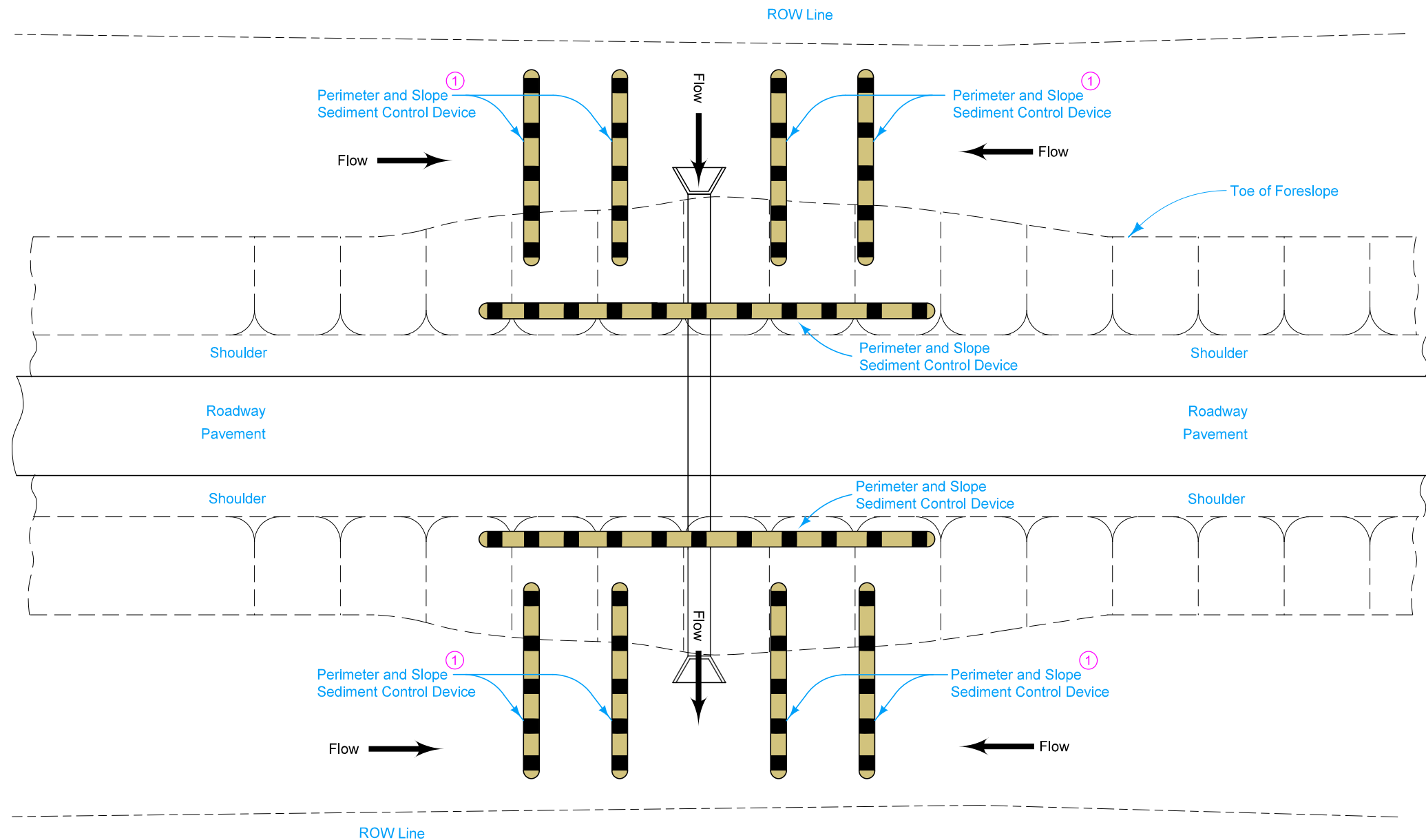
Possible Contract Items:  
Perimeter and Slope Sediment Control Device

Possible Tabulations:  
100-19  
100-34

	REVISION	
	1	10-19-21
<b>ROAD DESIGN DETAIL</b>		<b>570-12</b>
		SHEET 1 of 2

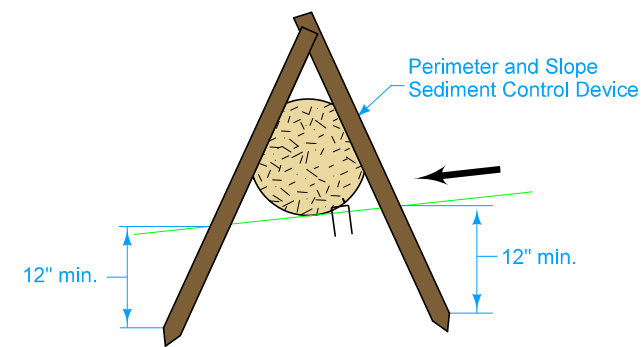
REVISIONS: Added cross section for staking details.

**TEMPORARY SEDIMENT CONTROL  
FOR SHOULDER WIDENING WITH  
EXPOSED SOIL**



① Silt Fence for Ditch Check may be substituted at no additional cost to the Contracting Authority.

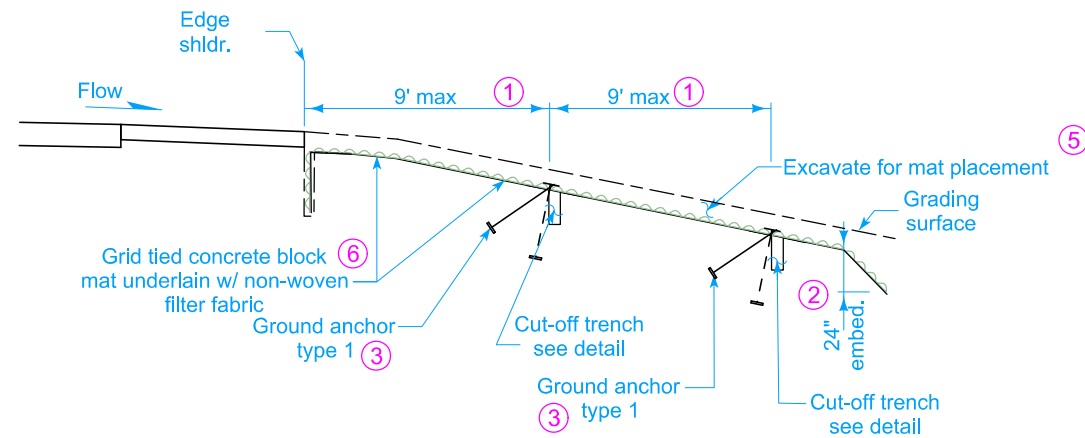
CONTINUOUS FLOW CULVERT



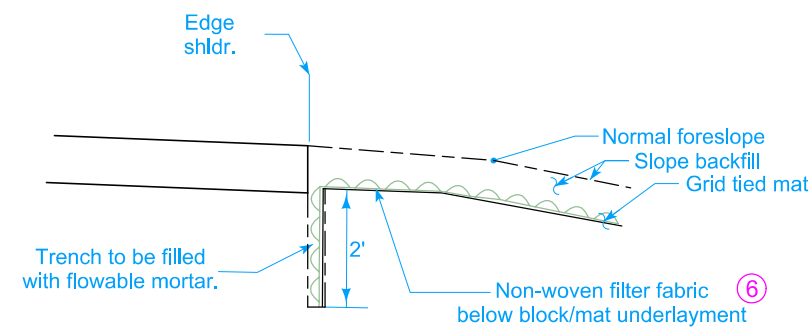
 <b>ROAD DESIGN DETAIL</b>	REVISION	
	1	10-19-21
	<b>570-12</b> SHEET 2 of 2	

REVISIONS: Added cross section for staking details.

**TEMPORARY SEDIMENT CONTROL  
FOR SHOULDER WIDENING WITH  
EXPOSED SOIL**



FORESLOPE LINING TYPICAL SECTION



ANCHOR BLOCK TYPICAL SECTION

- ① Dimension along grade, adjust to place anchor between blocks
- ② Embed two feet of mat on all exposed edges at 1:1 slope. backfill trench with well compacted excavated material.
- ③ Type 1 ground anchor, spa. at 4'. adjacent to cut-off trench install at 45 deg. to horz., otherwise install perp. to slope or at angle per mat manuf. recommendation. Mat shall be fastened to anchor with a steel top bearing 'X' plate, 12 inch cross, 0.11 inch thick steel. Plate shall be Zinc Plastisol coated or approved equal.
- ④ Type 2 anchor, install at 45 deg. to horz. as shown.
- ⑤ Excavate 10 in. for mat placement as required. place 10 in. backfill over mat using excavated material or topsoil if required per re-vegetation requirements.
- ⑥ Non-woven filter fabric on placement grade below block and mat underlayment. fabric shall be continuous over placement width. Underlayment seams shall be overlapped 2 foot minimum. Underlayment shall be continuous across mat seams, with edge of overlap extending 2 feet minimum from edge of mat seam, otherwise a 4 foot wide section of underlayment shall be placed centered on the seam.

Measurement will be in square yards of slope covered, as measured along the slope.

Payment includes all materials, tools, and labor required to construct "Foreslope Erosion Countermeasure" as detailed.

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	NEW	10-19-21
<b>570-20</b>		SHEET 1 of 2
REVISIONS: New.		

**FORESLOPE EROSION COUNTERMEASURE  
REVETMENT DETAILS  
(MINOR OVERTOPPING)**

Grid tied concrete block  
mat underlain w/ non-woven  
filter fabric

Mat underlayment  
non-woven filter fabric

Non-woven filter  
fabric trench  
lining

Ground anchor  
type 2  
spa. at 3'

Cut-off trench  
see detail

24"

LAP DETAIL

- ⑦ Fold trench lining fabric with termination toward direction of flow, 12 in. lap min. lap section shall not be pinned/staked to underlying ground except within 3 in. of edge trench.
- ⑧ Embed mat underlayment fabric into trench, 18 in. min. depth as shown. mat underlayment may be continuous around trench sides and btm. or only sides when located at underlayment seam.
- ⑨ Non-woven filter fabric overlap, 24 in. min. width, place over mat underlayment, center on trench.
- ⑩ Backfill trench with well compacted excavated material.
- ⑪ Where trench is installed adjacent to ground anchor, place anchor through mat at edge of first block upstream of edge trench.
- ⑫ For mat seams parallel to the flow direction (longitudinal seams) abutting sections of mat shall be joined using stainless steel zip ties spaced at 12 inch centers.
- ⑬ Mat shall be fastened to anchor with a steel top bearing 'X' plate, 12 inch cross, 0.11 inch thick steel. Plate shall be Zinc Plastisol coated or approved equal.

Flow

Travel way

Shoulder

Anchor block

Anchor

⑬

2' embedment

2' overlap  
(see lap detail)

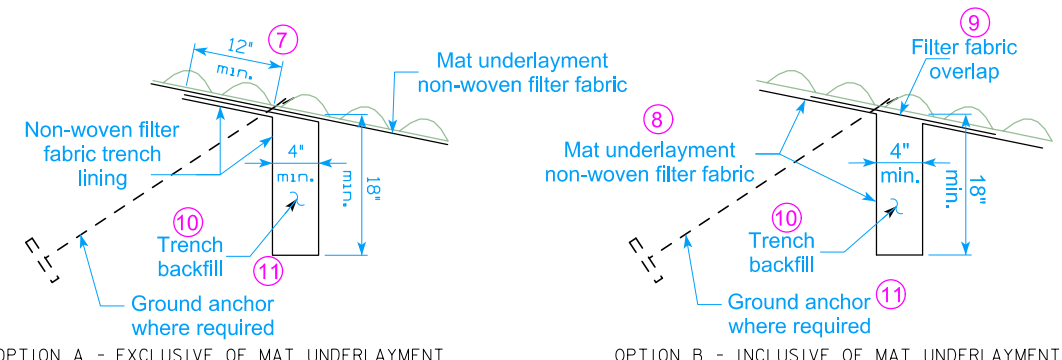
Toe of slope

2' embedment

Stainless steel zip tie

⑫

PLAN



CUT-OFF TRENCH DETAIL

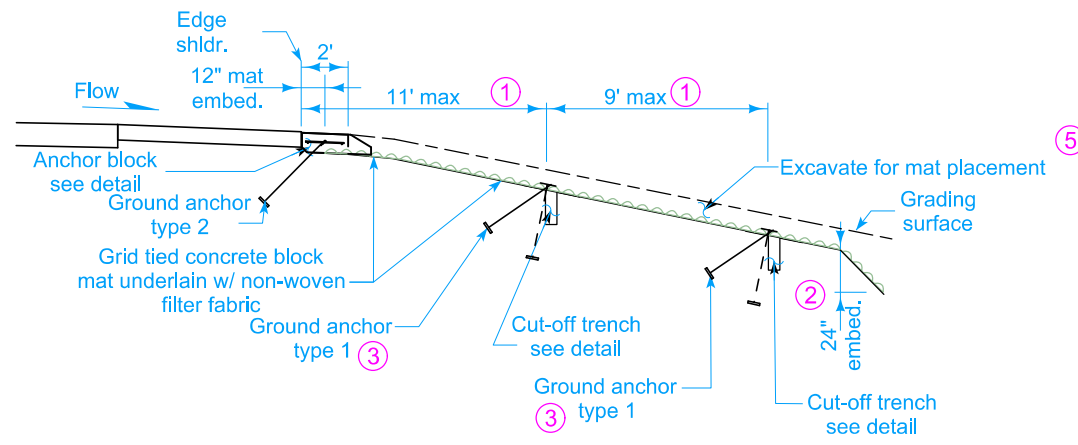
 <b>ROAD DESIGN DETAIL</b>	REVISION	
	NEW	10-19-21
	<b>570-20</b>	
SHEET 2 of 2		

REVISIONS: New.

**FORESLOPE EROSION COUNTERMEASURE  
REVTMENT DETAILS  
(MINOR OVERTOPPING)**

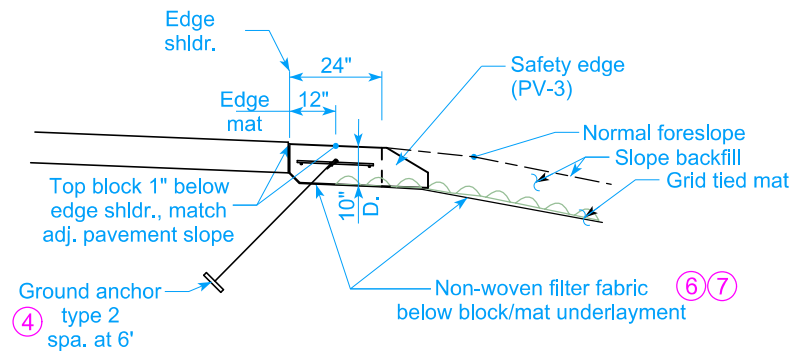
Measurement will be in square yards of slope covered, as measured along the slope.

Payment includes all materials, tools, and labor required to construct "Foreslope Erosion Countermeasure" as detailed.

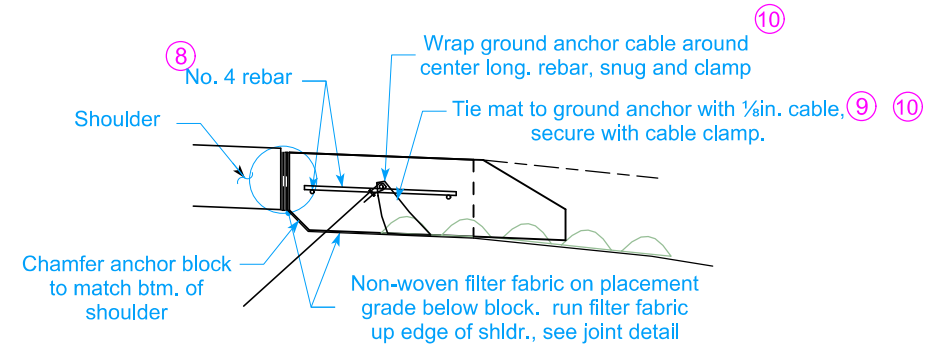


FORESLOPE LINING TYPICAL SECTION

- ① Dimension along grade, adjust to place anchor between blocks
- ② Embed two feet of mat on all exposed edges at 1:1 slope. backfill trench with well compacted excavated material.
- ③ Type 1 ground anchor, spa. at 4'. adjacent to cut-off trench install at 45 deg. to horz., otherwise install perp. to slope or at angle per mat manuf. recommendation. Mat shall be fastened to anchor with a steel top bearing 'X' plate, 12 inch cross, 0.11 inch thick steel. Plate shall be Zinc Plastisol coated or approved equal.
- ④ Type 2 anchor, install at 45 deg. to horz. as shown.
- ⑤ Excavate 10 in. for mat placement as required. place 10 in. backfill over mat using excavated material or topsoil if required per regetation requirements.
- ⑥ Non-woven filter fabric on placement grade below block and mat underlayment. fabric shall be continuous over placement width. underlayment seams shall be overlapped 2 foot minimum. underlayment shall be continuous across mat seams, with edge of overlap extending 2 feet minimum from edge of mat seam, otherwise a 4 foot wide section of underlayment shall be placed centered on the seam.
- ⑦ If pins are used to secure form for anchor block, pins shall be placed through holes between geogrid fibers. patch hole through underlayment with a portland cement mortar mix or approved equal.

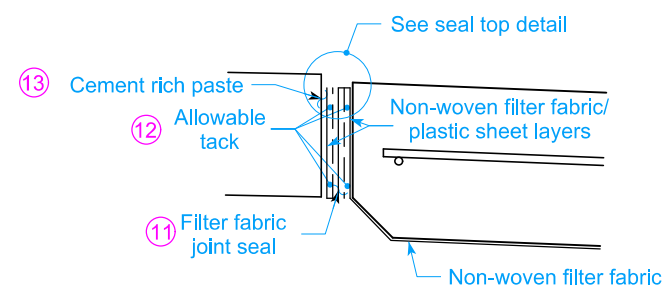


ANCHOR BLOCK TYPICAL SECTION

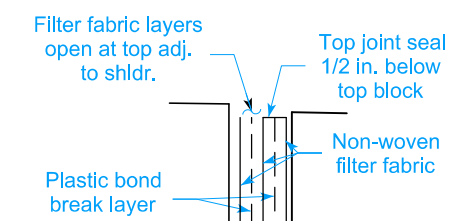


ANCHOR BLOCK DETAIL

- ⑧ Three (3) no. 4 reinforcing bar longitudinal along block. spa. as shown, place at midpoint of depth. place no. 4 bar transverse spa. at 36 in., 2 in. clr. all reinforcing bars epoxy coated.
- ⑨ Run cable through and diagonally under geogrid for one block width, loop up and over rebar. wrap cable in sperical manner, under geogrid then over rebar, along length of anchor block, amplitude approx. 1 ft. }. snug cable to minimize loose cable without displacing rebar. anchor cable ends with cable clamp.
- ⑩ Cable clamp does not need to develop rated cable strength. intent of clamp is to hold cable snug in advance of concrete placement.



JOINT DETAIL

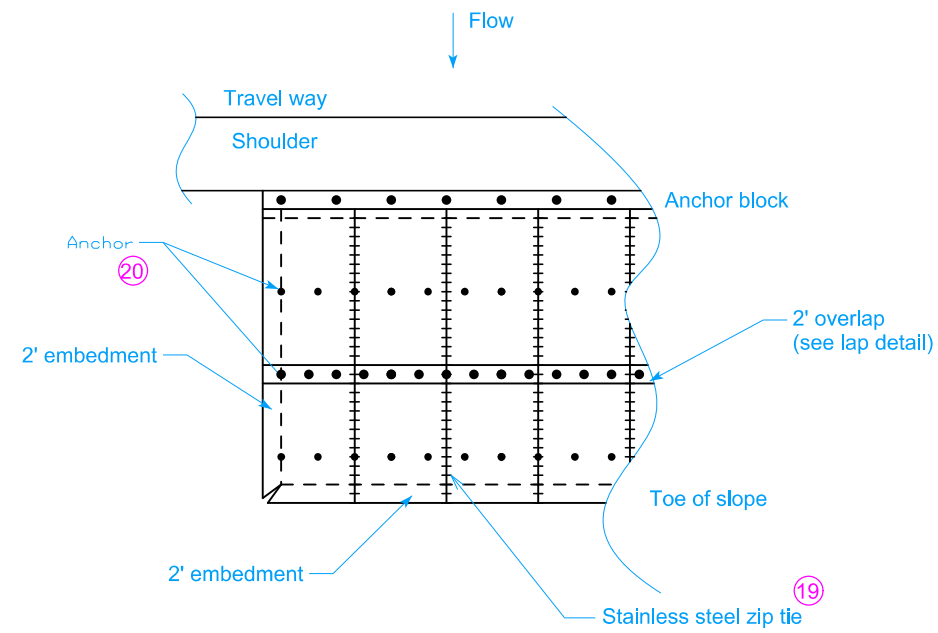


JOINT SEAL TOP DETAIL

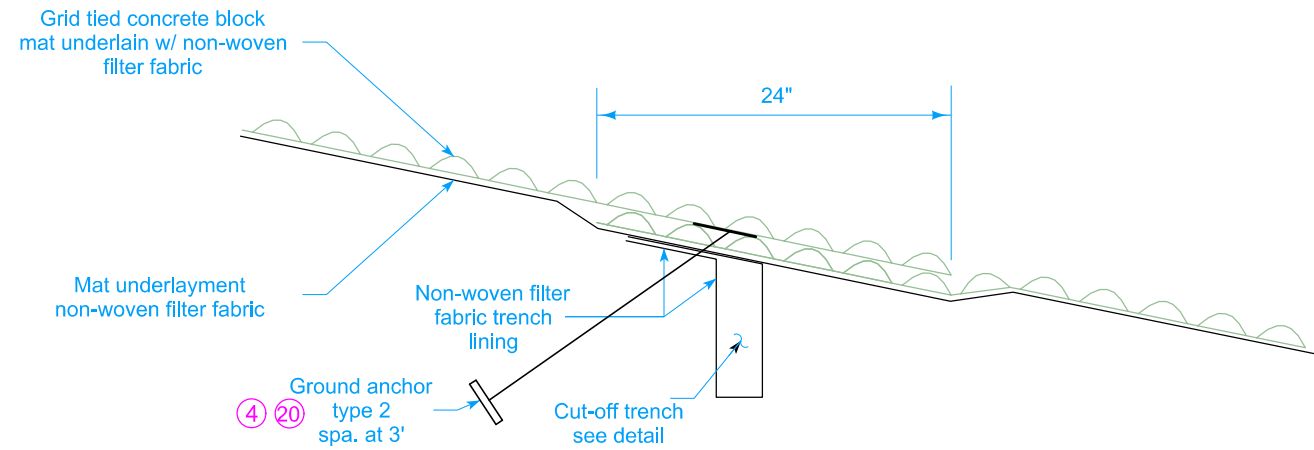
- ⑪ Fold filter fabric in serpentine manner as shown, three layers thick. fabric shall be folded to create layers. place plastic bond break layer between fabric layers. layers adj. to shldr. open at top.
- ⑫ Allowable tack (adhesive) to facilitate placement between outer fabric layers and plastic. allowable duct tape (or equal) strip placed at top to hold outer layer against shldr. after application of paste.
- ⑬ In advance of block concrete placement spread thin layer of cement rich paste, or approved adhesive, full face of shldr. press joint seal sandwich into paste/adhesive.

 <b>ROAD DESIGN DETAIL</b>	REVISION	
	NEW	10-19-21
	570-22	
SHEET 1 of 2		

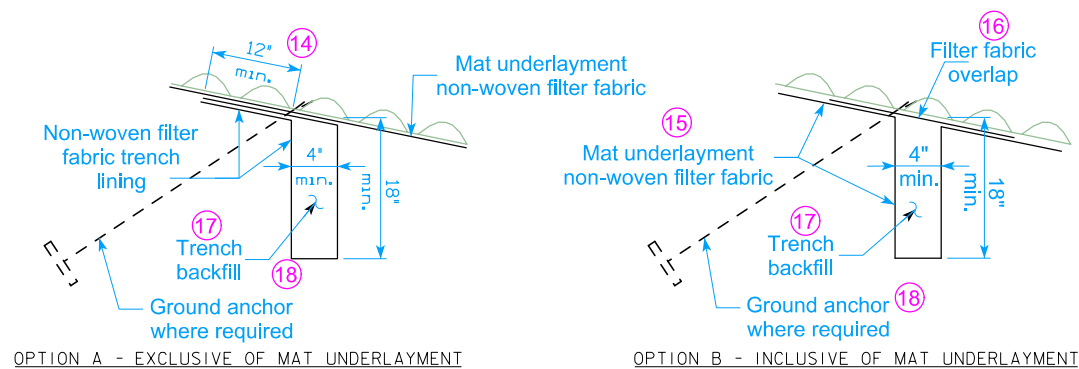
FORESLOPE EROSION COUNTERMEASURE  
REVETMENT DETAILS  
(MAJOR OVERTOPPING)



PLAN



LAP DETAIL



CUT-OFF TRENCH DETAIL

- (14) Fold trench lining fabric with termination toward direction of flow, 12 in. lap min. lap section shall not be pinned/staked to underlying ground except within 3 in. of edge trench.
- (15) Embed mat underlayment fabric into trench, 18 in. min. depth as shown. mat underlayment may be continuous around trench sides and btm. or only sides when located at underlayment seam.
- (16) Non-woven filter fabric overlap, 24 in. min. width, place over mat underlayment, center on trench.
- (17) Backfill trench with well compacted excavated material.
- (18) Where trench is installed adjacent to ground anchor, place anchor through mat at edge of first block upstream of edge trench.
- (19) For mat seams parallel to the flow direction (longitudinal seams) abutting sections of mat shall be joined using stainless steel zip ties spaced at 12 inch centers.
- (20) Mat shall be fastened to anchor with a steel top bearing 'X' plate, 12 inch cross, 0.11 inch thick steel. Plate shall be Zinc Plastisol coated or approved equal.

<b>IOWA DOT</b>	REVISION	
	NEW	10-19-21
<b>ROAD DESIGN DETAIL</b>		<b>570-22</b>
REVISIONS: New.		SHEET 2 of 2

**FORESLOPE EROSION COUNTERMEASURE  
REVETMENT DETAILS  
(MAJOR OVERTOPPING)**