

## 2021 OREGON STANDARD DRAWINGS

Standard Distribution  
Date of Issue: January 2022

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Senior Standards Engineer

**This is the January 2022 release of the 2021 Oregon Standard Drawings.**

For ODOT Projects the details in the standard drawings will be effective on the **June 1, 2021** bid opening where these drawings are called for in the project plans.

These drawings are for use with projects using the **2021 Oregon Standard Specifications**.

You will notice an “effective date” on the lower right bottom of each Standard Drawing. The bid opening date of a project should be in the effective date window of the drawings. This will ensure the correct drawings are being used on the projects.

Electronic PDF files with the effective date for each drawing are on the Web site at:

<http://www.oregon.gov/ODOT/Engineering/Pages/Standards.aspx>

The Standard Drawing Baseline Reports for the drawings contain useful information for the designer as well as updates that occur on the drawing. The link to the report is the title of the specific drawing on the webpage.

**These Standard Drawings are the ones that have updates:**

Drawing Number	Comment
RD406	
RD442	
RD500	
RD502	
RD503	
RD510	
RD530	
RD560	
RD570	
RD702	New Drawing
RD710	
RD711	
RD900	
RD905	

Drawing Number	Comment
RD909	New Drawing
RD910	
RD912	
RD913	
RD920	
RD930	
RD936	
RD1140	New Drawing
BR206	
BR208	
BR222	
BR226	
BR230	
BR236	
BR270	
BR310	
BR321	
BR405	
BR972	
TM200	
TM201	
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TM492	
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TM607	
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TM628	
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TM844	
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# OREGON STANDARD DRAWINGS 2021 NUMBERS AND REVISION DATES

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RD120	
RD130	
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RD170	01/2021
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RD286	
RD300	
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RD304	
RD306	
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RD325	
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RD328	
RD330	
RD332	
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RD335	
RD336	
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RD339	07/2021
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RD380	
RD382	
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RD386	
RD388	
RD390	
RD391	
RD393	
RD398	07/2021
RD399	
RD400	
RD401	
RD402	07/2021
RD403	07/2021
RD404	07/2021
RD405	
RD406	01/2022
RD407	07/2021
RD408	
RD409	
RD410	
RD412	
RD415	
RD416	
RD417	
RD419	07/2021

RD420	07/2021
RD421	
RD435	
RD436	
RD437	
RD438	
RD440	
RD442	01/2022
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RD444	
RD445	
RD450	
RD451	
RD470	
RD471	
RD481	
RD482	
RD500	01/2022
RD501	07/2021
RD502	01/2022
RD503	01/2022
RD505	
RD510	01/2022
RD515	
RD516	
RD520	
RD526	
RD530	01/2022
RD535	
RD545	
RD550	
RD560	01/2022
RD570	01/2022
RD575	
RD580	
RD581	
RD590	
RD602	
RD610	
RD615	07/2021
RD700	
RD701	
RD702	01/2022
RD705	
RD706	
RD707	
RD710	01/2022
RD711	01/2022
RD715	
RD720	

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RD721	
RD722	
RD725	
RD730	
RD735	
RD740	
RD745	07/2021
RD750	
RD770	
RD771	
RD780	07/2021
RD781	07/2021
RD782	07/2021
RD810	
RD815	
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RD825	
RD830	01/2021
RD832	
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RD840	
RD845	
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RD901	09/2021
RD902	07/2021
RD904	
RD905	01/2022
RD906	
RD908	
RD909	01/2022
RD910	01/2022
RD912	01/2022
RD913	01/2022
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RD920	01/2022
RD922	
RD930	01/2022
RD932	
RD936	01/2022
RD938	07/2021
RD940	07/2021
RD950	
RD952	07/2021
RD960	07/2021
RD1000	01/2021
RD1005	01/2021
RD1006	01/2021
RD1010	01/2021
RD1015	01/2021
RD1030	01/2021

RD1031	01/2021
RD1032	01/2021
RD1033	01/2021
RD1040	01/2021
RD1045	01/2021
RD1050	01/2021
RD1055	01/2021
RD1060	01/2021
RD1065	01/2021
RD1070	01/2021
RD1140	01/2022
BR115	
BR133	
BR135	
BR136	
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BR140	
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BR145	
BR157	
BR165	01/2021
BR175	
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BR200	
BR203	
BR206	01/2022
BR207	
BR208	01/2022
BR209	
BR212	
BR214	
BR216	
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BR221	
BR222	01/2022
BR223	
BR226	01/2022
BR230	01/2022
BR233	
BR236	01/2022
BR240	
BR241	
BR242	
BR245	
BR246	
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BR253	
BR256	
BR260	
BR263	
BR266	
BR270	01/2022
BR273	
BR285	07/2021
BR286	07/2021
BR290	
BR291	
BR300	
BR310	01/2022
BR321	01/2022
BR325	
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BR340	
BR350	
BR360	
BR365	
BR375	
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BR405	01/2022
BR410	
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BR422	
BR425	
BR430	
BR435	
BR440	
BR445	
BR500	
BR505	
BR520	
BR525	
BR550	
BR705	
BR706	01/2021
BR707	
BR708	
BR709	
BR730	
BR740	
BR750	01/2021
BR751	
BR760	
BR800	
BR805	



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DRAWING NUMBER	REVISION DATE	DRAWING NUMBER	REVISION DATE	DRAWING NUMBER	REVISION DATE
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BR820	01/2021
BR825	01/2021
BR830	01/2021
BR835	01/2021
BR840	
BR841	
BR970	
BR971	
BR972	01/2022
TM200	01/2022
TM201	01/2022
TM204	
TM206	
TM211	01/2022
TM212	07/2021
TM220	
TM221	07/2021
TM222	
TM223	
TM224	
TM225	
TM230	
TM231	
TM232	
TM233	
TM240	
TM300	
TM301	
TM302	
TM303	07/2021
TM450	07/2021
TM452	07/2021
TM453	07/2021
TM454	07/2021
TM456	07/2021
TM457	07/2021
TM460	07/2021
TM462	07/2021
TM466	07/2021
TM467	07/2021
TM470	07/2021
TM471	07/2021
TM472	07/2021
TM482	07/2021
TM485	07/2021
TM492	01/2022
TM500	
TM501	01/2022

TM502	01/2022
TM503	
TM504	
TM505	01/2022
TM515	
TM516	
TM517	07/2021
TM520	
TM521	07/2021
TM530	
TM531	
TM539	
TM547	
TM551	
TM560	
TM561	
TM570	
TM571	
TM575	
TM576	
TM577	
TM600	
TM601	
TM602	
TM606	
TM607	01/2022
TM608	01/2022
TM609	01/2022
TM610	
TM611	
TM612	01/2021
TM614	
TM615	01/2022
TM616	01/2022
TM617	01/2022
TM618	
TM619	
TM620	
TM621	01/2021
TM622	
TM623	01/2022
TM624	
TM625	
TM626	
TM627	01/2021
TM628	01/2022
TM629	07/2021
TM630	07/2021
TM631	07/2021
TM635	

TM650	
TM651	01/2021
TM652	
TM653	
TM654	
TM655	
TM656	
TM657	
TM658	
TM670	01/2022
TM671	
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TM676	
TM677	
TM678	01/2022
TM679	
TM680	
TM681	
TM687	
TM688	
TM689	
TM690	
TM691	01/2021
TM693	
TM694	
TM695	01/2021
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**OREGON STANDARD DRAWINGS 2021  
NUMBERS AND REVISION DATES**

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TM870	01/2022
TM871	
TM880	07/2021

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     U.S. Route Shields TM211

**Sign Supports**

Breakaway Location Guidelines TM635  
 Cantilever TM621, TM622, TM623,  
 TM624, TM625, TM626,  
 TM627, TM628, TM690,  
 TM691  
 Multi-Post Breakaway TM600, TM601  
 Sign Bridge TM614, TM615, TM616,  
 TM617, TM618, TM619,  
 TM620, TM693, TM694,  
 TM695, TM696, TM697  
 Square Tube TM681, TM687,

# 2021 OREGON STANDARD DRAWINGS INDEX

Temporary	TM688, TM689
Triangular Base Breakaway	TM822
Variable Message Sign	TM602
	TM606, TM607, TM608,
	TM609, TM610, TM611,
	TM612, TM621, TM622,
	TM623, TM624, TM625,
	TM626, TM627, TM628,
	TM690, TM691, TM693,
	TM694, TM695, TM696,
	TM697
Wood Post	TM670
Service Connection, Water System	RD274
Siphon Box	RD376
Slabs, Precast Prestressed	BR400, BR405, BR410,
	BR415, BR420, BR422,
	BR445
<b>Slope</b>	
Drains, Temporary	RD1045
Paving	BR115
Pipe Anchors	RD330, RD332
Protector, Concrete Manhole	RD358
Rounding	RD150
Slotted Drains, Metal Pipe (CMP)	RD328
Snow Fence, Metal	RD825
<b>Soundwalls</b>	
Masonry (Pile Footing)	BR750, BR751
Masonry (Spread Footing)	BR730
Precast Concrete	BR740
Stairway, Concrete	RD120

Steps, Manhole Precast	RD336
Stop Lane, Truck And Bus	
At Railroad Crossing	RD445
Storm Water Treatment and	
Storage Facility Field Marker	RD399
Street Cut	RD302
Subsurface Drain	RD312

**-T-**

## Temporary Traffic Control

2-Lane, 2-Way Roadways	TM850
Abrupt Edge	TM800
Barricades	TM820
Blasting Zones	TM871
Bridge Construction	TM870
Closure Details	TM840
Concrete Barrier	TM830
Freeway Sections	TM860, TM861, TM862
Impact Attenuator	TM831, TM832, TM833
Intersection Work Zones	TM841, TM842, TM843
Message Sign	TM800
Non-Freeway Multi-Lane Sections	TM851, TM852, TM853
Pedestrian Accessible Routing	TM844
Reflective Pavement Makers	TM810
Rumble Strips	TM830
Sign Supports	TM689, TM821
Speed Reduction (Moving Operations)	TM880
Tables, Flare Rate, Taper, Spacing	TM800
Temporary Sign Support	TM822

Thrust Blocking, Water Systems RD250

## 2021 OREGON STANDARD DRAWINGS INDEX

Tire Wash Facility RD1060

**Traffic**

Island RD705  
 Separator, Concrete RD706

**Traffic Signals**

Color Code Chart TM470  
 Controller Cabinet and Foundation TM482  
 Fire Preemption Details TM456  
 Junction Boxes TM472  
 Maintenance Pad Details RD160  
 Mast Arm Pole Details TM450  
 Mounting Details  
     Adjustable Signal Head TM462  
     Spanwire TM456  
 Pedestrian Signal TM457, TM467  
 Pole Footing Details  
     Mast Arm Pole TM450  
     Strain Pole TM452  
 Pole Mounts TM680  
 Ramp Meter Details TM492  
 Service Cabinet TM485  
 Spanwire Design TM456  
 Strain Pole Details TM452  
 Supports TM650, TM651, TM652,  
     TM653, TM654, TM655,  
     TM656,  
     TM657, TM658  
 Temporary TM453, TM454, TM456  
 Trenching & Conduit Installation TM471  
 Vehicle Signal Details TM460  
 Vehicle Signal Pedestal TM457

Trench Backfill RD300

Truck Aprons on Roundabouts RD170  
 Trucks and Bus Stop Lanes  
     At Railroad Crossing RD445  
 Truck Scale Pit BR182  
 Truncated Dome RD902

**-V-**

Valve Box And Operator  
     Extension Assembly RD258  
 VMS Walk-In Bridge TM698

**-W-****Walls**

Retaining, Concrete BR705, BR706, BR707,  
 BR708, BR709  
 Soundwall, Masonry  
     Pile Footing BR750, BR751  
     Spread Footing BR730  
 Soundwall, Precast BR740

**Water Systems**

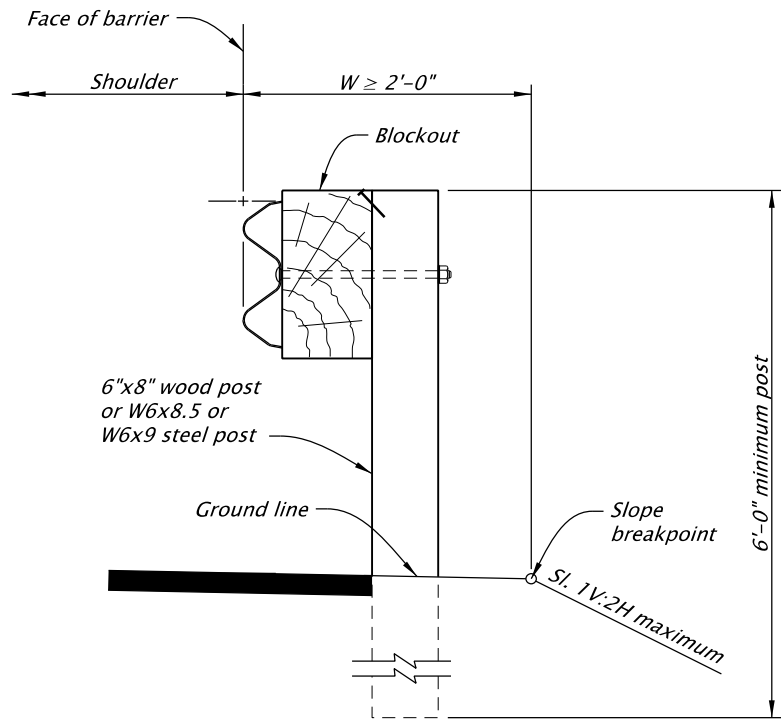
Air Release Assembly, Manual RD266  
 Air Release/Air Vacuum  
     Valve Assembly RD270  
 Hydrant Installation RD254  
 Main Dead-End Blowoff Assembly RD262  
 Root Barrier RD286  
 Thrust Blocking RD250  
 Valve Box And Operator  
     Extension Assembly RD258

January 2022

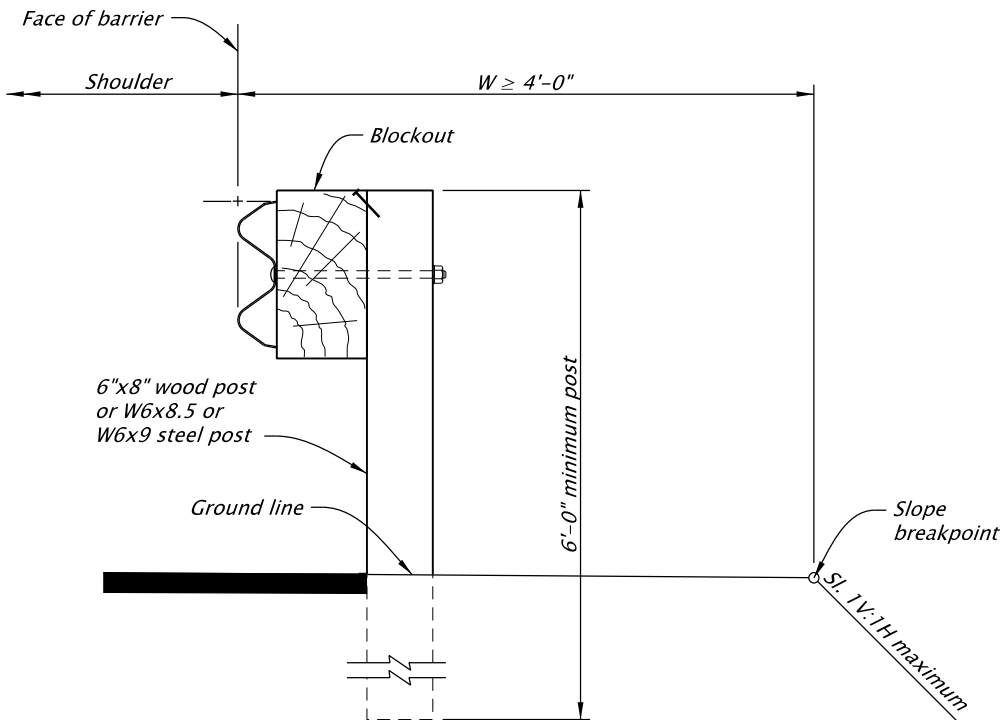
## 2021 OREGON STANDARD DRAWINGS INDEX

Water Meter Assembly	RD278
Water Sampling Station	RD282
Water Service Connection	RD274
Wingwalls, Concrete Box Culverts	BR800
Wind Pressure Map	TM671
Wind Speed Map	TM672

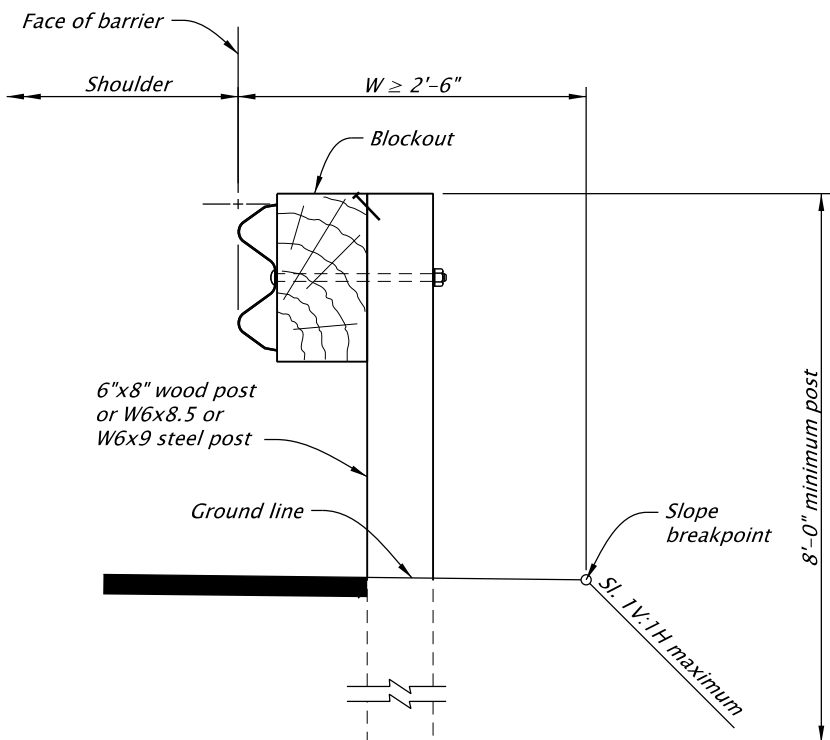




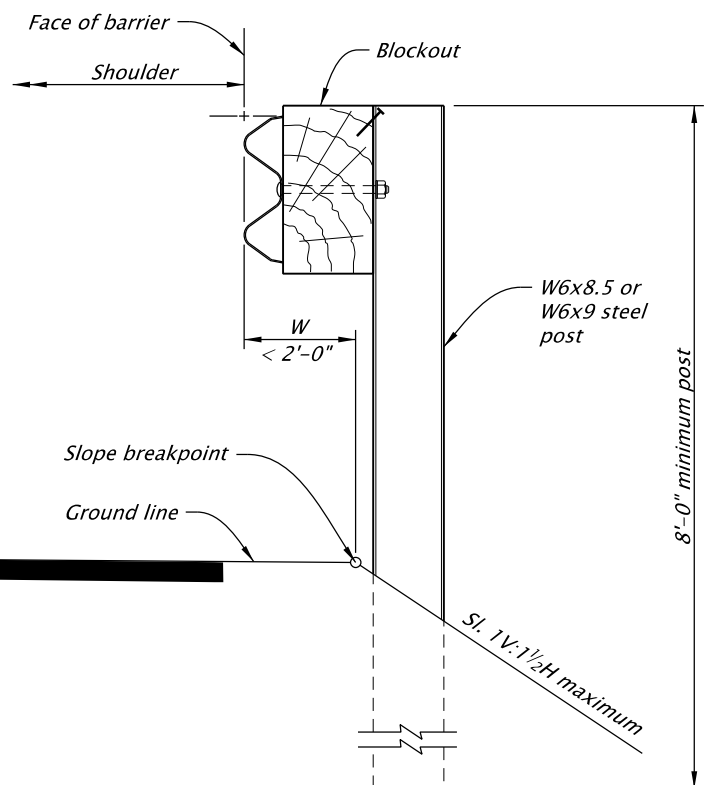
**CASE 1**  
(Wood post shown)



**CASE 2**  
(Wood post shown)  
Use when there is a 4'-0" or greater shoulder widening  
from face of guardrail to the slope breakpoint



**CASE 3**  
(Wood post shown)  
Use when there is a 2'-6" or greater shoulder widening  
from face of guardrail to the slope breakpoint



**CASE 4**  
(Steel post shown)  
Use when there is less than a 2'-0" shoulder widening  
from face of guardrail to the slope breakpoint

## PLACEMENT OF GUARDRAIL ON SLOPES

NOTE: Cases shown do not apply to terminals,  
transition sections or anchors.

### GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

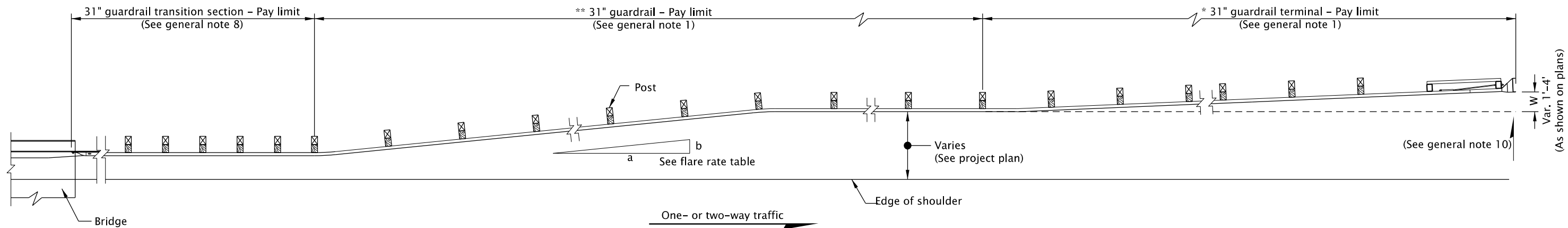
1. See appropriate guardrail standard drawing(s) for details not shown.
2. Wood blocks shown. Blocks of an approved alternate material may be used. See ODOT's QPL.
3. All posts for guardrail run shall be of the same type: wood or steel.

SLOPE / EMBANKMENT TABLE			
POST LENGTH (ft)	POST TYPE	SLOPE (V:H)	W (ft) (Face of barrier to slope of breakpoint)
6	Wood/Steel	1:2 or flatter	2'-0" minimum
6	Wood/Steel	1:1 or flatter	4'-0" minimum
8	Wood/Steel	1:1 or flatter	2'-6" minimum
8	Steel	1:1 1/2 or flatter	Less than 2'-0"

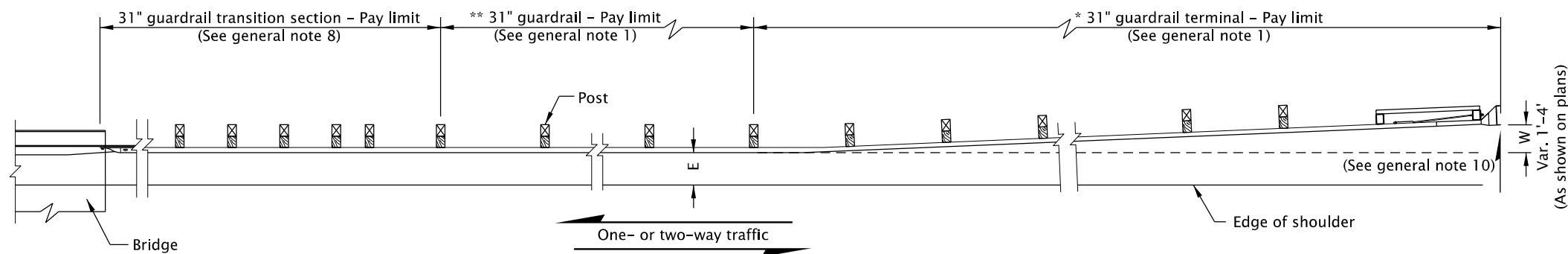
CALC. BOOK NO. <b>N/A</b>		SDR DATE <b>04-JAN-2022</b>	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>PLACEMENT OF GUARDRAILS ON SLOPES</b>	
		<b>2021</b>	
		DATE	REVISION DESCRIPTION
		07-2021	DRAWING CREATED
		12-2021	REVISED DETAILS AND NOTES

rd442.dgn 14-JAN-2022

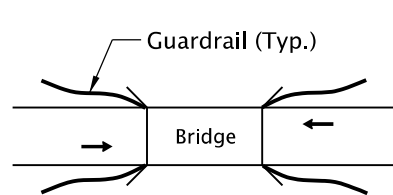
RD442



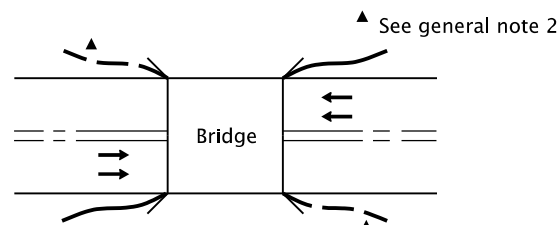
NARROW BRIDGE ON ONE OR TWO-WAY TRAFFIC



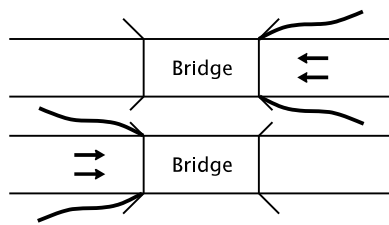
ONE OR TWO-WAY TRAFFIC



TWO LANE



MULTILANE



MULTILANE

LOCATIONS AT BRIDGE ENDS  
(MINIMUM SHOWN)

- \* Provide from ODOT's QPL.  
Install according to manufacturer's instruction.
- \*\* Length of need calculation will determine quantity of Type 2A required.

FLARE RATE TABLE	
POSTED SPEED (MPH)	FLARE RATE a:b
70	15 : 1
60	14 : 1
55	12 : 1
50	11 : 1
45	10 : 1
40 or less	9 : 1

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

- See appropriate standard drawing(s) for details not shown.
- Guardrail at indicated positions is required for protection at bridge ends. Additional guardrail is to be installed as required by guardrail warrant and fastened to bridge.
- Face of guardrail at locations shown above must match face of bridge curb or bridge rail on structure without curb.
- Trailing ends (Freeway, multilane and similar one-way facilities) not exposed to opposing traffic:  
(a) Guardrail terminals, use a Downstream Anchor Terminal (DAT) (RD438), Type B end piece and do not flare.  
(b) At bride ends, omit transition guardrail & Type 3 guardrail. Use bridge connection (Bridge drawing BR236) and guardrail as required in plans.
- Rail expansion slots to be provided at bridge end connections.  
See dwg. no. RD412 "MIDWEST GUARDRAIL SYSTEM INSTALLATION AT BRIDGE DECK EXPANSION JOINT" details and notes.

- Where bridges employ guardrail in lieu of handrail or vehicular barriers, adjacent connecting guardrail runs shall be the same type.
- (a) All bolts except adjustment bolts shall be drawn tight on rails and components on initial installation.  
(b) Final tightness check on rail and component bolts and re-tightening as required to be done 30 days after initial installation.
- See project plans for details not shown. See dwg. no. RD482 for Type 3, Nested W-Beam details. For transition guardrail detail and installation limits at bridge ends, see applicable bridge drawings.
- "W" distance is measured from face of guardrail at end post, exclusive of end piece.
- The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 1V : 10H when the guardrail is within 12'-0" from the edge of the shoulder. Paving of widened shoulder to face of posts in both ends of guardrail runs is required.
- Wood or steel post. Wood post shown.

CALC. BOOK NO. N/A

SDR DATE 14-JAN-2022

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*

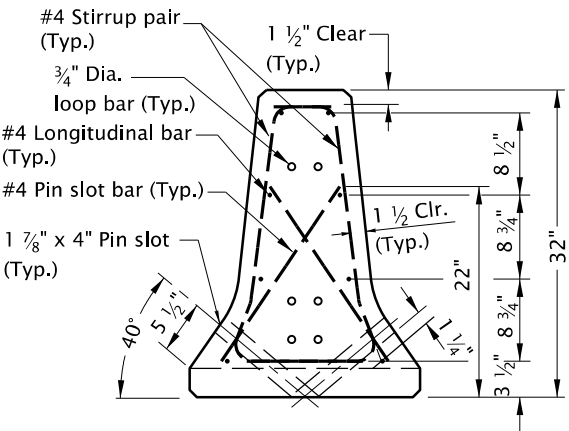
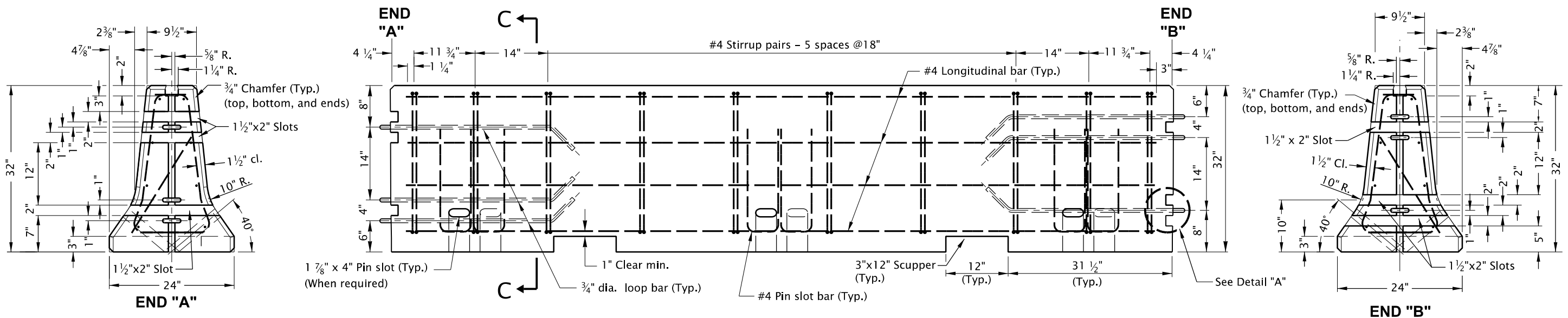
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS  
MIDWEST GUARDRAIL SYSTEM  
TYPICAL LAYOUTS  
AT BRIDGE ENDS

2021

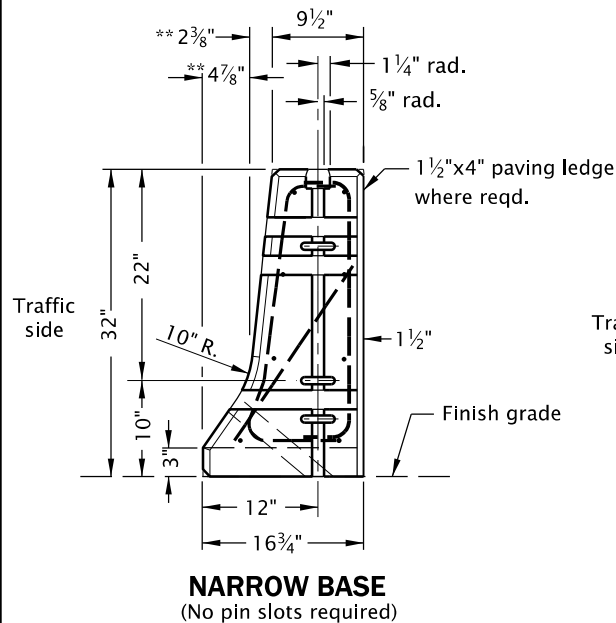
DATE	REVISION	DESCRIPTION
12-2021	REVISED NOTES	





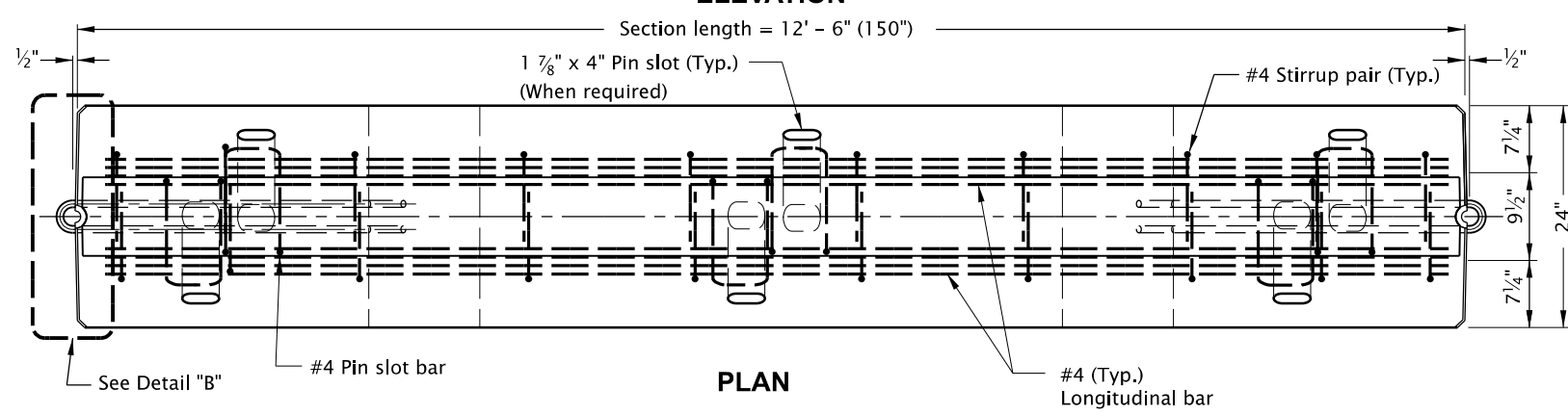
SECTION C-C

\* Barrier used as shoulder barrier and placed in areas where these dimensions cannot be obtained shall be secured to roadway.  
\*\* Dimensions marked thus are to the intersection point of the barrier slopes. Construct the 10" radius to provide a smooth transition between the slopes.

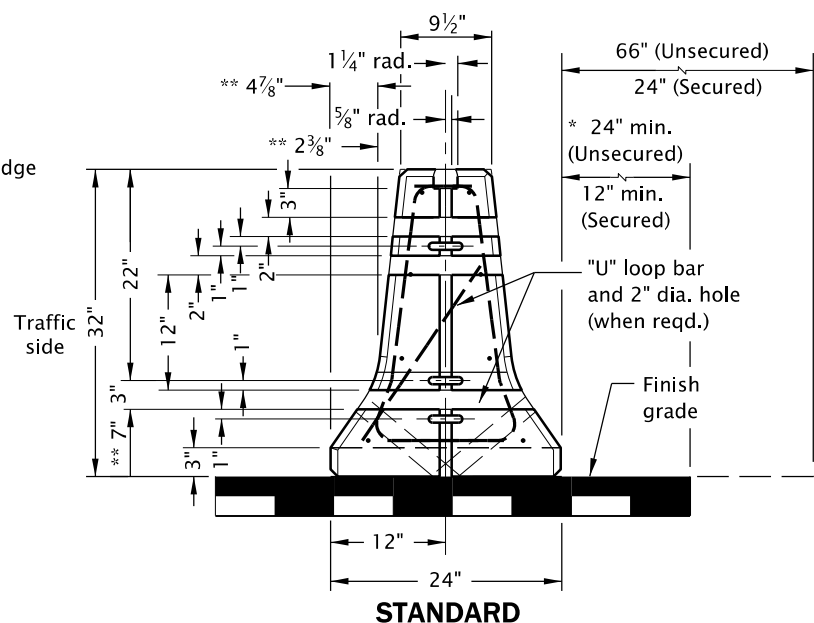


NARROW BASE  
(No pin slots required)

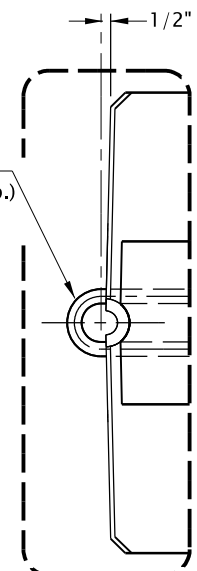
SHOULDER BARRIER



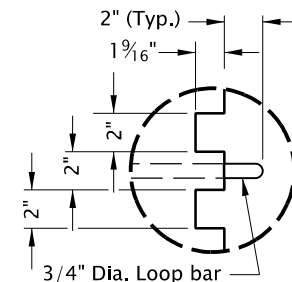
MEDIAN BARRIER



STANDARD



BARRIER END  
DETAIL "B"



TYP. BARRIER PIN LOOP  
DETAIL "A"

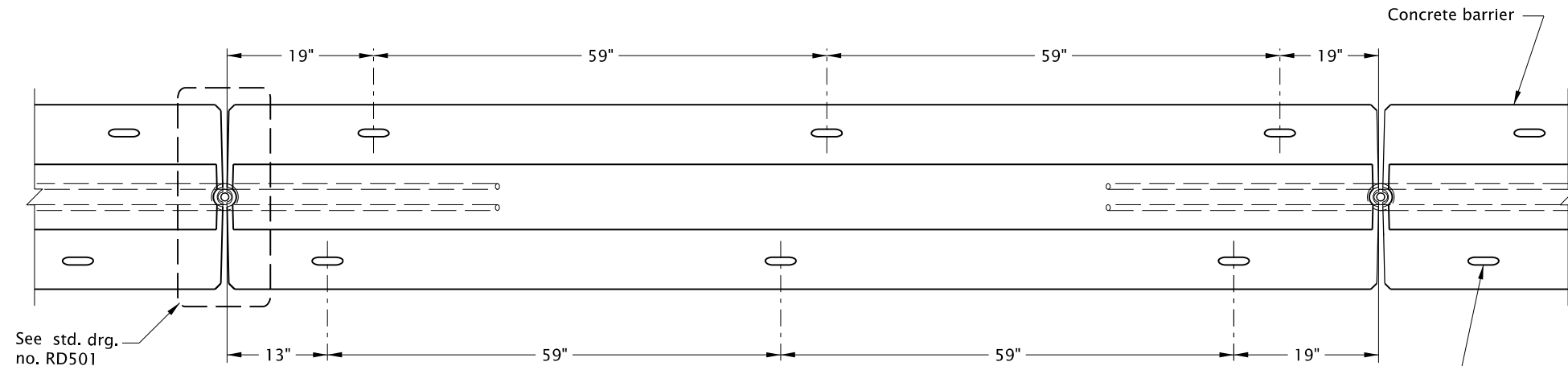
GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. All reinforcement shall be full length as shown and shall be 2" clear of nearest face of conc., unless otherwise shown.
2. Max. chord length for curves with a 1425' radius or less shall be 12.5'. Max. chord length for curves with radii exceeding 1425' shall be 25'.
3. Normal use of precast barrier units is restricted to curvatures with radii greater than 770'.
4. Narrow base shldr. barrier to be used only at locations with backfill behind barrier as shown on plans.
5. Temp. conc. barrier to be precast conc. median barrier with pin and loop assembly (See Std. Drg. RD502).
6. When scuppers are not required, plug them with a minimum 2" of grout, as directed.
7. Conc. grout for grouting over pins, pinning holes or grouting of scuppers shall be portland cement grout, weak in strength and of thick consistency, as directed.
8. Precast concrete barrier used in medians less than 8' in width shall be secured to roadway. See Std. Dwgs. RD515 & RD516 for details.
9. See Std. Dwg. RD501 for details not shown. See Std. Dwg. RD502 for securing concrete barrier to roadway.
10. All pins, bolts, dowels, loop bars, and connectors shall be hot-dip galvanized after fabrication.
11. For temporary installations, provide a minimum of 18" of clear space behind the barrier if secured or 5.5' of clear space behind unsecured barrier. Place temporary barrier on smooth, solid surfacing. Maintain smooth, solid surfacing for the clear area behind temporary barrier.

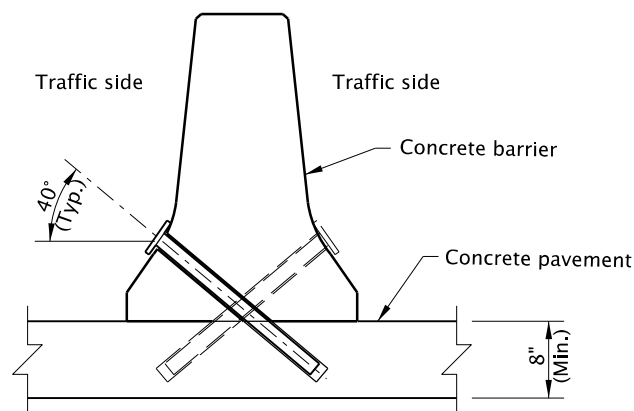
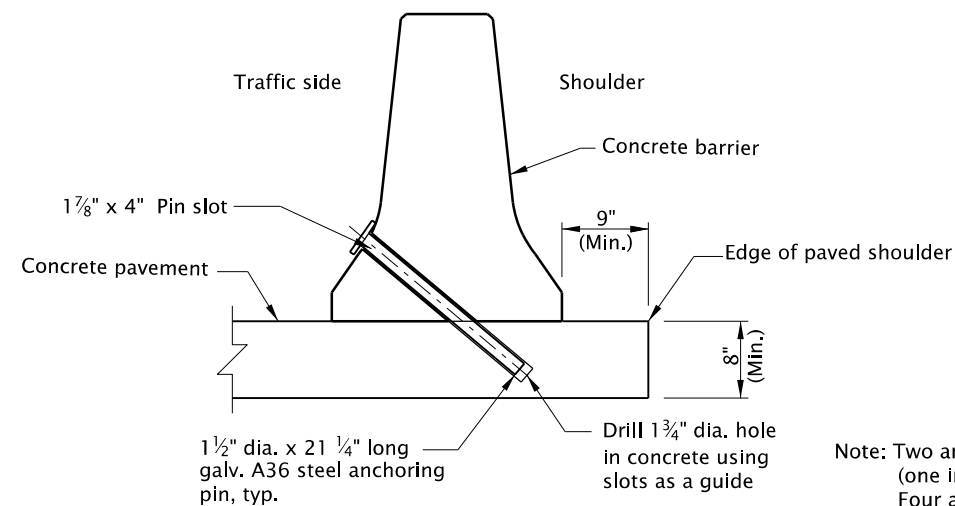
CALC. BOOK NO. <b>N/A</b>		SDR DATE <b>14-JAN-2022</b>	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>32" CONCRETE BARRIER TYPE "F" PRECAST</b>	
		2021	
		DATE	REVISION DESCRIPTION
		01-2021	TITLE CHANGED, REVISED DETAILS AND NOTES
		04-2021	REVISED DETAILS AND NOTES
		12-2021	REVISED NOTES

rd502.dgn 14-JAN-2022

RD502

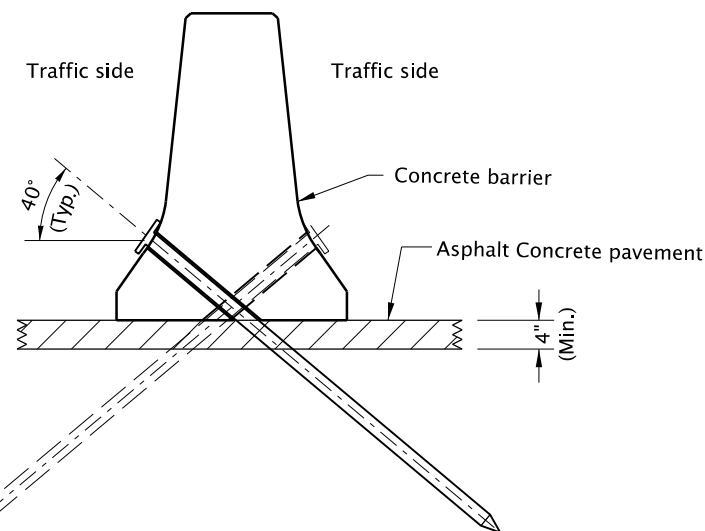
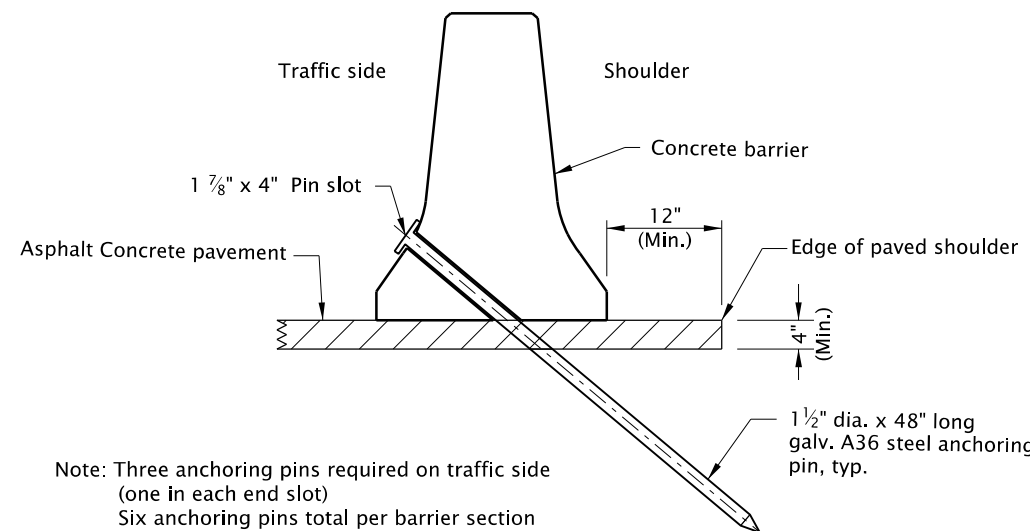


PLAN  
CONCRETE BARRIER ANCHORING PIN LOCATIONS



Note: Two anchoring pins required on traffic side (one in each end slot)  
Four anchoring pins total per barrier section

CONCRETE ANCHORING PIN DETAILS



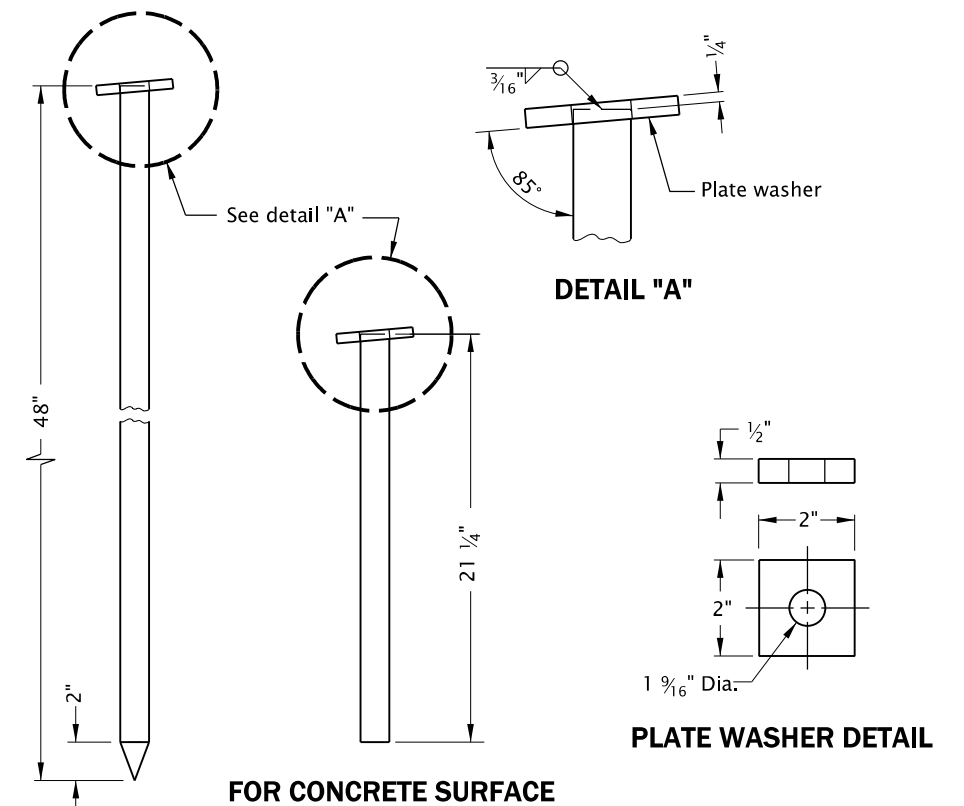
Note: Three anchoring pins required on traffic side (one in each end slot)  
Six anchoring pins total per barrier section

ASPHALT ANCHORING PIN DETAILS

METHODS OF SECURING CONCRETE BARRIER TO ROADWAY

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. See Std. Dwgs. RD500 and RD501 for details not shown.
2. Conc. grout for grouting over pins, pinning holes or grouting of scuppers shall be portland cement grout, weak in strength and of thick consistency, as directed.
3. Precast concrete barrier used in medians less than 8' in width shall be secured to roadway.  
See Std. Dwgs. RD515 & RD516 for details.
4. All pins, bolts, dowels, loop bars, and connectors shall be hot-dip galvanized after fabrication.



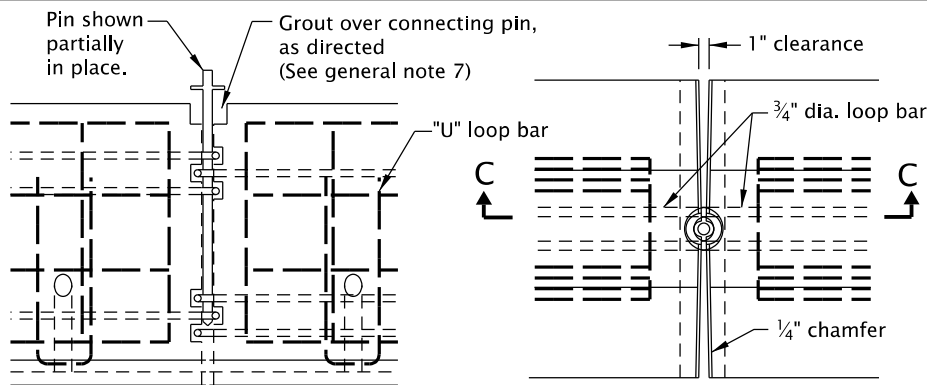
FOR CONCRETE SURFACE  
FOR ASPHALT SURFACE

ANCHORING PIN ASSEMBLY DETAIL

CALC. BOOK NO. <u>          N/A          </u>	SDR DATE <u>          14-JAN-2022          </u>												
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>	NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications												
	<b>OREGON STANDARD DRAWINGS</b>												
	<b>32" CONCRETE BARRIER TYPE "F" PRECAST</b>												
	2021												
	<table><tr><td>DATE</td><td>REVISION DESCRIPTION</td></tr><tr><td>10-2020</td><td>NEW DRAWING CREATED</td></tr><tr><td>01-2022</td><td>REVISED NOTES</td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>	DATE	REVISION DESCRIPTION	10-2020	NEW DRAWING CREATED	01-2022	REVISED NOTES						
	DATE	REVISION DESCRIPTION											
10-2020	NEW DRAWING CREATED												
01-2022	REVISED NOTES												

Effective Date: June 1, 2022 – November 30, 2022

RD502

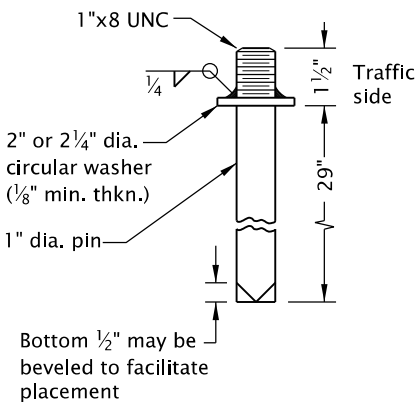


SECTION C-C  
For details not shown, see End Views A-A and B-B

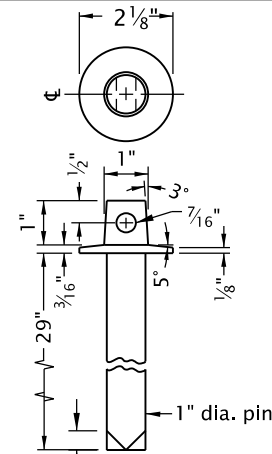
PLAN  
For details not shown, see End Views A-A and B-B

PIN AND LOOP CONNECTION

PIN NOTES:  
1. Washer shall be forged as integral part of pin or shall be welded as shown.

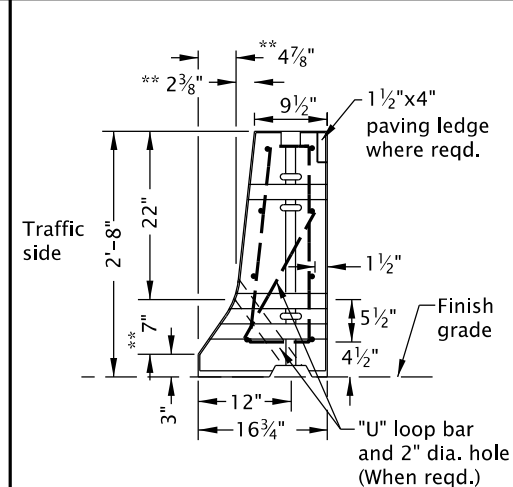


PIN DETAIL

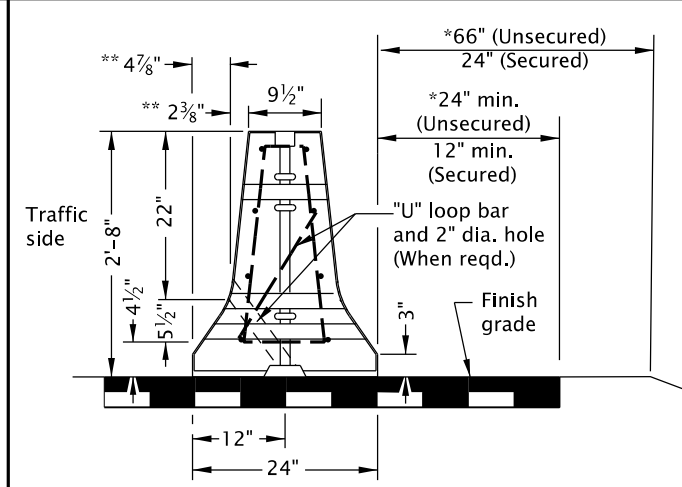


ALTERNATE PIN DETAIL

STANDARD BARRIER PIN



(NARROW BASE)

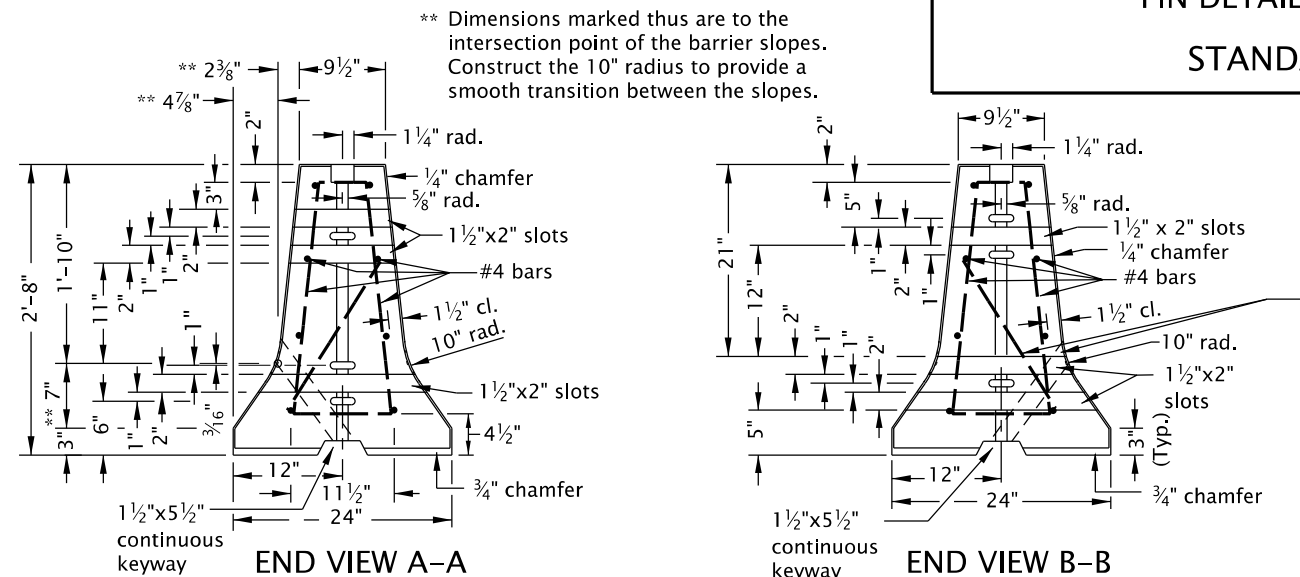


(STANDARD)

SHOULDER BARRIER

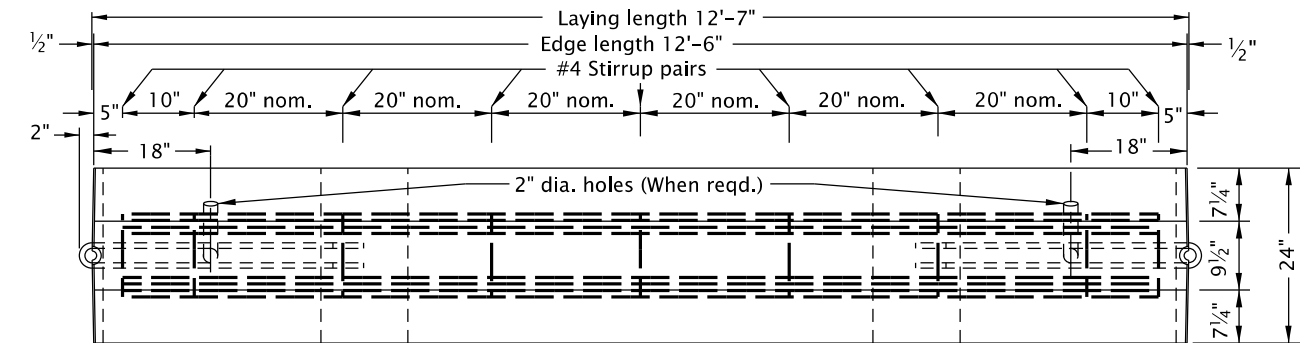
(For assembly details and dimensions, see median barrier at left)

\* Barrier used as shoulder barrier and placed in areas where these dimensions cannot be obtained shall be secured to roadway.

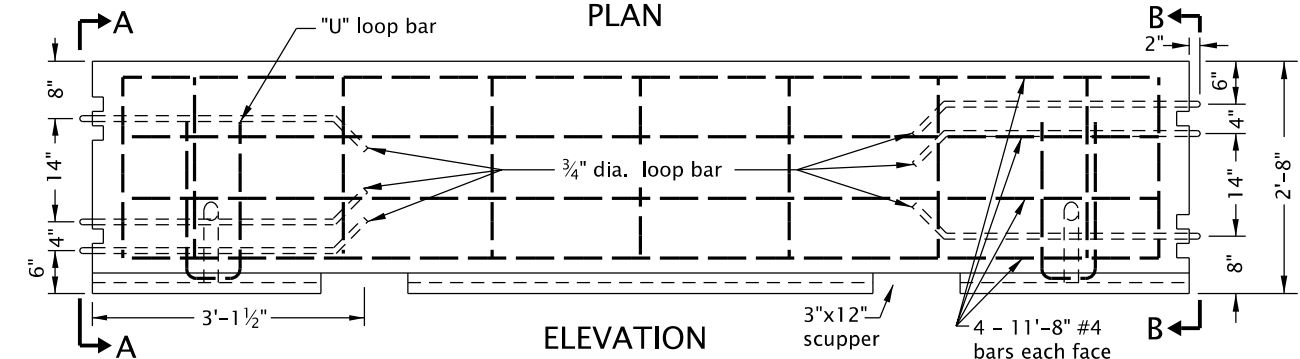


END VIEW A-A

END VIEW B-B

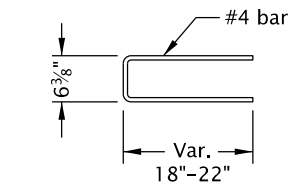


PLAN

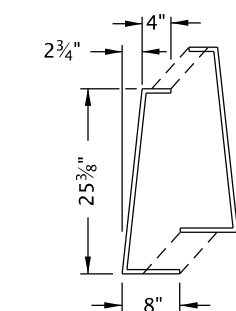


ELEVATION  
MEDIAN BARRIER

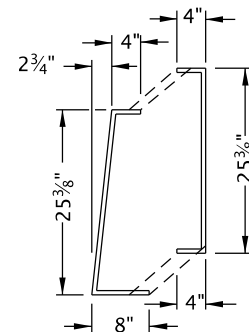
"U" loop bar and 2" dia. holes (When reqd.) finish flush with non-shrinking grout, as directed



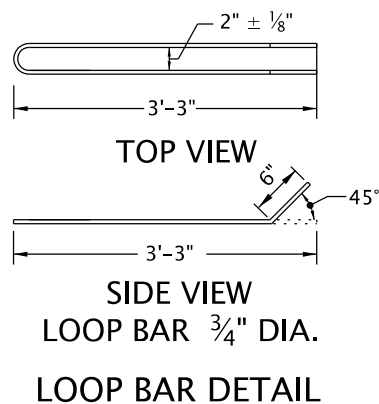
"U" LOOP BAR DETAIL



STIRRUP "M"  
(MEDIAN BARRIER)  
#4 Rebar



STIRRUP "S"  
(SHOULDER BARRIER)  
#4 Rebar



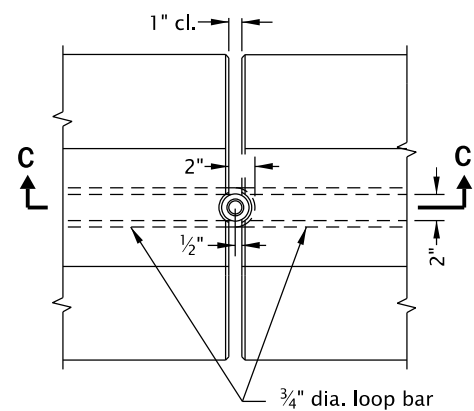
LOOP BAR DETAIL

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. All reinforcement shall be full length as shown and shall be 2" clear of nearest face of conc., unless otherwise shown.
2. Max. chord length for curves with a 1425' radius or less shall be 12.5'. Max. chord length for curves with radii exceeding 1425' shall be 25'.
3. Normal use of precast barrier units is restricted to curvatures with radii greater than 770'.
4. Narrow base shldr. barrier to be used only at locations with backfill behind barrier as shown on plans.
5. Temp. conc. barrier to be precast conc. median barrier with pin and loop assembly.
6. When scuppers are not required, plug them with a minimum 2" of grout, as directed.
7. Conc. grout for grouting over pins, pinning holes or grouting of scuppers shall be portland cement grout, weak in strength and of thick consistency, as directed.
8. Precast concrete barrier used in medians less than 8' in width shall be secured to roadway. See Std. Dwgs. RD515 & RD516 for details.
9. See Std. Dwg. RD516 for securing concrete barrier to roadway.
10. All pins, bolts, dowels, loop bars, and connectors shall be hot-dip galvanized after fabrication.
11. For temporary installations, provide a minimum of 18" of clear space behind the barrier if secured or 5.5' of clear space behind unsecured barrier. Place temporary barrier on smooth, solid surfacing. Maintain smooth, solid surfacing for the clear area behind temporary barrier.

NOTE:  
THIS DRAWING IS RETAINED FOR TEMPORARY INSTALLATION AND MAINTENANCE PURPOSES ONLY.  
DO NOT USE FOR NEW PERMANENT INSTALLATIONS.

CALC. BOOK NO.	N/A	SDR DATE	14-JAN-2022
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications			
OREGON STANDARD DRAWINGS			
32" CONCRETE BARRIER TYPE "F" PRECAST			
2021			
DATE	REVISION	DESCRIPTION	
04-2021	REVISED	DETAILS AND NOTES	
12-2021	REVISED	NOTES	



## PLAN

#### #4 STIRRUP DETAILS

Technical drawing of a concrete pile cap showing dimensions and reinforcement details. The drawing includes a plan view at the top and a cross-sectional view below it.

**Plan View Dimensions:**

- Overall width: 24"
- Top edge width: 9 1/2"
- Left side width: 4 7/8" (marked with \*\*)
- Right side width: 4 7/8" (marked with \*\*)
- Distance from left edge to centerline: 2 3/8" (marked with \*\*)
- Distance from right edge to centerline: 2 3/8" (marked with \*\*)
- Radius of the bottom edge: 1 1/4" rad.

**Cross-Section View Dimensions:**

- Overall height: 22"
- Top flange thickness: 2"
- Distance from top flange to first stirrup: 5"
- Distance between stirrups: 1"
- Distance from bottom to first stirrup: 5"
- Bottom flange thickness: 2"
- Overall width at base: 24"

**Reinforcement Details:**

- #4 stirrup pairs (indicated by arrows pointing to the stirrups in the cross-section)
- 1 1/2"x2" slots (indicated by arrows pointing to the slots in the cross-section)

**SECTION A-A**

Diagram illustrating the components and dimensions of a 25'-0" nominal length of a composite barrier system.

The total length is 25'-0" nominal.

The diagram shows the following sections and components:

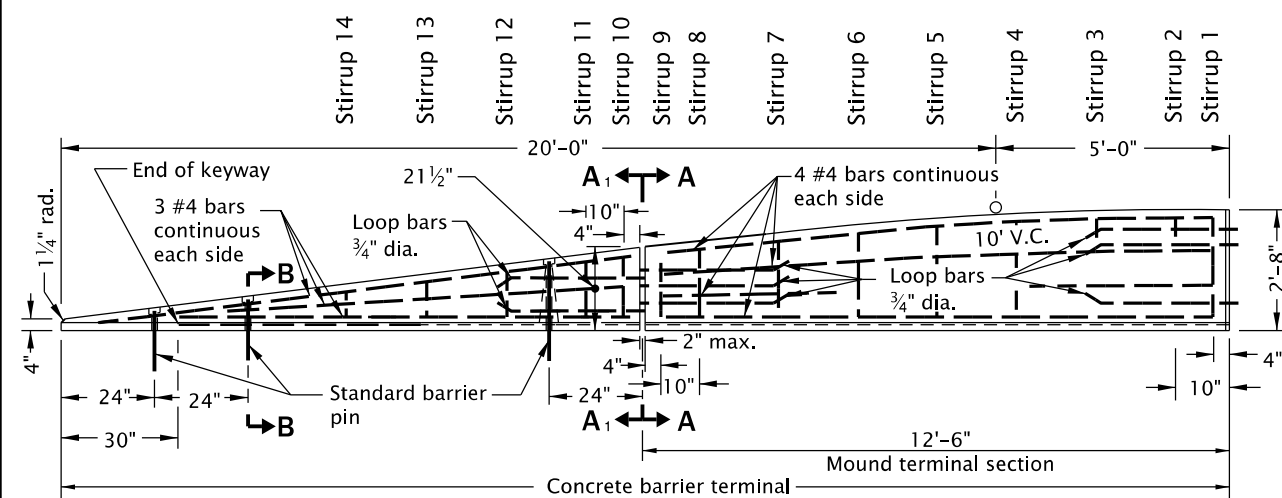
- Section 1: 12'-6" long, containing loop bars (3/4" dia.).
- Section 2: 3/4" max. gap.
- Section 3: 12'-6" long (12'-7" laying length), containing loop bars (3/4" dia.).
- Section 4: 3/4" max. gap.
- Section 5: End connection as reqd. to match type of barrier being used.

Additional dimensions and details:

- Loop bars are 3/4" dia.
- End connection is as required to match the type of barrier being used.
- Spacing between loop bars is 24" (indicated for the first two sections).

## PLAN

End connection as reqd. to match type of barrier being used. Pin and loop arrangement to mate to end of barrier. See Std. Dwg. RD500.



**SECTION B-B**

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. All reinforcement shall be full length as shown and shall be 2" clear of nearest face of conc., unless otherwise shown.
2. Reinf. shown is the minimum reqd. for all barriers in final position. Additional reinf. may be used to facilitate production, handling and installation of "Precast" units at the contractor's option and responsibility. (See note 1)
3. For details not shown, see Std. Dwg. RD500.
4. See Std. Dwg. RD516 for securing concrete barrier to roadway.
5. All pins, bolts, dowels, loop bars, and connectors shall be hot-dip galvanized after fabrication.
6. For use only where the design speed is less than 45 mph and the end is outside the required clear zone.

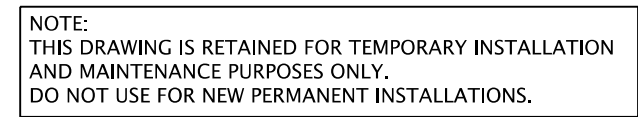
SDR DATE 14-JAN-2022

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

## 2021

DATE	REVISION DESCRIPTION
12-2021	REVISED NOTES

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*



Indicates narrow base shoulder barrier, see general note 6

Finish grade

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

Finish grade

Drill horizontal bolt holes  
(Bolt dia. +  $\frac{1}{8}$ " ) in  
hardened conc. with  
non-impact rotary drill

2 1/2"

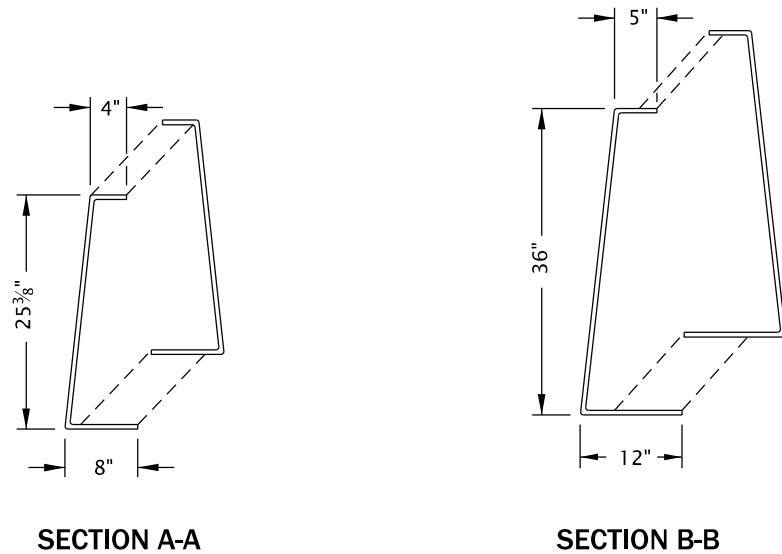
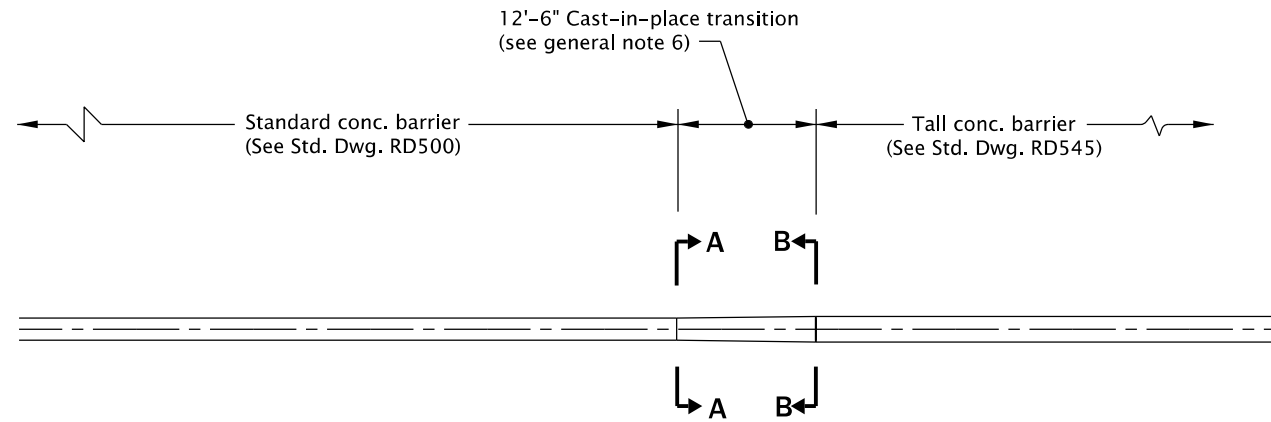
SECTION 5.5

Diagram illustrating a bolted connection between a steel beam and a column flange. The connection is shown in a cross-sectional view. The beam is on the left, and the column flange is on the right. The beam is connected to the column flange using two rows of bolts. The top row of bolts is labeled "2 - 5/8\" bolts w/std. steel washers (On back side) and lock nuts or jam nuts". The bottom row of bolts is labeled "6 - 7/8\" bolts w/std. steel washers and lock nuts or jam nuts". The beam is shown with a top flange and a web. The column flange is shown with a top flange and a web. The bolts are shown passing through the beam flange and the column flange. The bolts in the top row are shown passing through the top flange of the beam and the top flange of the column. The bolts in the bottom row are shown passing through the bottom flange of the beam and the bottom flange of the column. The bolts are shown in a staggered pattern. The diagram also shows the beam's web and the column's web. The beam's web is on the left, and the column's web is on the right. The beam's web is connected to the column's web using a gusset plate. The gusset plate is shown on the left side of the beam's web. The gusset plate is connected to the beam's web using bolts. The gusset plate is also connected to the column's web using bolts. The diagram shows the beam's web and the column's web in a cross-sectional view. The beam's web is on the left, and the column's web is on the right. The beam's web is connected to the column's web using a gusset plate. The gusset plate is shown on the left side of the beam's web. The gusset plate is connected to the beam's web using bolts. The gusset plate is also connected to the column's web using bolts. The diagram shows the beam's web and the column's web in a cross-sectional view. The beam's web is on the left, and the column's web is on the right. The beam's web is connected to the column's web using a gusset plate. The gusset plate is shown on the left side of the beam's web. The gusset plate is connected to the beam's web using bolts. The gusset plate is also connected to the column's web using bolts.

### MODIFIED STIRRUP PAIR

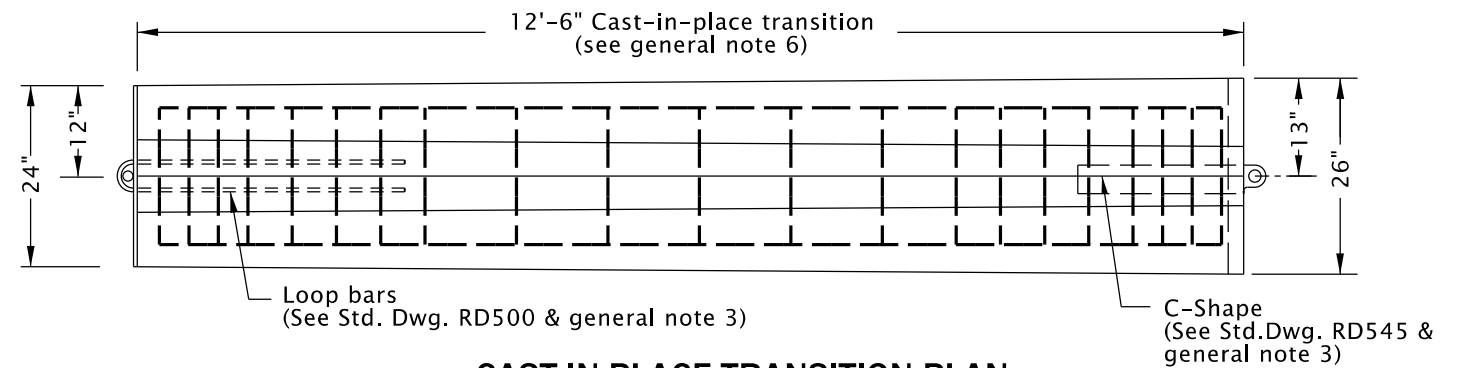
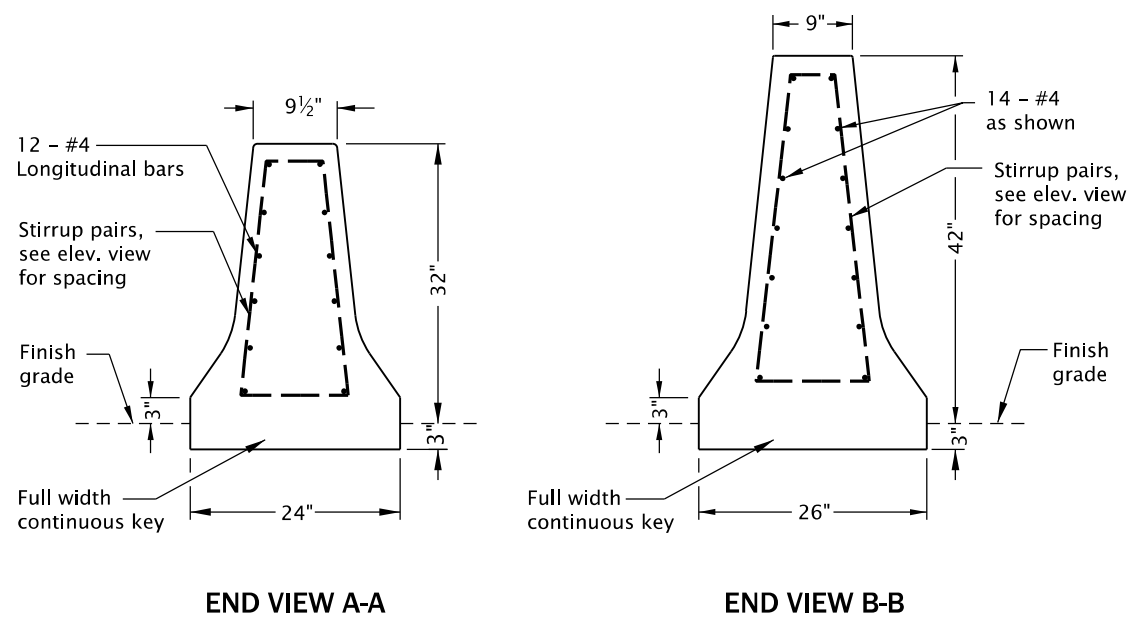
1. All reinforcing bars shall be full length as shown and shall be 2" clear of the nearest face of concrete unless shown otherwise.
2. See Std. Dwgs. RD400, RD405, RD410, RD415, RD417, RD500, RD505 & BR203, for details not shown.
3. For trailing end guardrail connection see Std. Dwg. BR236, Detail A.
4. If trench method is used to install posts, ensure compaction according to 00810.41, 2nd paragraph.
5. See Std. Dwg. RD516 for securing concrete barrier to roadway.
6. Narrow base shoulder barrier to be used only at locations with backfill behind barrier as shown on plans.
7. All pins, bolts, dowels, loop bars, and connectors shall be hot-dip galvanized after fabrication.

CALC. BOOK NO. _____	N/A	SDR DATE _____	14-JAN-2022
<p><i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i></p>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<h1>OREGON STANDARD DRAWINGS</h1> <h2>GUARDRAIL TRANSITION TO CONCRETE BARRIER</h2> <h3>2021</h3>	
		DATE	REVISION DESCRIPTION
		12-2021	REVISED NOTES

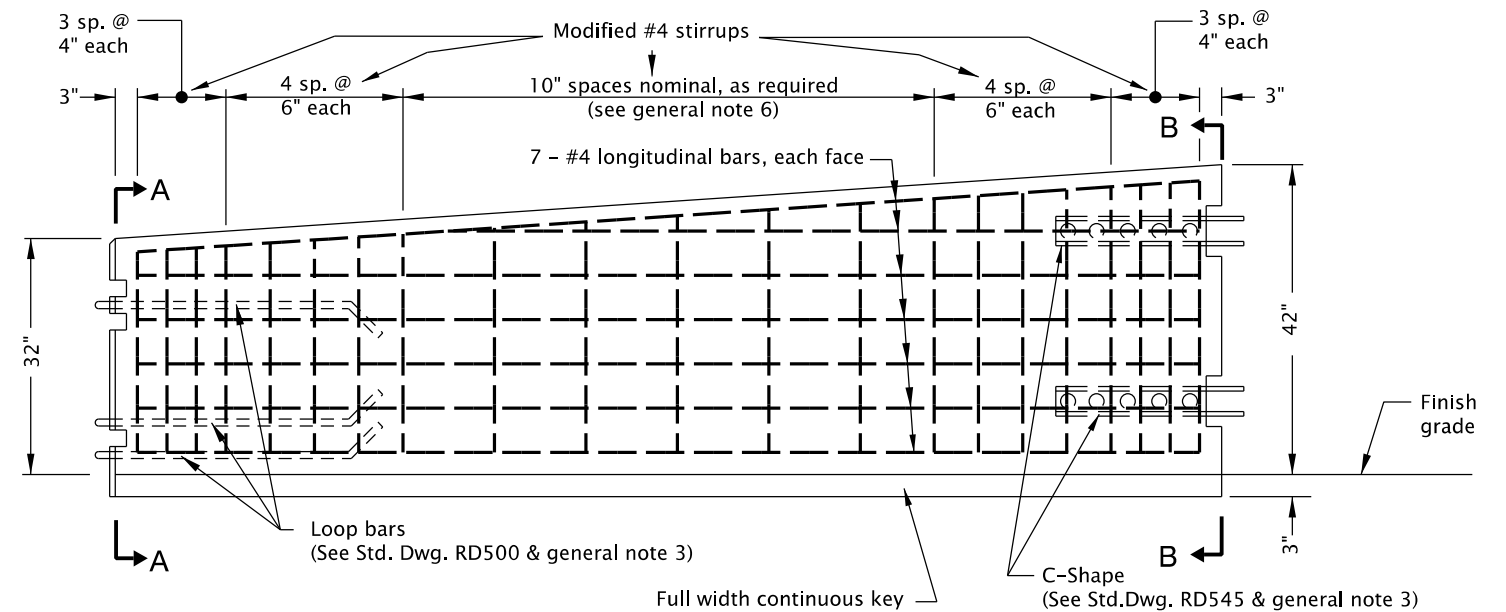


### MODIFIED #4 STIRRUPS

(Dimensions shown will be variable throughout transition from A-A to B-B. See general note 6)



### CAST-IN-PLACE TRANSITION PLAN



### CAST-IN-PLACE TRANSITION ELEVATION

#### GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. All reinforcing bars shall be full length as shown and shall be placed 1 1/2" clear of the nearest face of concrete unless shown otherwise.
2. Chamfer all edges 3/4".
3. Field verify end configurations of connecting barriers prior to forming connections at transitions. Dowelled connection is an acceptable alternative. See Std. Dwg. RD505 for details not shown.
4. See Std. Dwgs. RD500, RD505 & RD545 for details not shown.
5. All pins, bolts, dowels, loop bars, and connectors shall be hot-dip galvanized after fabrication.
6. Normal length for cast-in-place transition is 12'-6". Site conditions may require varying lengths between 6'-3" and 18"-9". Field verify transition length and end configurations of connecting barriers.

CALC. BOOK NO. N/A

SDR DATE 14-JAN-2022

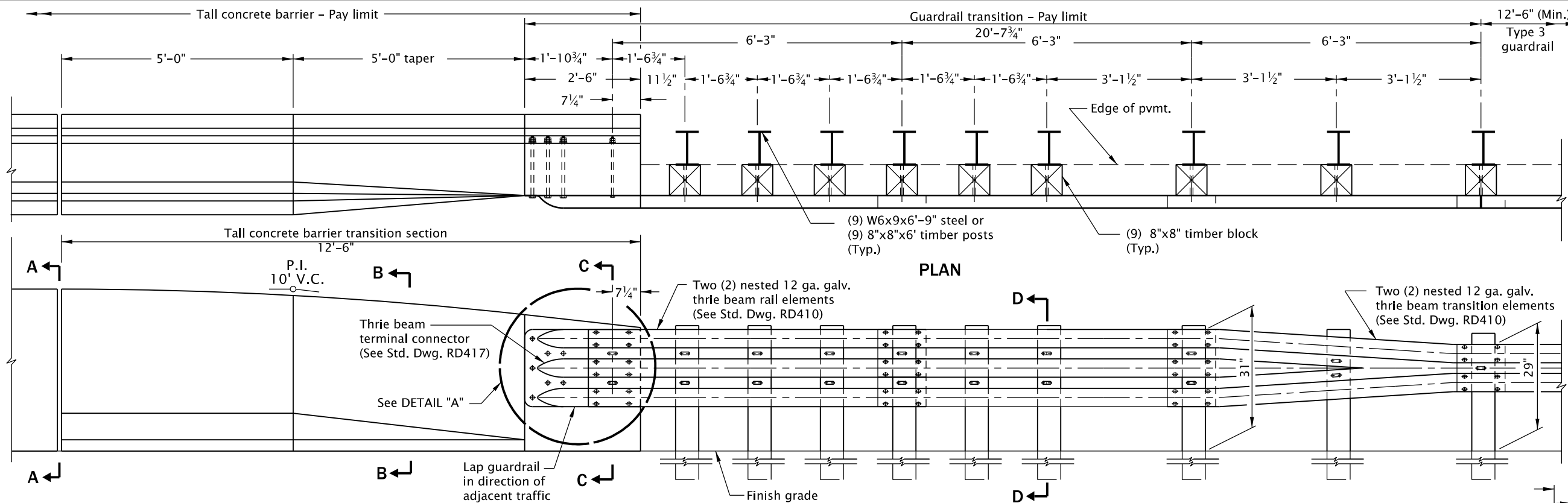
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

**OREGON STANDARD DRAWINGS**  
**CAST-IN-PLACE**  
**TALL CONCRETE BARRIER**  
**TRANSITION TO**  
**STANDARD CONCRETE BARRIER**  
2021

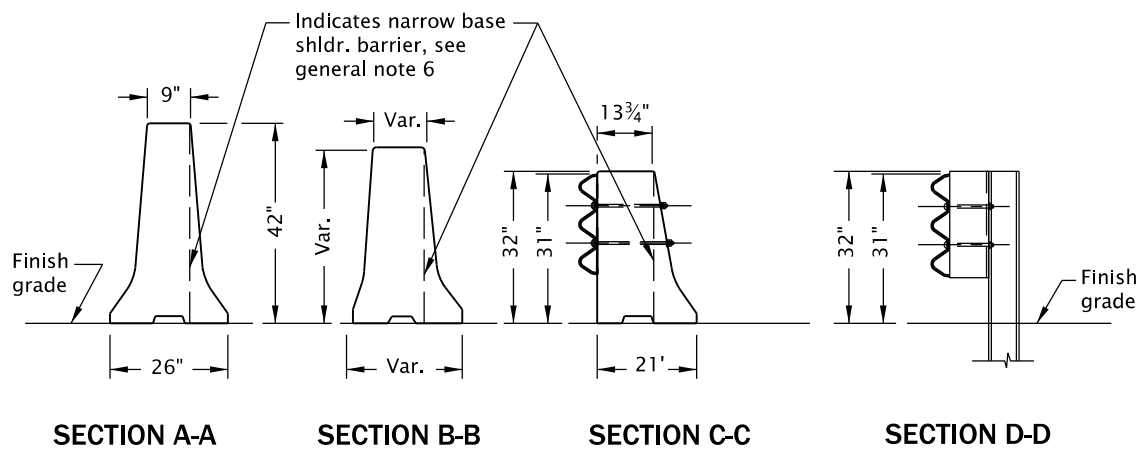
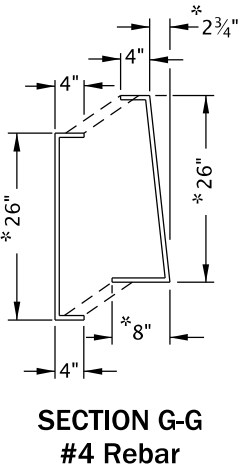
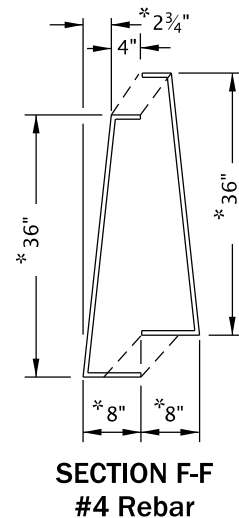
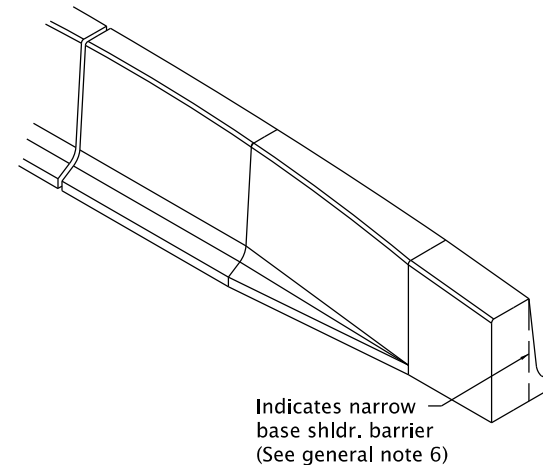
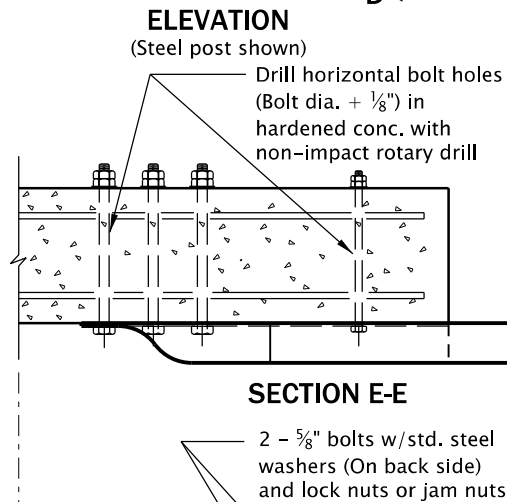
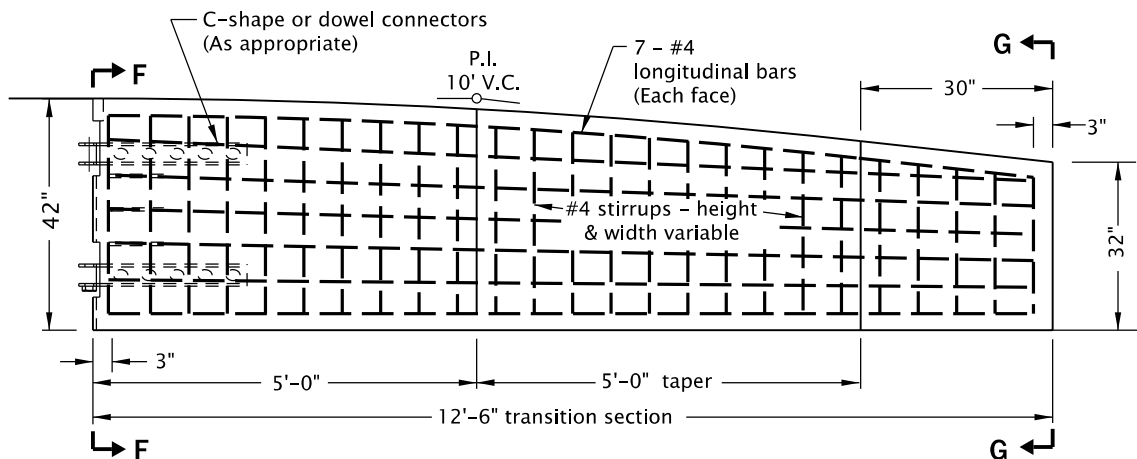
DATE	REVISION	DESCRIPTION
12-2021	REVISED NOTES	

rd570.dgn 14-JAN-2022

RD570



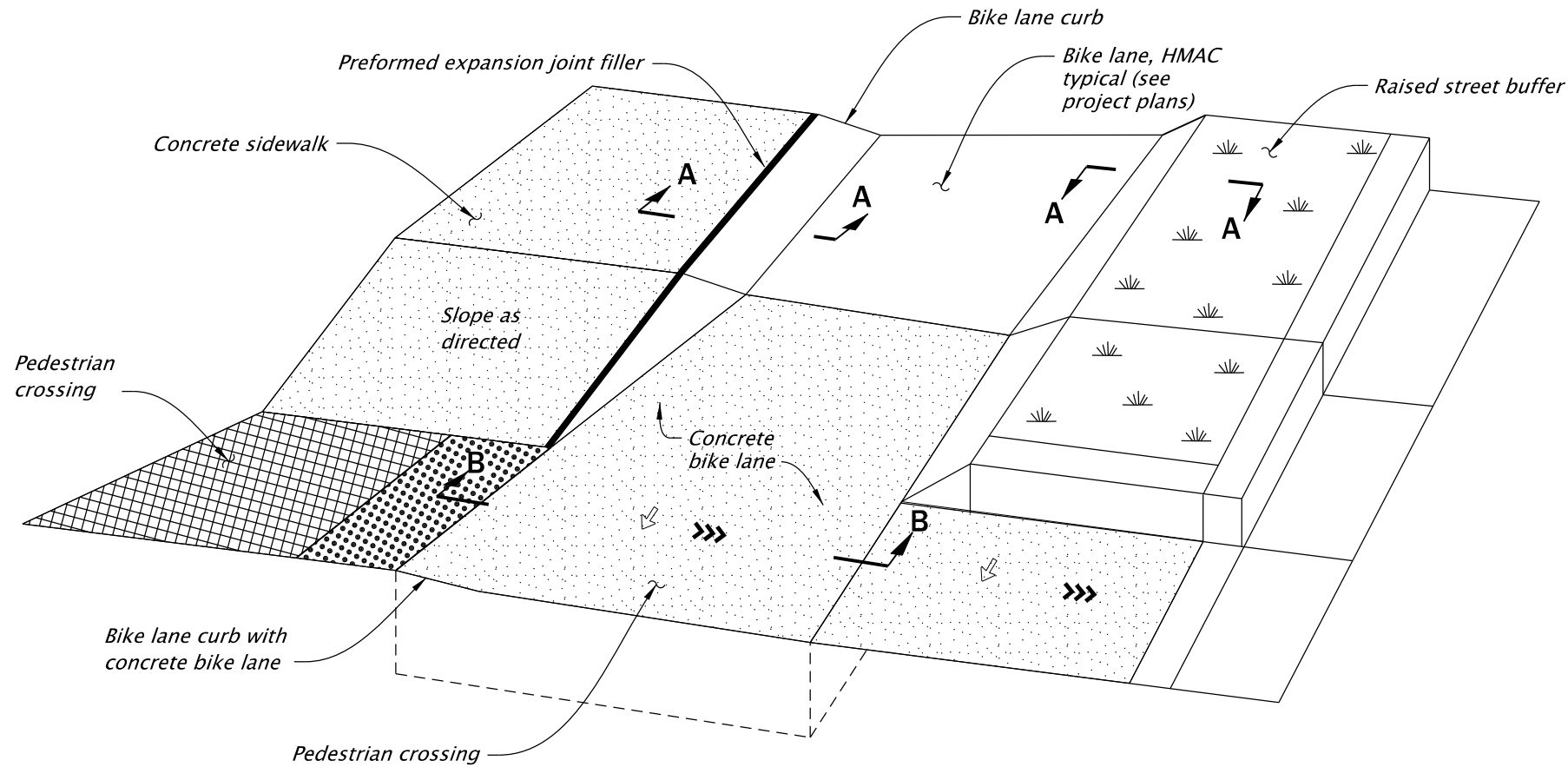
- GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:**
1. All reinforcing bars shall be full length as shown and shall be 2" clear of the nearest face of conc. unless shown otherwise.
  2. See Std. Dwgs. RD400, RD405, RD410, RD415, RD417 & RD545 for details not shown.
  3. For trailing end guardrail connection, see Std. Dwg. BR236, Detail A.
  4. If trench method is used to install posts, ensure compaction according to 00810.41 2nd paragraph.
  5. See Std. Dwg. RD516 for securing concrete barrier to roadway.
  6. Narrow base shldr. barrier to be used only at locations with backfill behind barrier as shown on plans.
  7. All pins, bolts, dowels, loop bars, and connectors shall be hot-dip galvanized after fabrication.



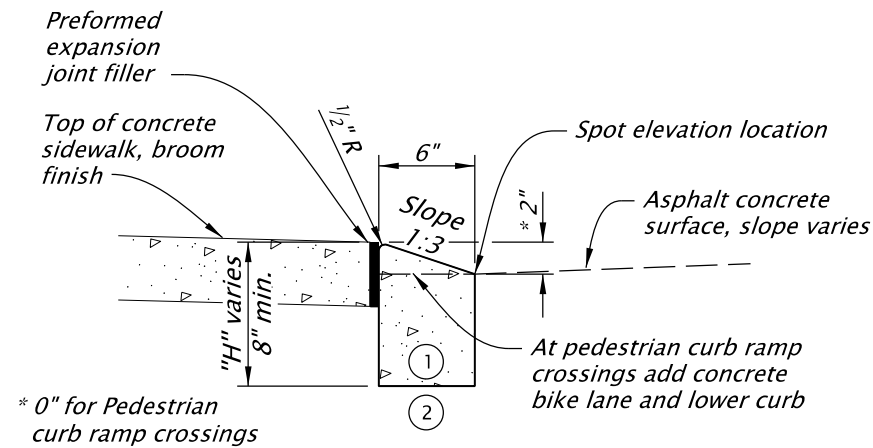
6 - 7/8" bolts w/std. steel washers and lock nuts or jam nuts

**NOTE:**  
THIS DRAWING IS RETAINED FOR TEMPORARY INSTALLATION AND MAINTENANCE PURPOSES ONLY.  
DO NOT USE FOR NEW PERMANENT INSTALLATIONS.

CALC. BOOK NO. <b>N/A</b>		SDR DATE <b>14-JAN-2022</b>	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>GUARDRAIL TRANSITION TO TALL CONCRETE BARRIER</b>	
		2021	
		DATE 12-2021	REVISION DESCRIPTION REVISED NOTES

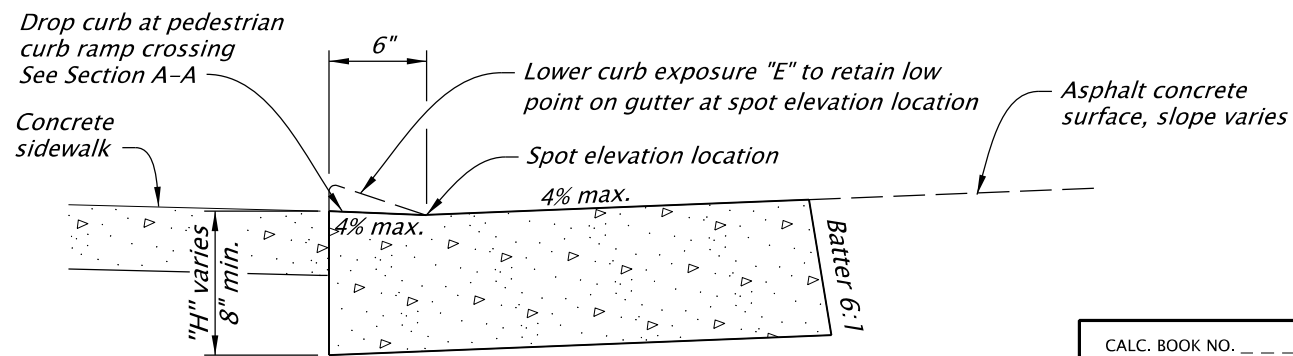


**BIKE LANE CURB WITH CONCRETE BIKE LANE  
ISOMETRIC VIEW**



**SECTION A-A  
BIKE LANE CURB**  
(Where shown on plans)

- ① Control joints cut at 15' intervals, minimum 2" depth
- ② Place a minimum of 6" approved granular base at 95% MPD (3/4" Minus crushed granular)



**SECTION B-B  
BIKE LANE CURB WITH CONCRETE BIKE LANE**  
(Where shown on plans)

**GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:**

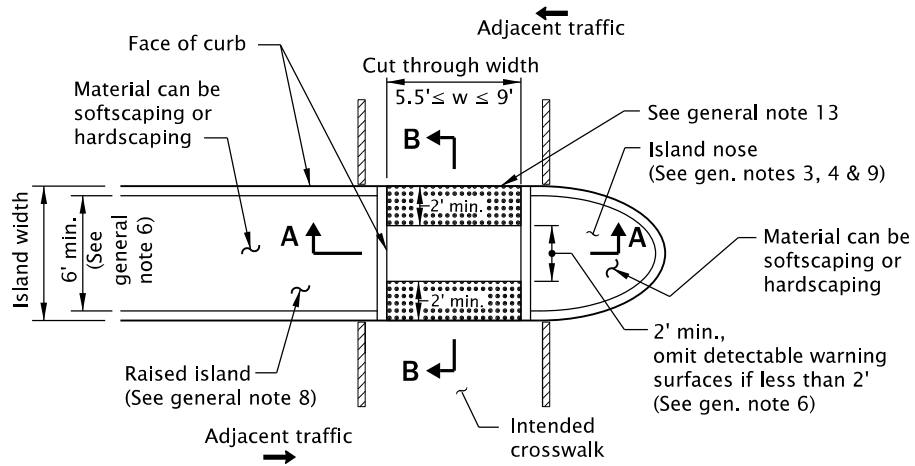
1. Bike Lane Curb details are based on applicable ODOT Standards.
2. Lower bike lane curb at all curb ramp pedestrian crossings.
3. Bike lane curb may continue across driveways or be lowered per curb ramps. See project plans.
4. On separated bike lanes (where bike lane is apart from road shoulder), gutter pan shall not end in bike lane.
5. On or along state highways, where curb and gutter is required at curb ramps, add concrete bike lane to bike lane curb at curb ramps and at inlets.
6. Omit preformed expansion joint filler at curb ramps and where landscaping is adjacent to curb.
7. Transition between curb styles to connect curbs of different exposures "E". Transition length shall be 3' for each 1" difference in "E" unless specified in project plans.
8. Check the gutter flow depth to assure that the design flood does not spread across more than 2-feet of the bike lane and does not overtop the back of sidewalk at curb ramps. Place inlet in curb at low points and at upstream side of curb ramps or perform other approved design mitigation. Transition to standard curb on each side of inlet by lowering bike lane. See dwg. no. RD367.
9. Dimensions adjacent to radii are measured to the point of intersection of curb surfaces.
10. See dwg. nos. RD720 and RD727 for monolithic curb and sidewalk details. See dwg. nos. RD900 series for curb ramp details. See dwg. no. RD1140 for layout of separated bike lane crossings details.

**LEGEND:**

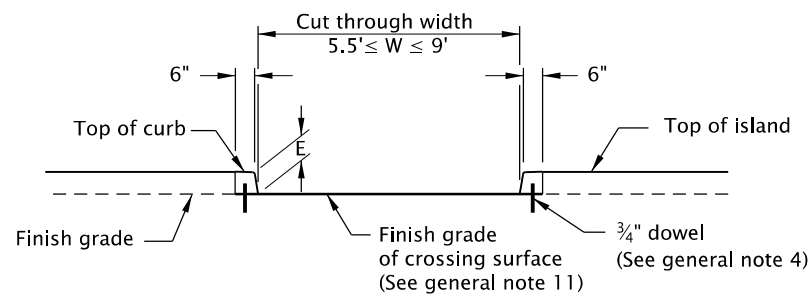
- Sidewalk or other traversable surface
- Detectable warning surface (DWS)
- Level area (turning space/landing)
- Running slope, 4.0% maximum.  
(Maximum 4.9% finished surface slope)
- Cross slope 1.5% maximum  
(Maximum 2.0% finished surface slope)

CALC. BOOK NO. <b>N/A</b>		SDR DATE <b>14-JAN-2022</b>	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>BIKE LANE CURBS</b>	
		2021	
		DATE	REVISION DESCRIPTION
		12-2021	NEW DRAWING CREATED

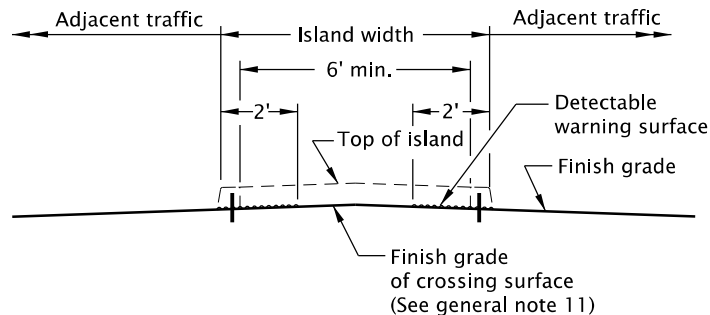




PLAN



SECTION A-A

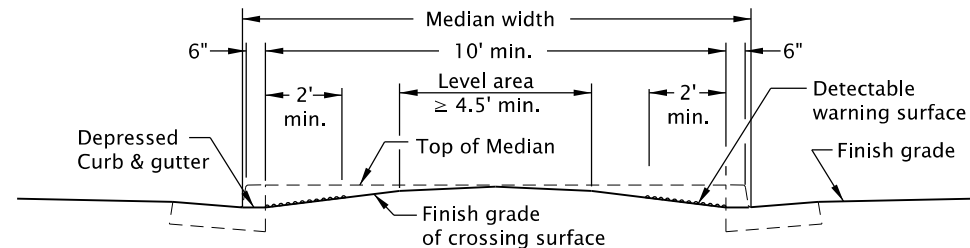


SECTION B-B  
MEDIAN ISLAND CROSSING  
(CUT THROUGH)  
(A.C. pavement shown)

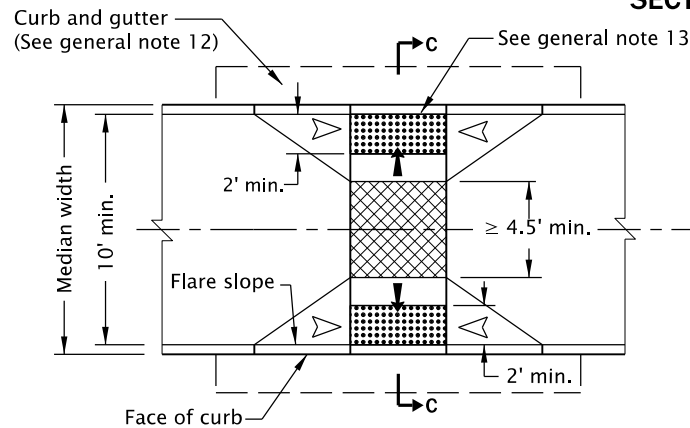
GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Accessible route islands are based on applicable ODOT Standards.
2. Place detectable warning surface at the back of curb for a minimum depth of 2 feet at curb ramp that is adjacent to traffic. For details not shown, see Std. Dwgs. RD902 through RD908.
3. The minimum area of islands that contain signal poles, pedestals, etc., shall be 75 square feet. Square feet to be measured to outer perimeter of entire island.
4. For cut through islands, dowel each island segment to the pavement with a minimum of two 3/4" diameter dowels. Dowel the nose section of the raised median island with a minimum of two 3/4" diameter dowels. Place dowels as directed. See Std. Dwg RD705.
5. Align curb ramps for lowered or partially lowered island and cut through island with the crosswalk.
6. Detectable warning surfaces shall be separated by a 2-foot minimum length of walkway without detectable warnings. Where no curb, the detectable warning surface shall be placed at the edge of roadway.

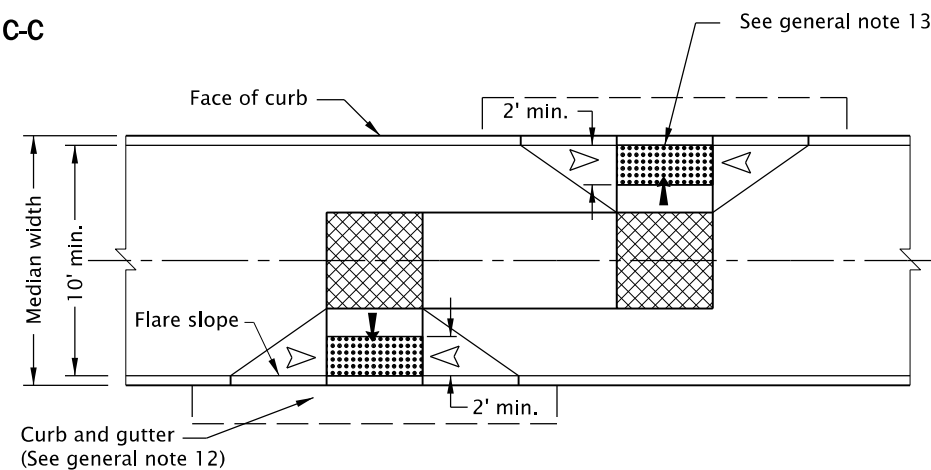
7. Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run. Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush.
8. Curb type and island width as shown on plans or as directed. Type A or Type CA islands are acceptable alternates, see Std. Dwg. RD705.
9. See project plans for details not shown. See Std. Dwg. RD707 for island nose treatment. See Std. Dwg. RD705 for expansion and contraction joint spacing. See Std. Dwgs. RD700, RD701, RD705 & RD706 for additional details. See TM Standard Drawings for signal pole, pedestrian pedestal, crosswalk markings, and related details.
10. Details intended for pedestrian route only. For multi-use path, see project plans for specific details.
11. When crossing surface grade is ≤ 5%, a level area is not required.
12. On or along state highways, curb and gutter is required at curb ramps.
13. Raised islands in crossings shall have accessible curb ramps at all crossings or all crossings shall be cut through with the street.



SECTION C-C

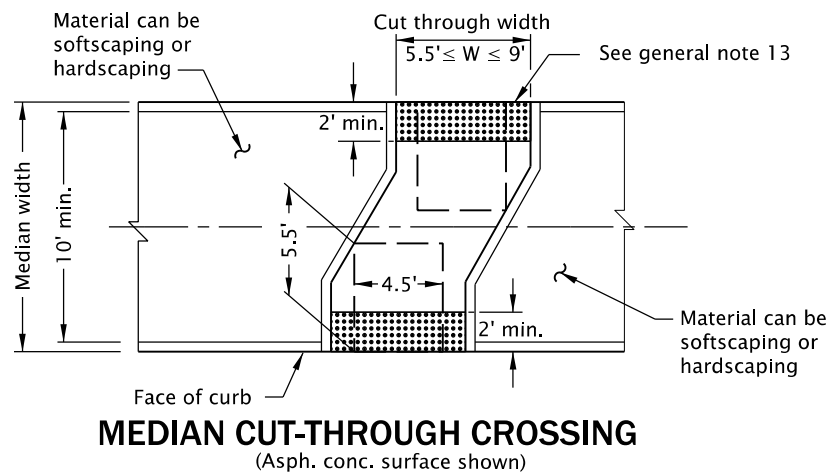


TYPE "A"



TYPE "B"

MEDIAN RAISED CROSSING  
(P.C. conc. surface shown)



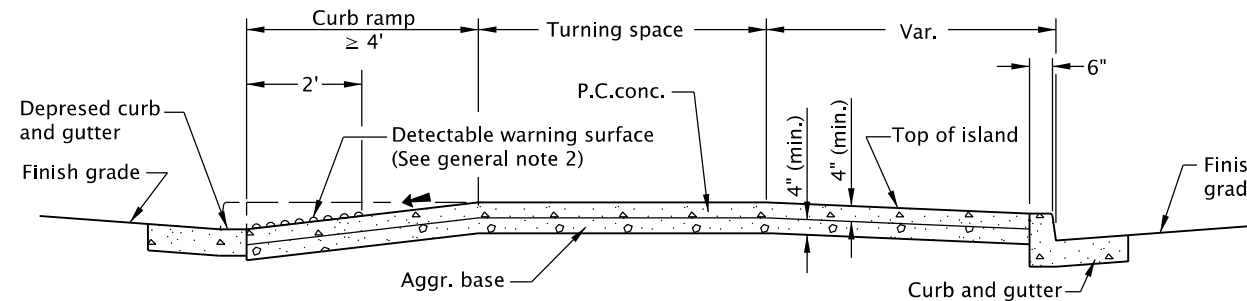
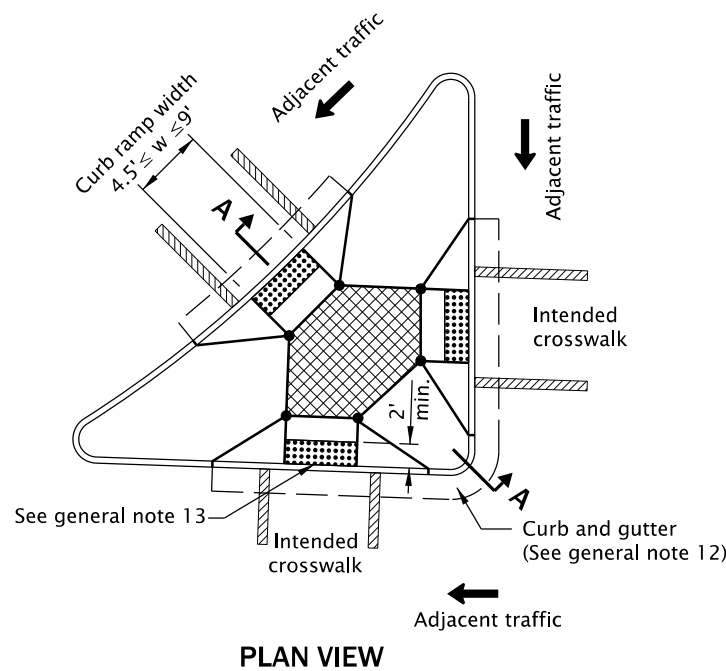
MEDIAN CUT-THROUGH CROSSING  
(Asph. conc. surface shown)

LEGEND:

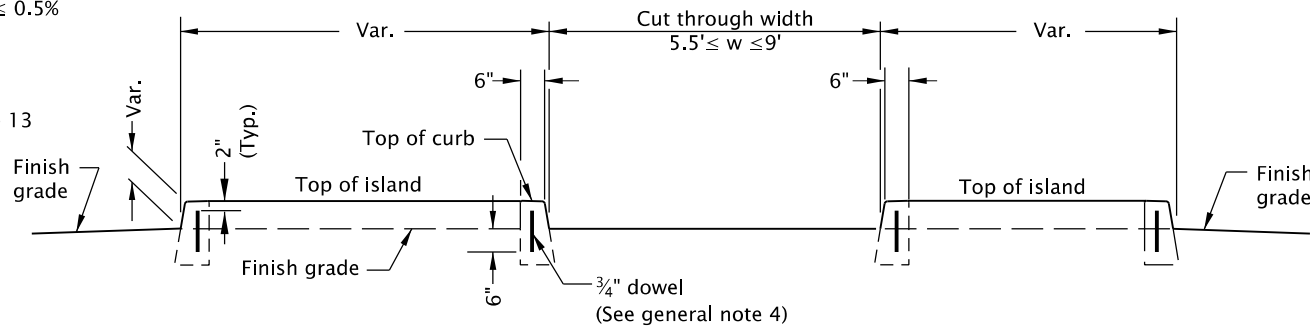
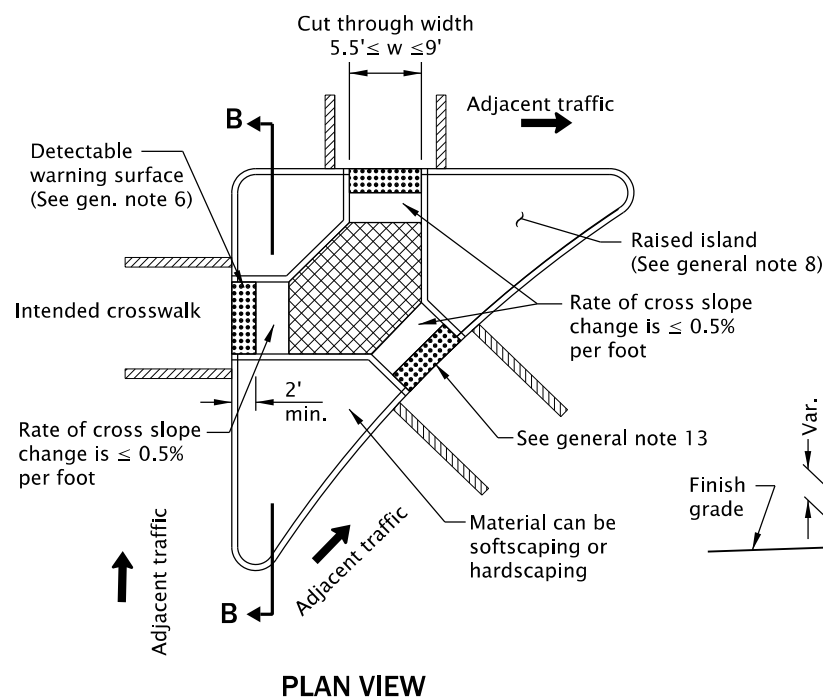
- Marked or intended crossing location
- Level area (Turning space/landing)  
Unobstructed 4.5' x 4.5'  
With obstruction 4.5' x 5.5' (Longer dimension in direction of pedestrian street crossing). For the purposes of this application, a max. 2.0% finished surface slope (for drainage) is considered level.
- Detectable warning surface
- Cross slope 1.5% max.  
(Max. 2.0% finished surface slope)
- Running slope 7.5% max.  
(Max. 8.3% finished surface slope)
- Flare slope  
(Max. 10.0% finished surface slope)
- Zero curb exposure
- Clear space 4.5' x 5.5'  
(Longer dimension in direction of pedestrian street crossing)

CALC. BOOK NO. <b>N/A</b>	SDR DATE <b>14-JAN-2022</b>
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
<b>OREGON STANDARD DRAWINGS</b>	
<b>ACCESSIBLE ROUTE ISLANDS</b>	
2021	
DATE	REVISION DESCRIPTION
07-2021	REVISED DETAILS AND NOTES
11-2021	REVISED NOTES

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*



SECTION A-A  
PARTIALLY LOWERED ISLAND DETAIL  
(Use perpendicular curb ramp inspection form)









RAISED RIGHT TURN CHANNELIZATION ISLAND

SECTION B-B  
CUT THROUGH ISLAND DETAIL

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Accessible route islands are based on applicable ODOT Standards.
2. Place detectable warning surface at the back of curb for a minimum depth of 2' at curb ramp that is adjacent to traffic. For details not shown, see Std. Dwgs. RD902 through RD908.
3. The min. area of islands that contain signal poles, pedestals, etc., shall be 75 sq. ft. Square feet to be measured to outer perimeter of entire island.
4. For cut through islands dowel each island segment to the pvmt. with a min. of 2, 3#4" dia. dowels. Dowel the nose section of the raised median island with a minimum of 2, 3#4" dia. dowels. Place dowels as directed. See Std. Dwg RD705.
5. Align curb ramps for lowered or partially lowered island and cut through island with the crosswalk.
6. Detectable warning surfaces shall be separated by a 2.0 ft minimum length of walkway without detectable warnings. Where no curb, the detectable warning surface shall be placed at the edge of roadway.
7. Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run. Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush.
8. Curb type and island width as shown on plans or as directed.  
Type A or Type CA islands are acceptable alternates, see Std. Dwg. RD705.
9. See project plans for details not shown.  
See Std. Dwg. RD707 for island nose treatment.  
See Std. Dwg. RD705 for expansion and contraction joint spacing.  
See Std. Dwgs. RD700, RD701, RD705 & RD706 for additional details.  
See TM Standard Drawings for signal pole, pedestrian pedestal, crosswalk markings, and related details.
10. Details intended for pedestrian route only. For multi-use path, see project plans for specific details.
11. When crossing surface grade is  $\leq 5\%$ , a level area is not required.
12. On or along state highways, curb and gutter is required at curb ramps.
13. Raised islands in crossings shall have accessible curb ramps at all crossings or all crossings shall be cut through with the street.

LEGEND:

-  Marked or intended crossing location
-  Level area (Turning space/landing)  
Unobstructed 4.5' x 4.5'  
With obstruction 4.5' x 5.5' (Longer dimension in direction of pedestrian street crossing).  
For the purposes of this application, a max. 2.0% finished surface slope (for drainage) measured perpendicular in two directions is considered level.
-  Detectable warning surface
-  Cross slope 1.5% max.  
(Max. 2.0% finished surface slope)
-  Running slope 7.5% max.  
(Max. 8.3% finished surface slope)
-  Zero curb exposure

CALC. BOOK NO. **N/A**

SDR DATE **14-JAN-2022**

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

ACCESSIBLE ROUTE  
CHANNELIZED ISLANDS











2021

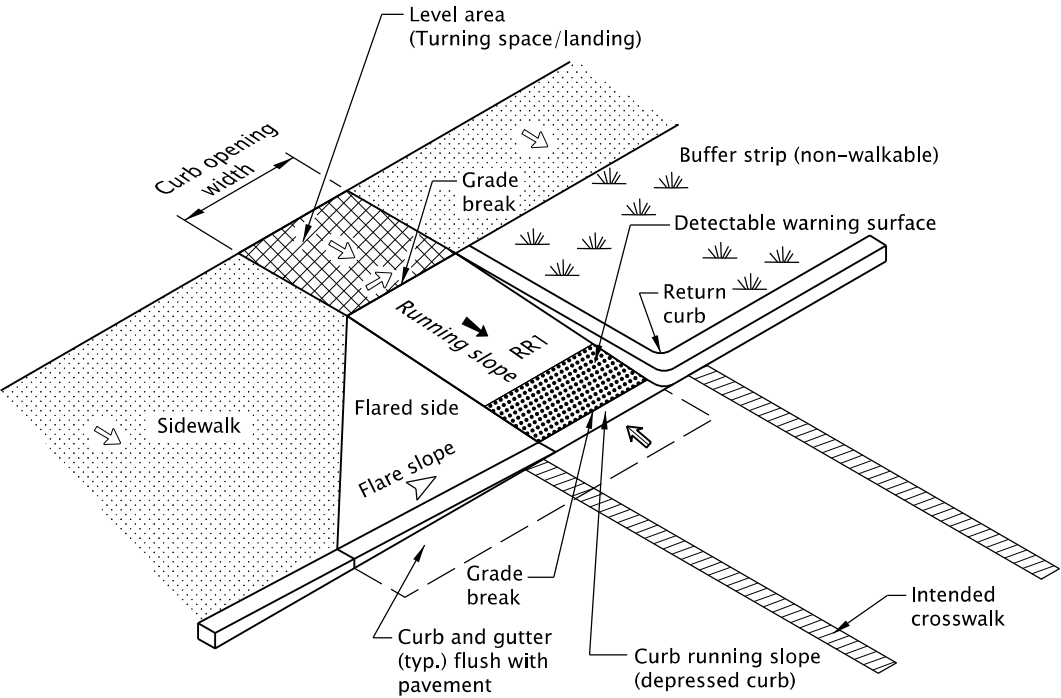
DATE	REVISION DESCRIPTION
07-2020	DRAWING CREATED
07-2021	REVISED NOTES
11-2021	REVISED NOTES

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*

CURB RAMP INDEX

STD. DWG. NO.	STD. DWG. TITLE
RD900	Curb Ramp Components And Legend
RD901	Curb Ramp Legend And Corner Identification
RD902	Detectable Warning Surface Details
RD904	Detectable Warning Surface Placement For Curb Ramps
RD905	Detectable Warning Surface Placement For Directional Curbs
RD906	Detectable Warning Surface Placement For Accessible Route Island
RD908	Detectable Warning Surface Placement
RD909	Detectable Guide Strip Placement At Bike Ramps
RD910, RD912	Perpendicular Curb Ramp
RD913	Perpendicular Curb Ramp With Closure
RD916	Perpendicular Curb Ramp Single Ramp
RD920	Parallel Curb Ramp
RD922	Parallel Curb Ramp Single Ramp
RD930, RD932 & RD936	Combination Curb Ramp
RD938	Combination Curb Ramp Single Ramp
RD940	Blended Transition Curb Ramp Single Ramp
RD950 & RD952	End Of Walk Curb Ramp
RD960	Unique Curb Ramp

LEGEND:	
	Marked or intended crossing location
	Sidewalk or other traversable surface
	Detectable warning surface (DWS)
	Level area (Turning space/landing)
	Cross slope 1.5% max. (Max. 2.0% finished surface slope) (Normal sidewalk cross slope)
	Running slope 4.0% max. (Max. 4.9% finished surface slope)
	Running slope 7.5% max. (Max. 8.3% finished surface slope)
	Counter slope 4.0% max, ascending or descending (Max. 5.0% finished surface slope) Slope as required for drainage
	Flare slope (Max. 10.0% finished surface slope)
	4'x4' clear space
RR1	Ramp Run Position 1

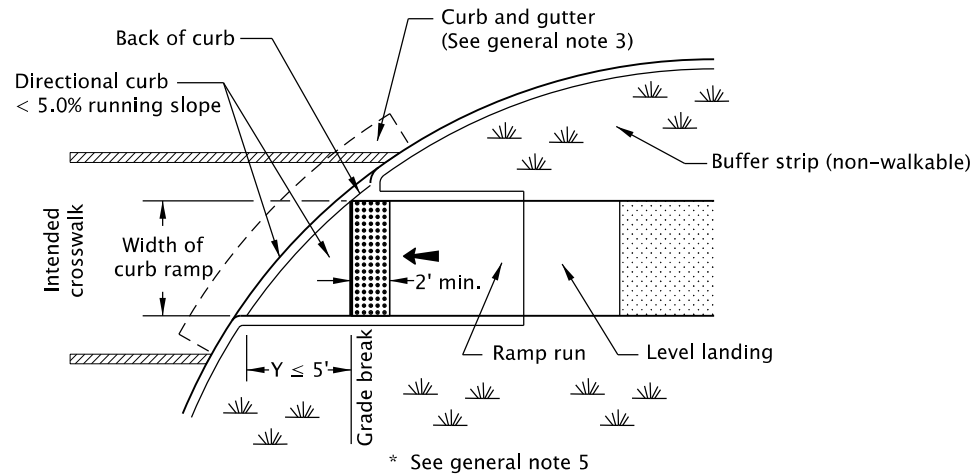


TYPICAL CURB RAMP SYSTEM COMPONENTS  
(PERPENDICULAR TYPE SHOWN)

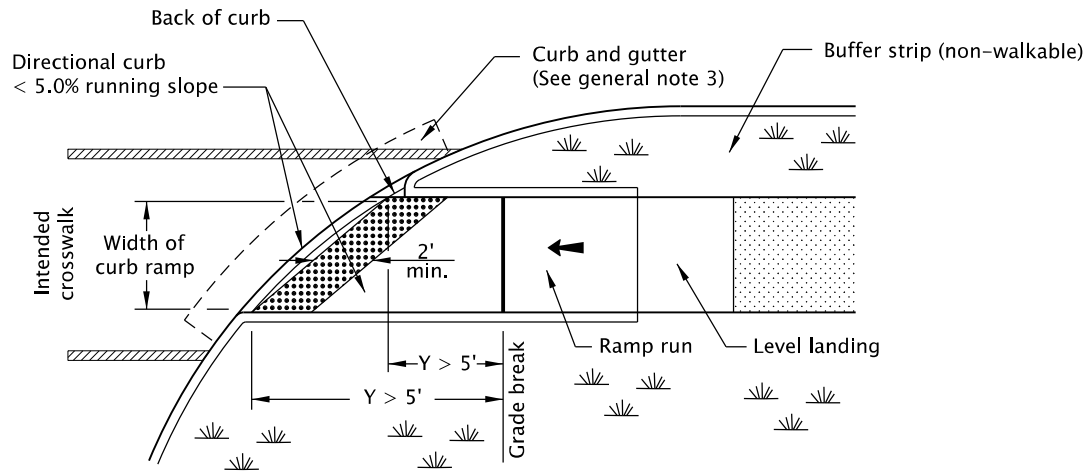
CALC. BOOK NO. <b>N/A</b>		SDR DATE <b>14-JAN-2022</b>	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>CURB RAMP COMPONENTS AND LEGEND</b>	
		2021	
		DATE	REVISION DESCRIPTION
		07-2020	DRAWING CREATED
		07-2021	REVISED DETAILS AND NOTES
		01-2022	REVISED LEGEND

rd905.dgn 14-JAN-2022

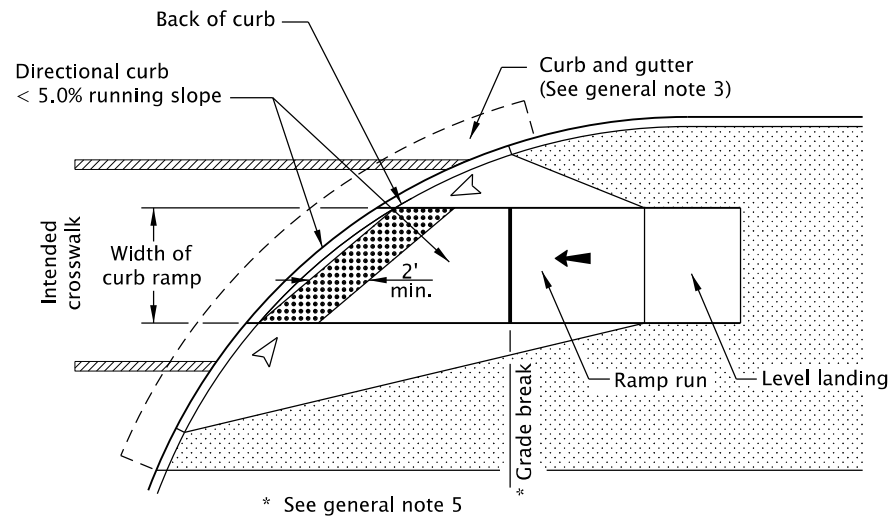
RD905



**CURB RAMP CROSSING**  
**GRADE BREAK ≤ 5 FT. FROM BACK OF CURB**



**CURB RAMP CROSSING**  
**GRADE BREAK > 5 FT. FROM BACK OF CURB**








**CURB RAMP CROSSING**  
**DIRECTIONAL CURB WITH FLARED CONSTRUCTION**

**GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:**

1. Detectable warning surface details & locations are based on applicable ODOT Standards.
2. See project plans for details not shown.  
See Std. Dwgs. RD700 & RD701 for curbs.  
See Std. Dwg. RD902 for detectable warning surface installation details.
3. On or along state highways, curb and gutter is required at curb ramps.
4. Detectable warning surface placement for perpendicular ramps vary as shown.
5. Detectable warning surface placement across the grade break is prohibited.

**LEGEND:**

-  Marked or intended crossing location
-  Sidewalk
-  Detectable warning surface
-  Running slope 7.5% max.  
(Max. 8.3% finished surface slope)
-  Flare slope  
(Max. 10.0% finished surface slope)

CALC. BOOK NO. **N/A**

SDR DATE **14-JAN-2022**

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*

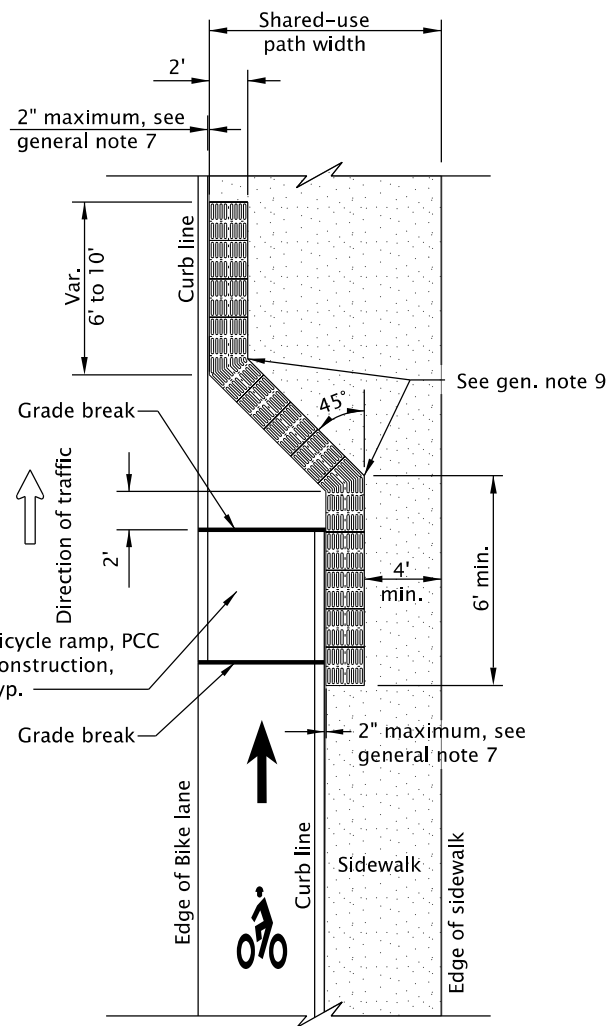
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

**OREGON STANDARD DRAWINGS**  
**DETECTABLE WARNING SURFACE**  
**PLACEMENT FOR**  
**DIRECTIONAL CURBS**

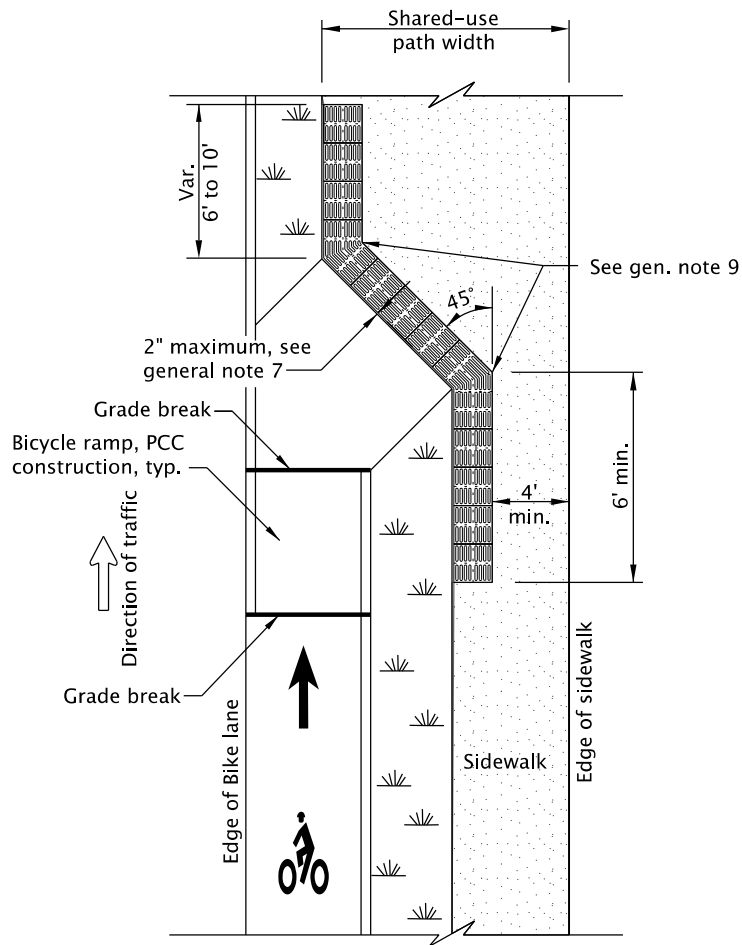
2021	
DATE	REVISION DESCRIPTION
07-2020	DRAWING CREATED
01-2022	REVISED NOTES

rd909.dgn 14-JAN-2022

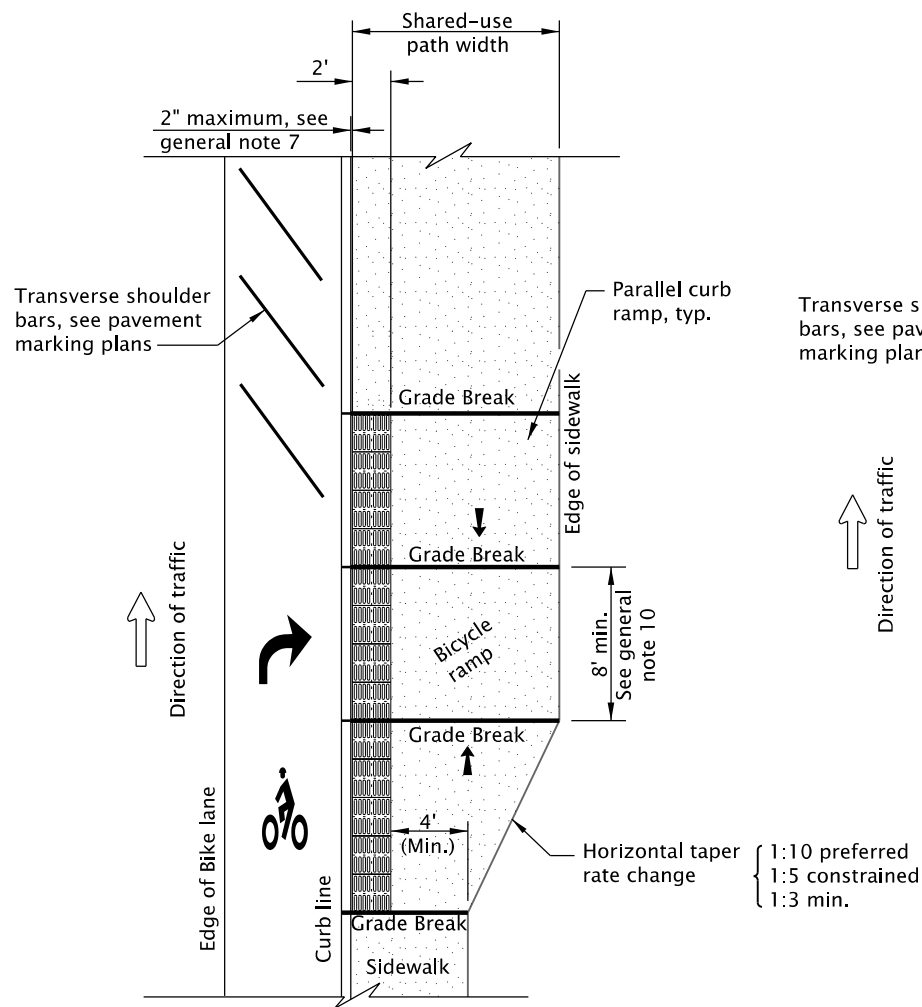
RD909



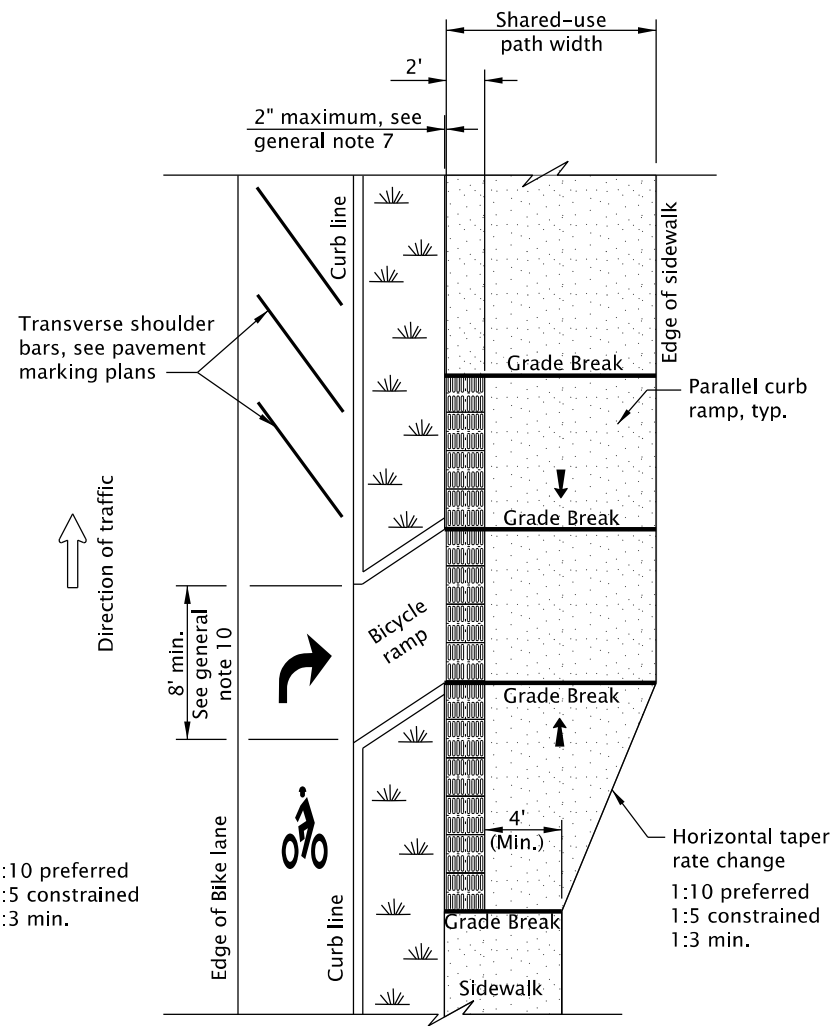
**OPTION "BR-1"**  
**BICYCLE LANE DROP TO CURB LINE SIDEWALK**



**OPTION "BR-2"**  
**BICYCLE LANE DROP TO SEPARATED SIDEWALK**



**OPTION "BR-3"**  
**BICYCLE LANE PARALLEL RAMP APPROACH**



**OPTION "BR-4"**  
**BICYCLE LANE ANGLED RAMP APPROACH**

**LEGEND:**



Detectable guide strip



Sidewalk



Running slope 7.5% maximum  
(maximum 8.3% finished surface slope)

**GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:**

1. Bicycle ramp details are based on applicable ODOT Standards. If curb ramp serves both bicycles and pedestrians, do not use this drawing. See Std. Dwg. RD902.
2. See project plans for details not shown.  
See Std. Dwgs. RD700 and RD702 for curbs.  
See Std. Dwgs. RD720 & RD721 for sidewalks.  
See Std. Dwg. RD920 for parallel curb ramp details.  
See Std. Dwg. RD1140 for separated bike lanes.  
See Std. Dwg. TM500 for transverse shoulder bars details
3. Site conditions normally require a project specific design. See project plans for details not shown.
4. Curb ramps for shared use paths intersecting a roadway shall be full width of path, excluding flares.

5. Detectable guide strip color shall be blue if no color specified. Color shall be contrasting to the surrounding area, light on dark, or dark on light. Blue markings are reserved for accessibility features. Alternative colors require a design exception on or along state highways.
6. Agency review and approval required for detectable guide strip products.
7. Detectable guide strip shall be placed a maximum of 2-inches from the edge of the sidewalk.
8. Place abutting panels within 1/4-inch of each other and install anchors, as specified by manufacturers, along cut edge.
9. Miter panels at 45 degree angle. Detectable guide strips may be cut to meet necessary shape as shown.
10. When a curb ramp is used to provide bicycle access from a roadway to a sidewalk, the curb ramp opening will be  $\geq$  8' wide.

CALC. BOOK NO. **N/A**

SDR DATE **14-JAN-2022**

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

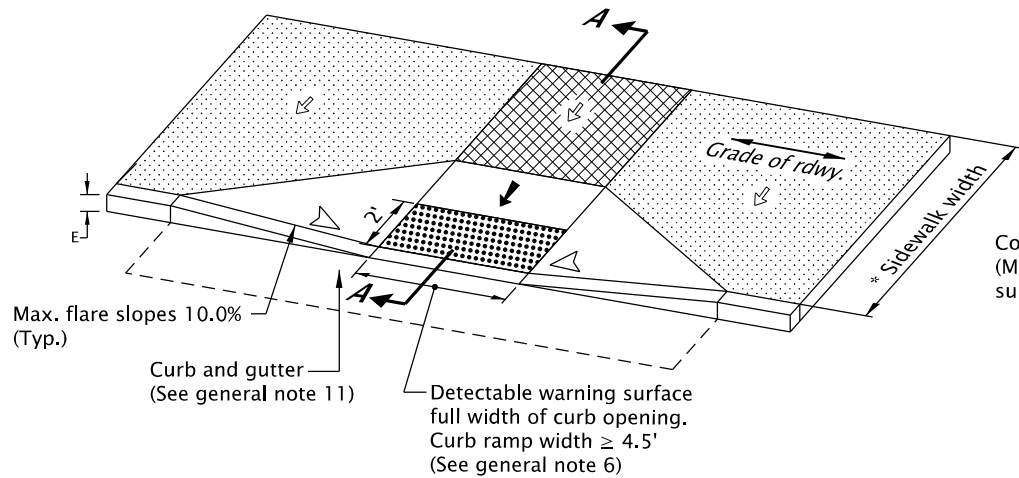
**OREGON STANDARD DRAWINGS**  
**DETECTABLE GUIDE STRIP**  
**PLACEMENT AT BIKE RAMPS**

2021

DATE	REVISION	DESCRIPTION
12-2021	NEW DRAWING CREATED	

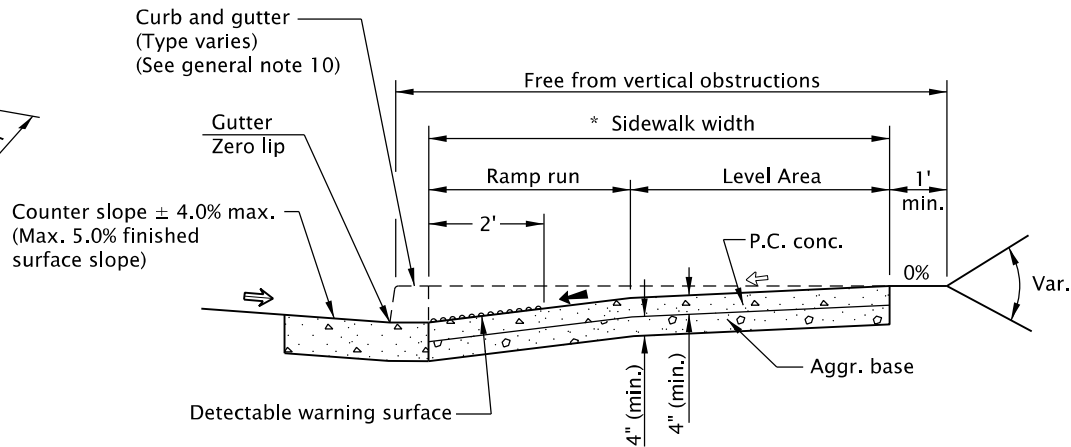
Effective Date: June 1, 2022 – November 30, 2022

RD909



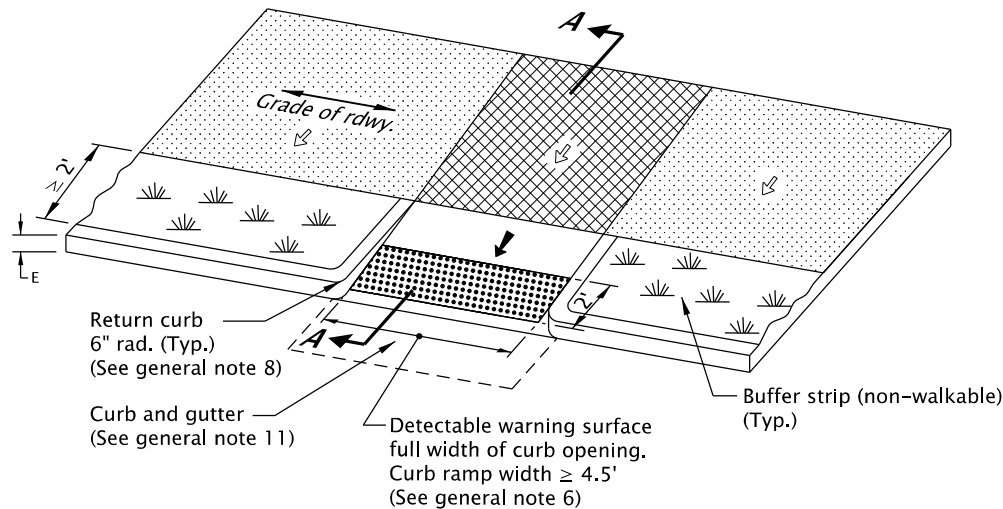
### PERPENDICULAR CURB RAMP DETAIL

(Use "Parallel Curb Ramp Detail" or "Combination Curb Ramp Detail" when reqd. turning space cannot be obtained)

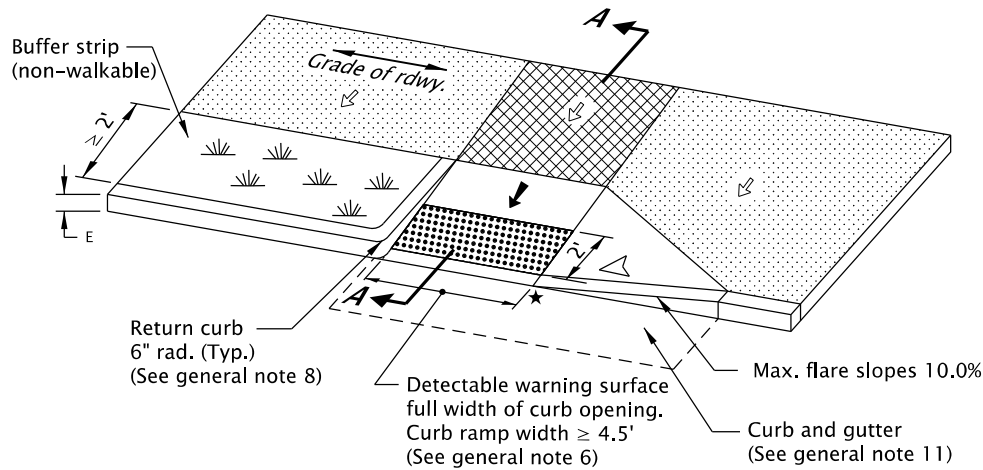


### SECTION A-A

\* NOTE: Minimum width of 14.25 feet sidewalk for E=7"



### THROUGH BUFFER STRIP



### WITH SINGLE FLARE

#### GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Curb ramp details are based on applicable ODOT Standards.
2. See Std. Dwg. RD700 & RD701 for curbs.  
See Std. Dwg. RD720 & RD721 for sidewalks.  
See Std. Dwg. RD902 through RD908 for detectable warning surface installation details.  
See Std. Dwg. RD912 through RD916 for curb ramp placement options.
3. Site conditions normally require a project specific design. See project plans for details not shown.
4. Tooled dummy joints are required at all curb ramp grade break lines, (see Std. Dwg. RD722).
5. Curb ramp slopes shown are relative to the true level horizon (zero bubble).
6. Place detectable warning surface at the back of curb for a minimum depth of 2' in the direction of pedestrian travel full width of curb ramp opening that is adjacent to traffic.
7. Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run. Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush.
8. Return curb may be provided in lieu of flared slope only if protected from traverse travel by landscaping, see Std. Dwg. RD721. Return curb shall not reduce width of approaching sidewalk.
9. Curb ramps for shared use paths intersecting a roadway shall be full width of path, excluding flares. When a curb ramp is used to provide bicycle access from a roadway to a sidewalk, the curb ramp opening will be  $\geq 8'$  wide, (see Std. Dwg. RD909 for additional details).
10. Place an inlet at upstream side of curb ramp or perform other approved design mitigation. Check the gutter flow depth at curb ramp locations to assure that the design flood does not overtop the back of sidewalk.
11. On or along state highways, curb and gutter is required at curb ramps.

#### LEGEND:

- Sidewalk
- Detectable warning surface
- Level area (Turning space/landing)  
Unobstructed 4.5' x 4.5'  
With obstruction 4.5' x 5.5' (Longer dimension in direction of pedestrian street crossing).  
For the purposes of this application, a max. 2.0% finished surface slope (for drainage) measured perpendicular in two directions is considered level.
- Cross slope 1.5% max.  
(Max. 2.0% finished surface slope)  
(Normal sidewalk cross slope)
- Running slope 7.5% max.  
(Max. 8.3% finished surface slope)
- Counter slope 4.0% max. ascending or descending,  
(Max. 5.0% finished surface slope)  
Slope as required for drainage
- Flare slope  
(Max. 10% finished surface slope)

CALC. BOOK NO. **N/A**

SDR DATE **14-JAN-2022**

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

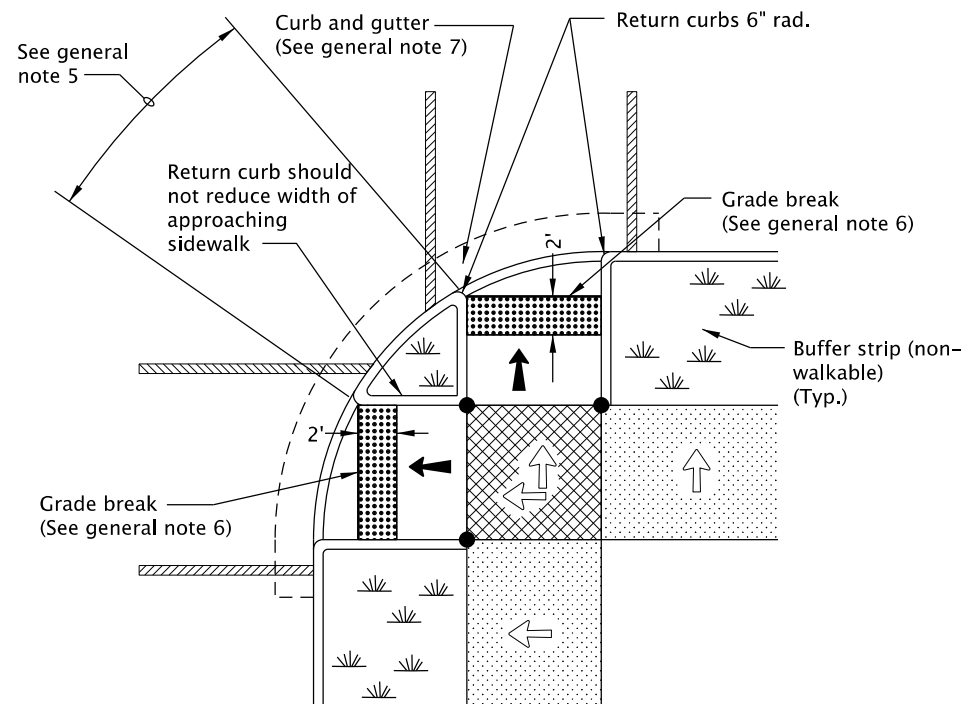
### OREGON STANDARD DRAWINGS

### PERPENDICULAR CURB RAMP

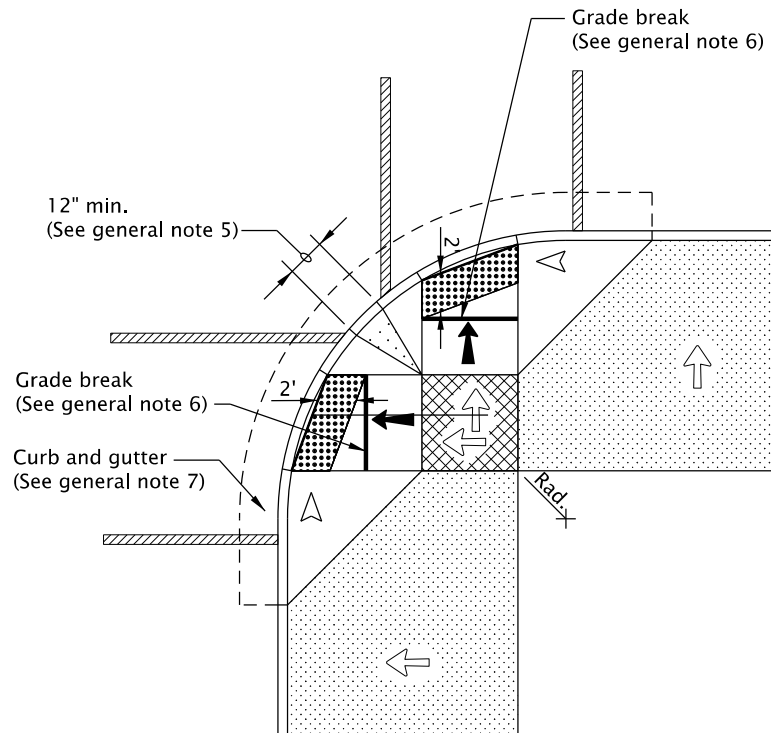
2021

DATE	REVISION	DESCRIPTION
07-2020	DRAWING CREATED	
01-2022	REVISED NOTES	

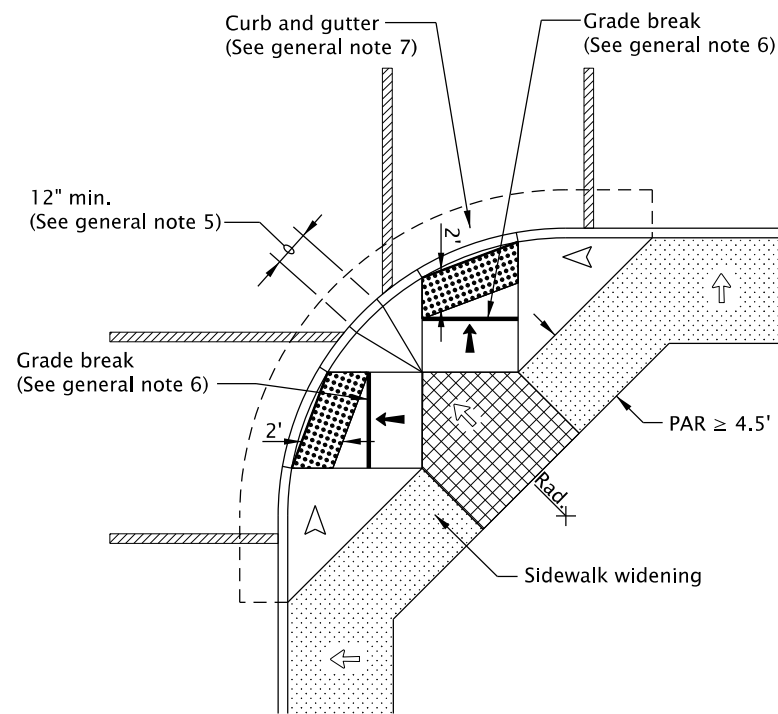
*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*



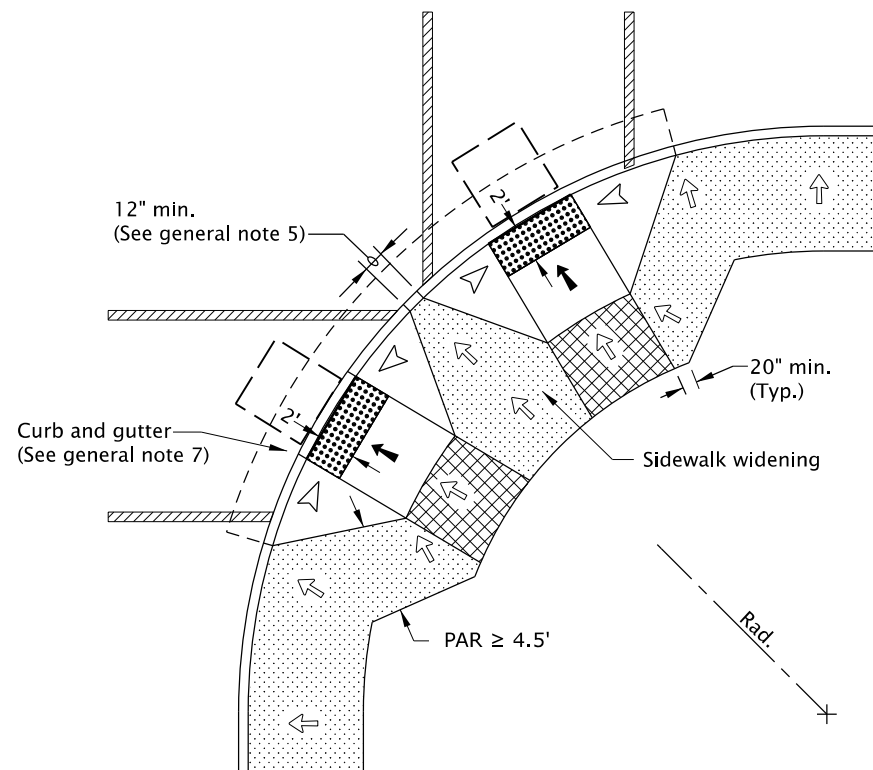
**WITH LANDSCAPED BUFFER STRIP  
OPTION "PR-1"**



**FOR WIDE SIDEWALKS  
OPTION "PR-2"**



**FOR NARROW SIDEWALKS  
OPTION "PR-3"**



**FOR NARROW SIDEWALKS  
OPTION "PR-4"**

**GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:**

1. Curb ramp details are based on applicable ODOT Standards.
2. See project plans for details not shown.  
See Std. Dwgs. RD700 & RD701 for curbs.  
See Std. Dwgs. RD720 & RD721 for sidewalks.  
See Std. Dwg. RD910 for perpendicular curb ramp details.  
See Std. Dwgs. RD902 through RD908 for detectable warning surface installation details.
3. Tooled dummy joints are required at all curb ramp grade break lines, (see Std. Dwg. RD722).
4. Curb ramp slopes shown are relative to the true level horizon (zero bubble).
5. When 2 curb ramps are immediately adjacent, the curb exposure (E) between the adjacent side flares may range between 3" and full design exposure.
6. Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run. Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush.
7. On or along state highways, curb and gutter is required at curb ramps.

**LEGEND:**

	Marked or intended crossing location
	Sidewalk
	Detectable warning surface
	Level area (Turning space/landing) Unobstructed 4.5' x 4.5' With obstruction 4.5' x 5.5' (Longer dimension in direction of pedestrian street crossing). For the purposes of this application, a max. 2.0% finished surface slope (for drainage) measured perpendicular in two directions is considered level.
	Cross slope 1.5% max. (Max. 2.0% finished surface slope) (Normal sidewalk cross slope)
	Running slope 7.5% max. (Max. 8.3% finished surface slope)
	Flare slope (Max. 10% finished surface slope)
	Zero curb exposure
	4' x 4' clear space
PAR	Pedestrian Access Route

CALC. BOOK NO. **N/A**

SDR DATE **14-JAN-2022**

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

**OREGON STANDARD DRAWINGS**

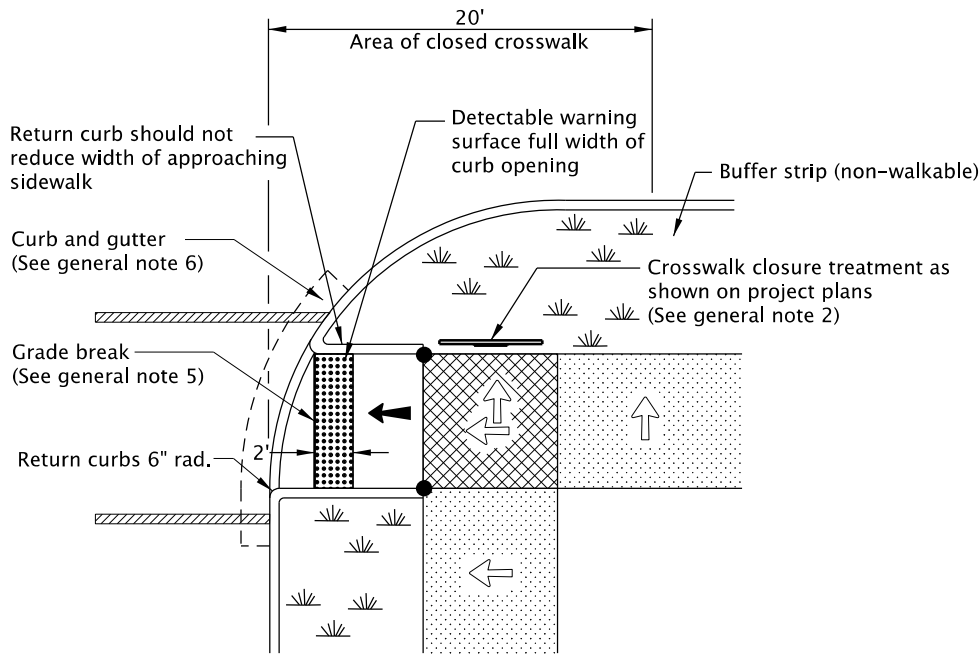
**PERPENDICULAR CURB RAMP**

2021

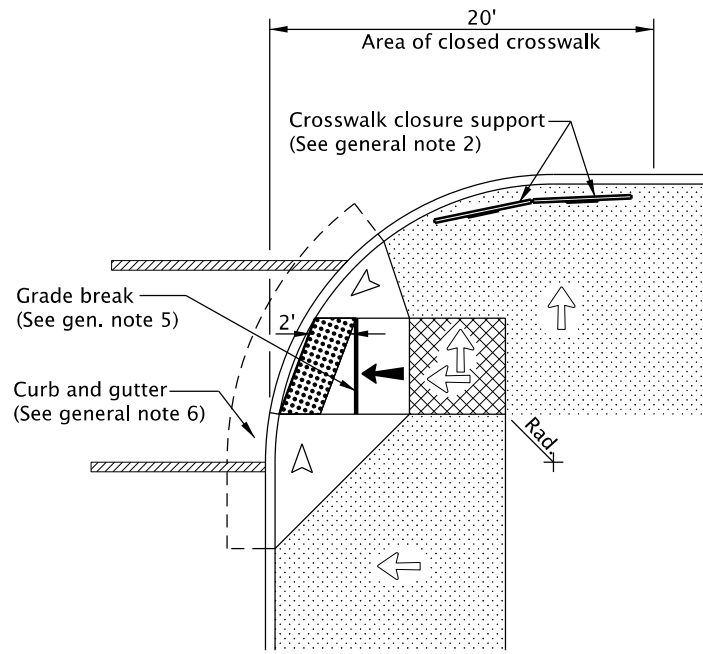
DATE	REVISION	DESCRIPTION
07-2020	DRAWING CREATED	
07-2021	REVISED DETAIL AND NOTES	
01-2022	REVISED DETAILS AND NOTES	

rd913.dgn 14-JAN-2022

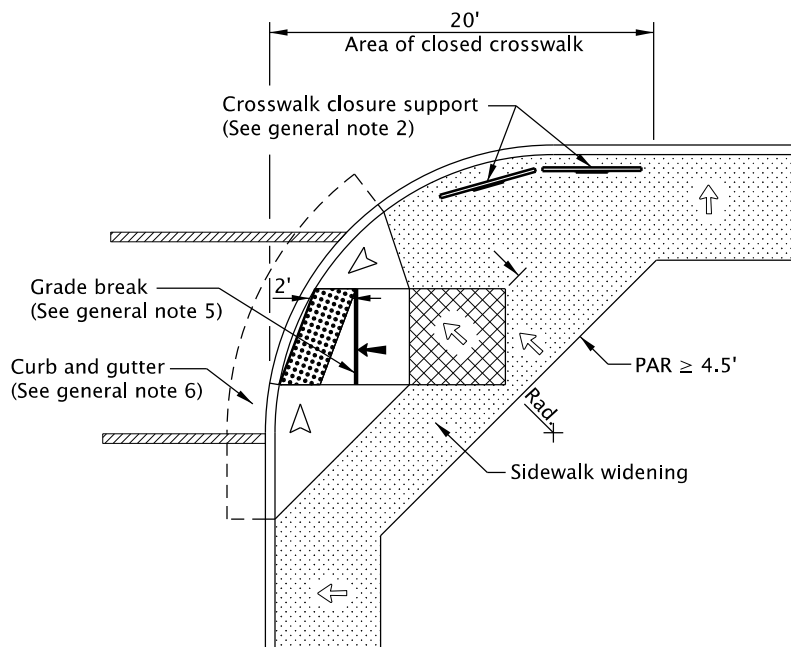
RD913



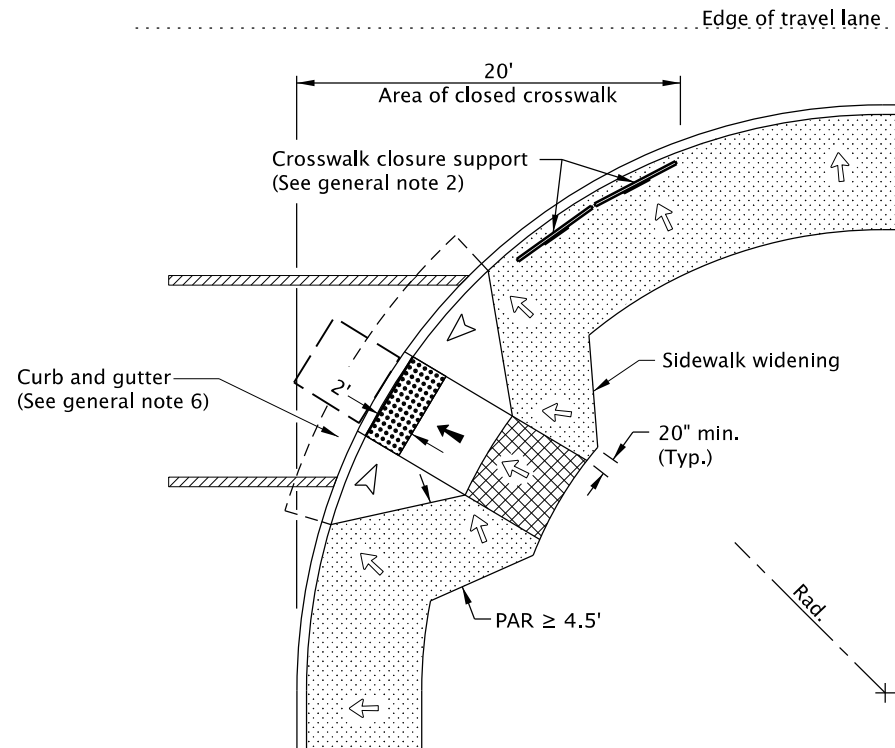
**CROSSWALK CLOSURE WITH LANDSCAPE BUFFER STRIP  
OPTION "PR-5"**



**CROSSWALK CLOSURE FOR WIDE SIDEWALK  
OPTION "PR-6"**



**CROSSWALK CLOSURE FOR NARROW SIDEWALK  
OPTION "PR-7"**



**CROSSWALK CLOSURE  
OPTION "PR-8"**

**GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:**

1. Curb ramp details are based on applicable ODOT Standards.
2. See project plans for details not shown.  
See Std. Dwgs. RD700 & RD701 for curbs.  
See Std. Dwgs. RD720 & RD721 for sidewalks.  
See Std. Dwg. RD910 for perpendicular curb ramp details.  
See Std. Dwgs. RD902 through RD908 for detectable warning surface installation details.  
See Std. Dwg. TM240 for crosswalk closure detail.
3. Tooled dummy joints are required at all curb ramp grade break lines, (see Std. Dwg. RD722).
4. Curb ramp slopes shown are relative to the true level horizon (zero bubble).
5. Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run. Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush.
6. On or along state highways, curb and gutter is required at curb ramps.

**LEGEND:**

- Marked or intended crossing location
- Sidewalk
- Detectable warning surface
- Level area (Turning space/landing)  
Unobstructed 4.5' x 4.5'  
With obstruction 4.5' x 5.5' (Longer dimension in direction of pedestrian street crossing).  
For the purposes of this application, a max. 2.0% finished surface slope (for drainage) measured perpendicular in two directions is considered level.
- Cross slope 1.5% max.  
(Max. 2.0% finished surface slope)  
(Normal sidewalk cross slope)
- Running slope 7.5% max.  
(Max. 8.3% finished surface slope)
- Flare slope  
(Max. 10% finished surface slope)
- Zero curb exposure
- 4' x 4' clear space
- PAR Pedestrian Access Route

CALC. BOOK NO. **N/A**

SDR DATE **14-JAN-2022**

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

**OREGON STANDARD DRAWINGS  
PERPENDICULAR CURB RAMP  
WITH CLOSURE**

2021

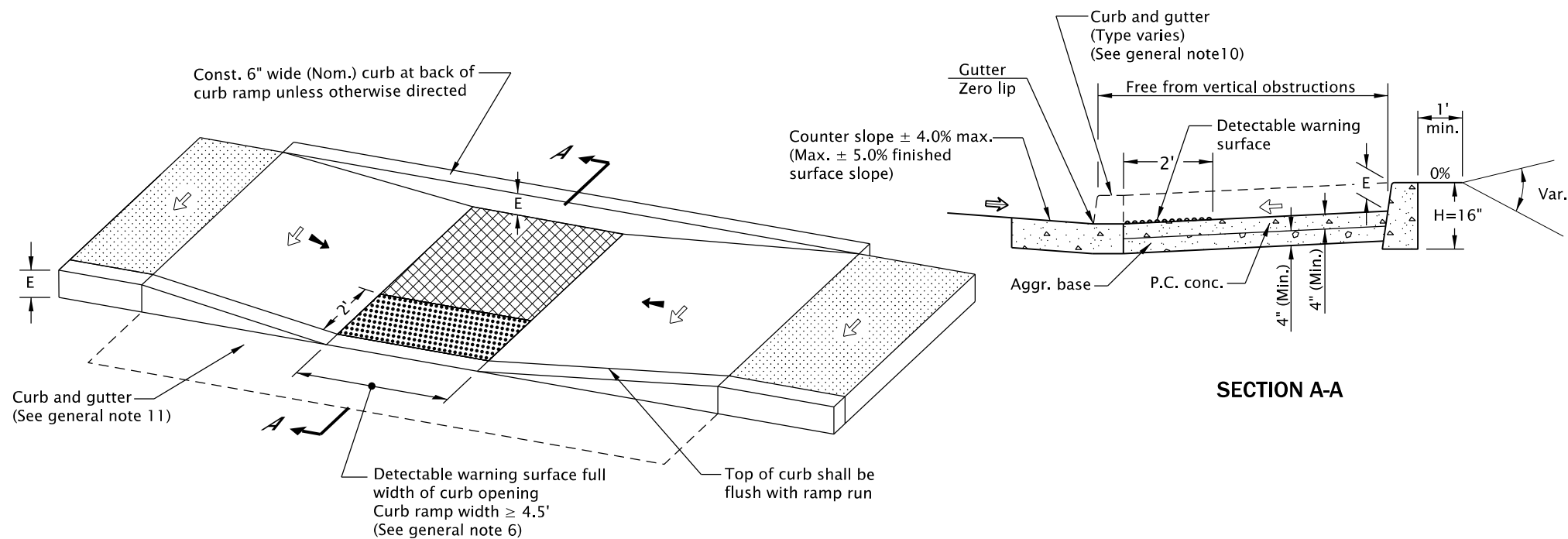
DATE	REVISION	DESCRIPTION
07-2020	DRAWING CREATED	
01-2022	REVISED DETAILS AND NOTES	

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*

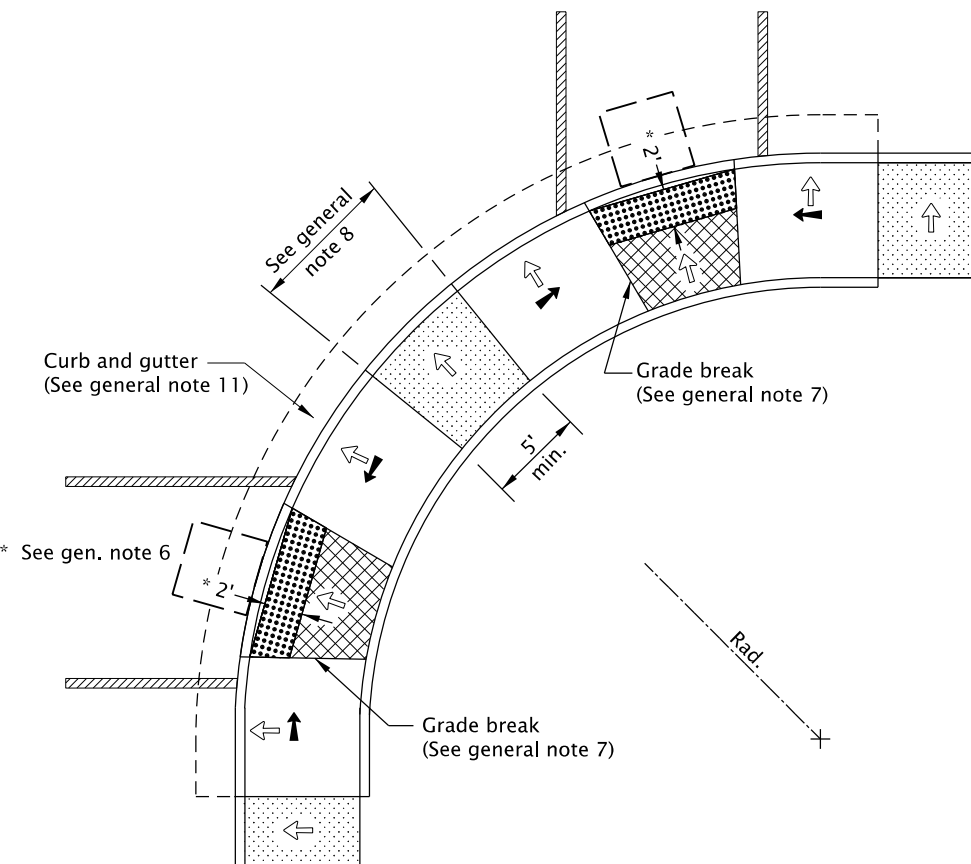
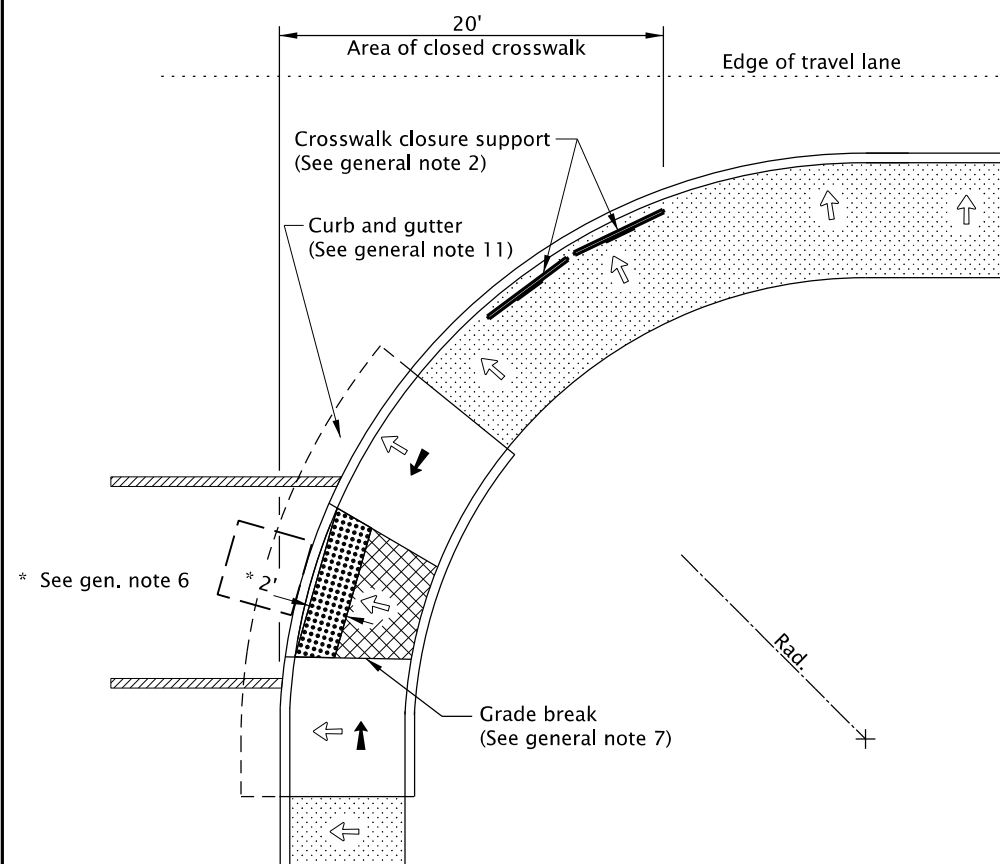
Effective Date: June 1, 2022 – November 30, 2022

RD913





PARALLEL CURB RAMP DETAIL

PARALLEL CURB RAMPS  
OPTION "PL-1"PARALLEL CURB RAMP WITH CROSSWALK CLOSURE  
OPTION "PL-2"

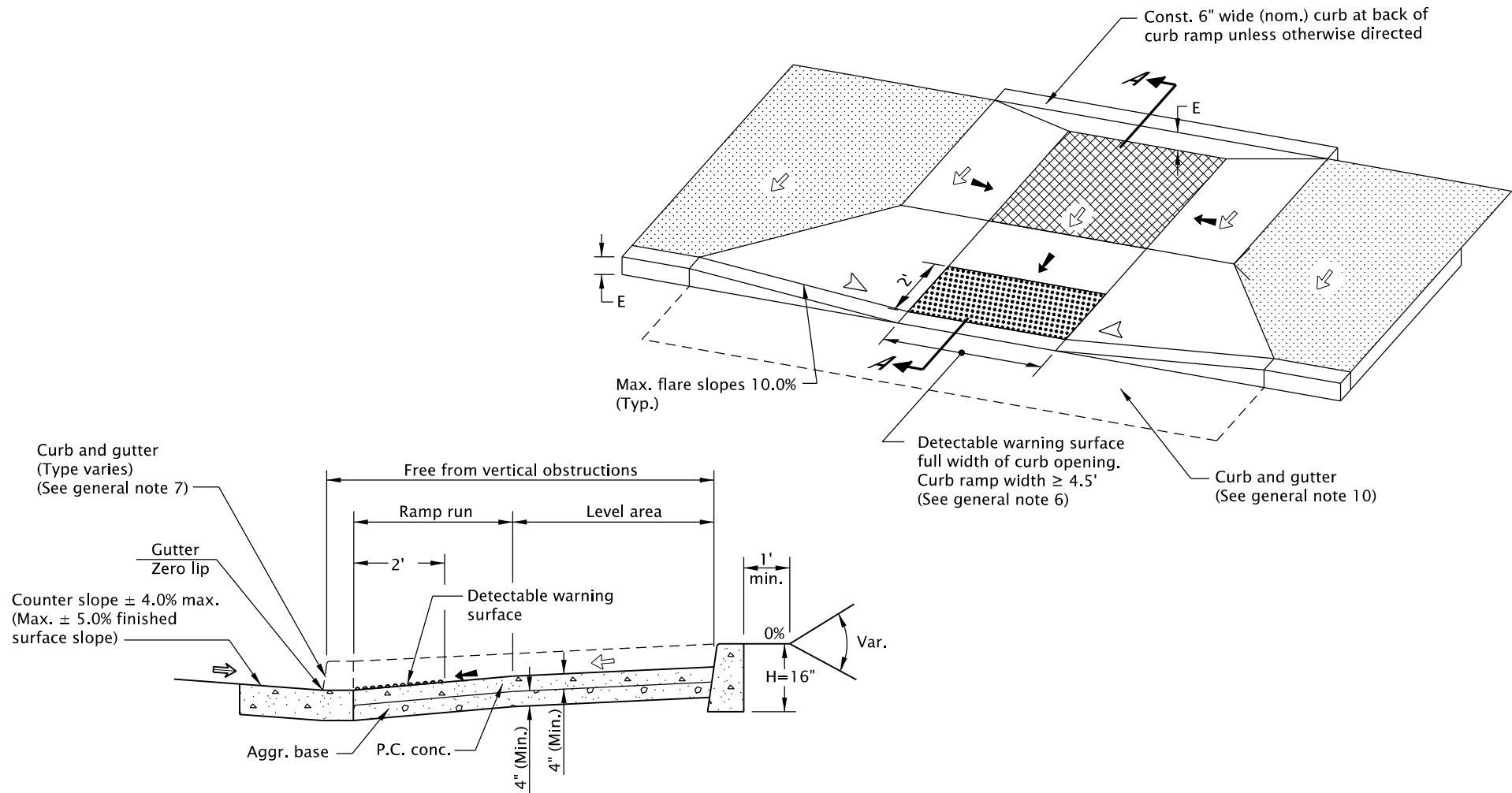
## GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Curb ramp details are based on applicable ODOT Standards.
2. See Std. Dwgs. RD700 & RD701 for curbs.  
See Std. Dwgs. RD720 & RD721 for sidewalks.  
See Std. Dwgs. RD902 through RD908 for detectable warning surface installation details.  
See Std. Dwg. TM240 for crosswalk closure detail.
3. Site conditions normally require a project specific design. See project plans for details not shown.
4. Tooled dummy joints are required at all curb ramp grade break lines, (see Std. Dwg. RD722).
5. Curb ramp slopes shown are relative to the true level horizon (zero bubble).
6. Place detectable warning surface at the back of curb for a minimum depth of 2' in the direction of pedestrian travel full width of curb ramp opening that is adjacent to traffic.
7. Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run. Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush.
8. When 2 ramp runs are immediately adjacent, the curb exposure (E) between the adjacent side may range between 3" and full design exposure.
9. Curb ramps for shared use paths intersecting a roadway shall be full width of path, excluding flares. When a curb ramp is used to provide bicycle access from a roadway to a sidewalk, the curb ramp opening will be  $\geq 8'$  wide, (see Std. Dwg. RD909 for additional details).
10. Place an inlet at upstream side of curb ramp or perform other approved design mitigation. Check the gutter flow depth at curb ramp locations to assure that the design flood does not overtop the back of sidewalk.
11. On or along state highways, curb and gutter is required at curb ramps.

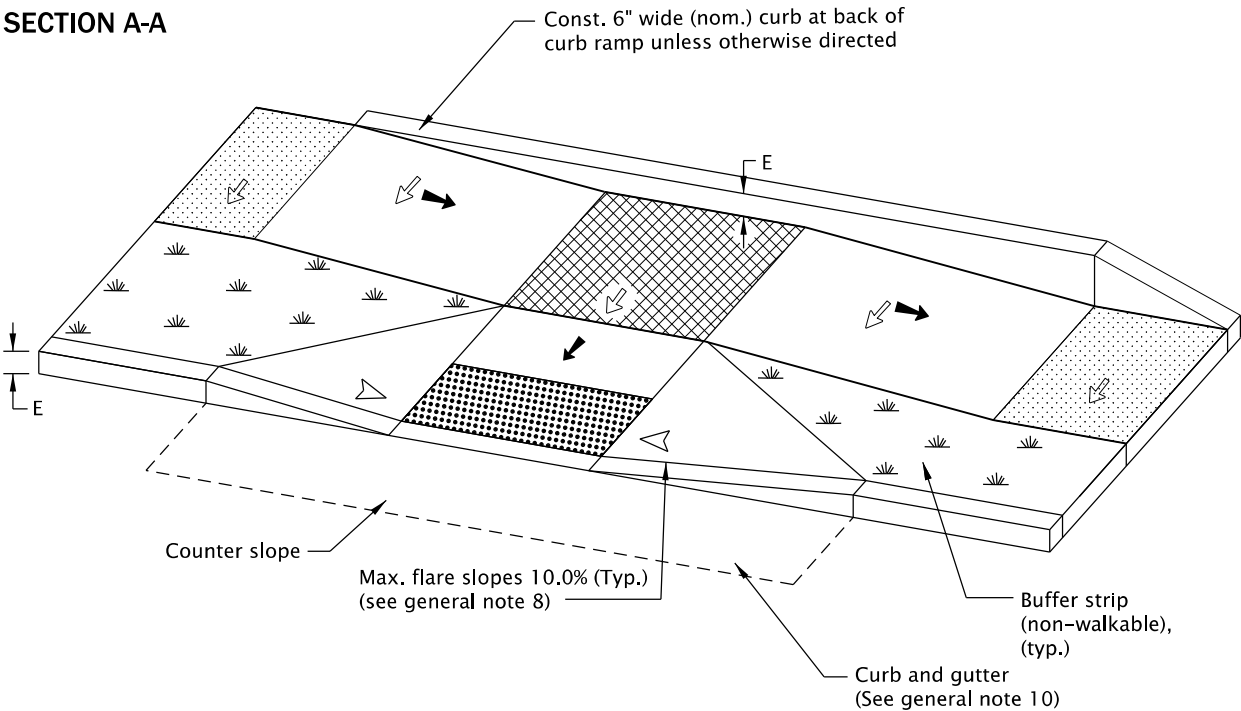
## LEGEND:

	Sidewalk
	Detectable warning surface
	Level area (Turning space/landing) Unobstructed 4.5' x 4.5' With obstruction 4.5' x 5.5' (Longer dimension in direction of pedestrian street crossing). For the purposes of this application, a max. 2.0% finished surface slope (for drainage) measured perpendicular in two directions is considered level.
	Cross slope 1.5% max. (Max. 2.0% finished surface slope) (Normal sidewalk cross slope)
	Running slope 7.5% max. (Max. 8.3% finished surface slope)
	Counter slope 4.0% max. ascending or descending, (Max. 5.0% finished surface slope) Slope as required for drainage
	4'x4' clear space

CALC. BOOK NO. <u>      </u> <b>N/A</b> <u>      </u>	SDR DATE <u>      </u> <b>14-JAN-2022</b> <u>      </u>	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>	NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
	<b>OREGON STANDARD DRAWINGS</b>	
	<b>PARALLEL CURB RAMP</b>	
	2021	
	DATE	REVISION DESCRIPTION
	07-2020	DRAWING CREATED
07-2021	REVISED DETAIL AND NOTES	
01-2022	REVISED NOTES	



SECTION A-A



COMBINATION CURB RAMP DETAIL

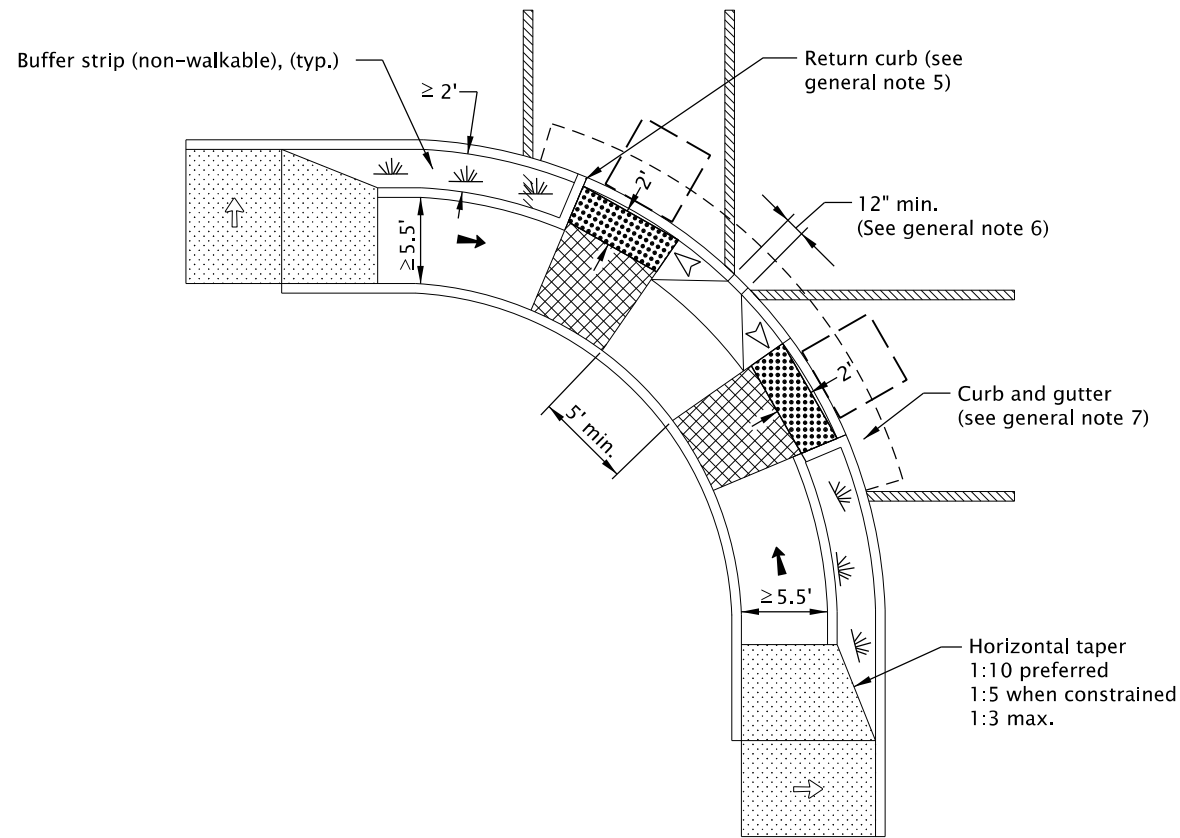
GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Curb ramp details are based on applicable ODOT Standards.
2. See project plans for details not shown.  
See Std. Dwgs. RD700 & RD701 for curbs.  
See Std. Dwgs. RD720 & RD721 for sidewalks.  
See Std. Dwgs. RD902 through RD908 for detectable warning surface installation details.
3. Site conditions normally require a project specific design. See project plans for details not shown.
4. Tooled dummy joints are required at all curb ramp slope break lines, (see Std. Dwg. RD722).
5. Curb ramp slopes shown are relative to the true level horizon (zero bubble).
6. Place detectable warning surface at the back of curb for a minimum depth of 2' in the direction of pedestrian travel full width of curb ramp opening that is adjacent to traffic.
7. Place an inlet at upstream side of curb ramp or perform other approved design mitigation. Check the gutter flow depth at curb ramp locations to assure that the design flood does not overtop the back of sidewalk.
8. Return curb may be provided in lieu of flared slope only if protected from traverse travel by landscaping, see Std. Dwg. RD721. Return curb shall not reduce width of approaching sidewalk.
9. Curb ramps for shared use paths intersecting a roadway shall be full width of path, excluding flares. When a curb ramp is used to provide bicycle access from a roadway to a sidewalk, the curb ramp opening will be ≥ 8' wide, (see Std. Dwg. RD909 for additional details).
10. On or along state highways, curb and gutter is required at curb ramps.
11. Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run. Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush.

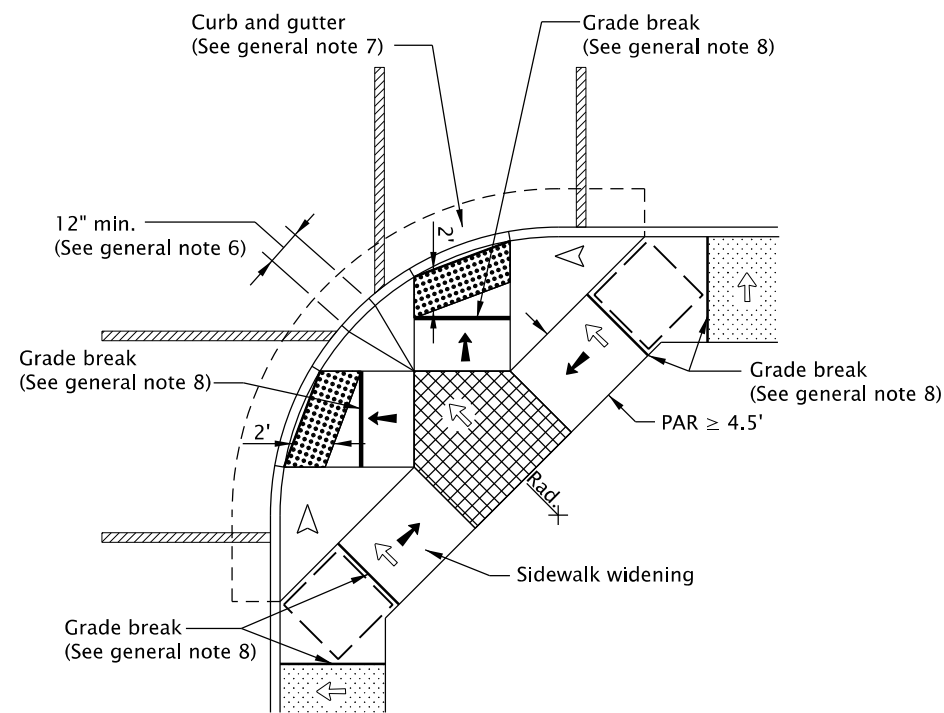
LEGEND:

- |  |  |
|--|--|
|  | Marked or intended crossing location   |
|  | Sidewalk   |
|  | Detectable warning surface   |
|  | Level area (Turning space/landing)<br>Unobstructed 4.5' x 4.5'<br>With obstruction 4.5' x 5.5' (Longer dimension in direction of pedestrian street crossing).<br>For the purposes of this application, a max. 2.0% finished surface slope (for drainage) measured perpendicular in two directions is considered level. |
|  | Cross slope 1.5% max.<br>(Max. 2.0% finished surface slope)<br>(Normal sidewalk cross slope)   |
|  | Running slope 7.5% max.<br>(Max. 8.3% finished surface slope)  |
|  | Counter slope 4.0% max. ascending or descending,<br>(Max. 5.0% finished surface slope)<br>Slope as required for drainage   |
|  | Flare slope<br>(Max. 10% finished surface slope)   |

CALC. BOOK NO. <b>N/A</b>		SDR DATE <b>14-JAN-2022</b>	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>COMBINATION CURB RAMP</b>	
		2021	
		DATE	REVISION DESCRIPTION
		07-2020	DRAWING CREATED
		07-2021	REVISED DETAILS AND NOTES
		01-2022	REVISED NOTES



PARALLEL COMBINATION WITH LANDSCAPE BUFFER STRIP  
OPTION "CC-3"



FOR NARROW SIDEWALKS  
OPTION "CC-4"

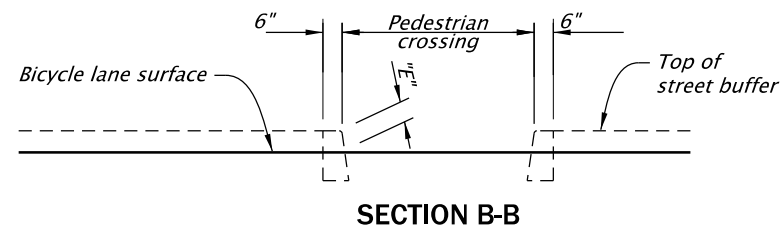
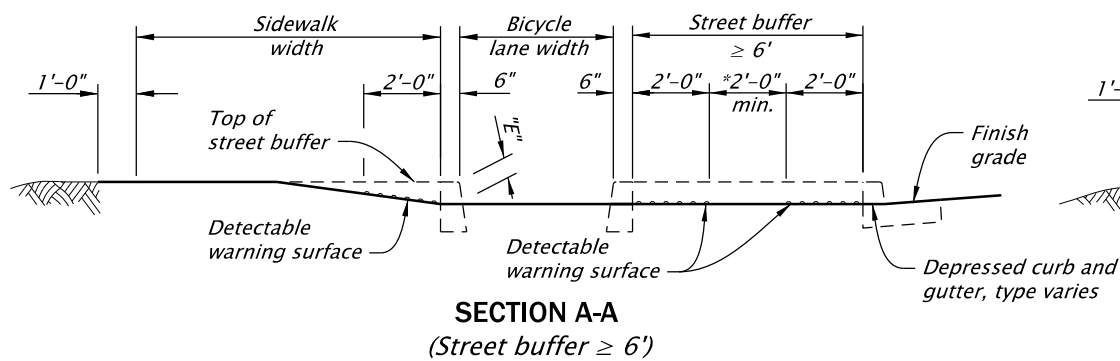
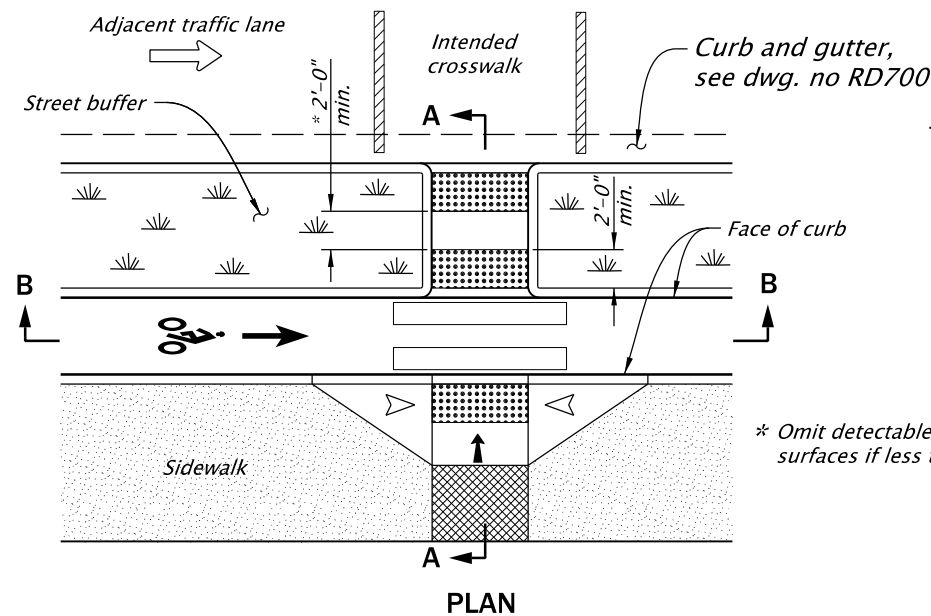
GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Curb ramp details are based on applicable ODOT Standards.
2. See project plans for details not shown.  
See Std. Dwgs. RD700 & RD701 for curbs.  
See Std. Dwgs. RD720 & RD721 for sidewalks.  
See Std. Dwgs. RD902 through RD908 for detectable warning surface installation details.  
See Std. Dwg. RD930 for combination curb ramp details.
3. Tooled dummy joints are required at all curb ramp grade break lines, (see Std. Dwg. RD722).
4. Curb ramp slopes shown are relative to the true level horizon (zero bubble).
5. Return curb may be provided in lieu of flared slope only if protected from traverse travel by landscaping, see Std. Dwg. RD721. Return curb shall not reduce width of approaching sidewalk.
6. When 2 curb ramps are immediately adjacent, the curb exposure (E) between the adjacent side flares may range between 3" and full design exposure.
7. On or along state highways, curb and gutter is required at curb ramps.
8. Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run. Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush.

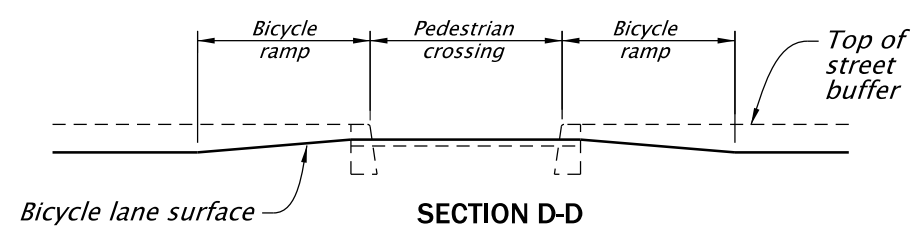
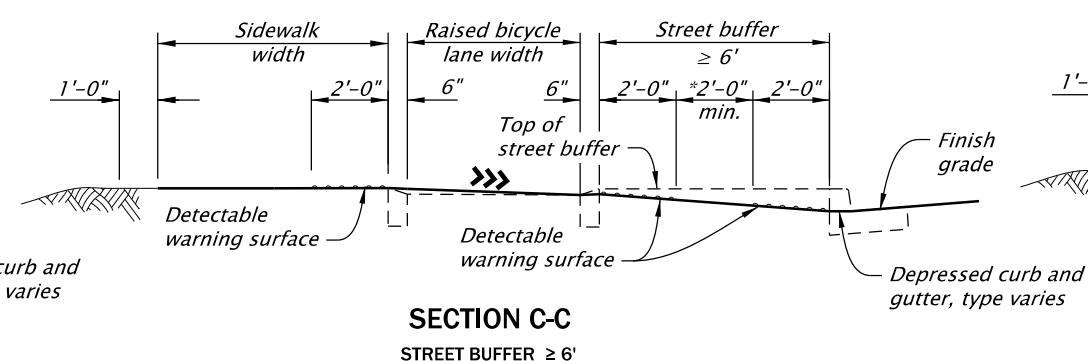
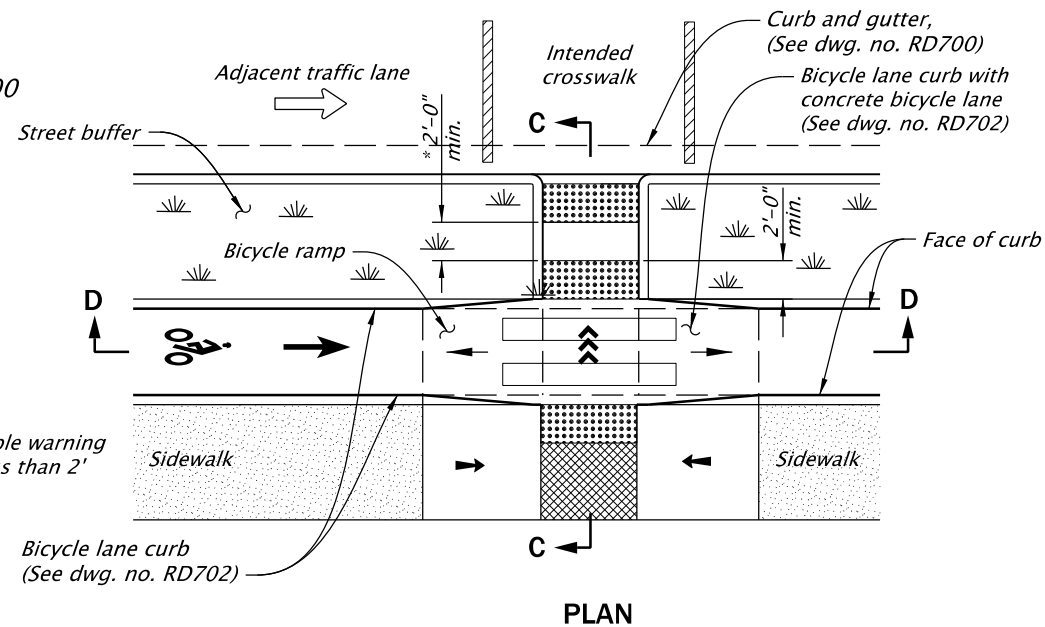
LEGEND:

- Marked or intended crossing location
- Sidewalk
- Detectable warning surface
- Level area (Turning space/landing)  
Unobstructed 4.5' x 4.5'  
With obstruction 4.5' x 5.5' (Longer dimension in direction of pedestrian street crossing).  
For the purposes of this application, a max. 2.0% finished surface slope (for drainage) measured perpendicular in two directions is considered level.
- Cross slope 1.5% max.  
(Max. 2.0% finished surface slope)  
(Normal sidewalk cross slope)
- Running slope 7.5% max.  
(Max. 8.3% finished surface slope)
- Flare slope  
(Max. 10% finished surface slope)
- Curb height
- 4' x 4' clear space
- PAR

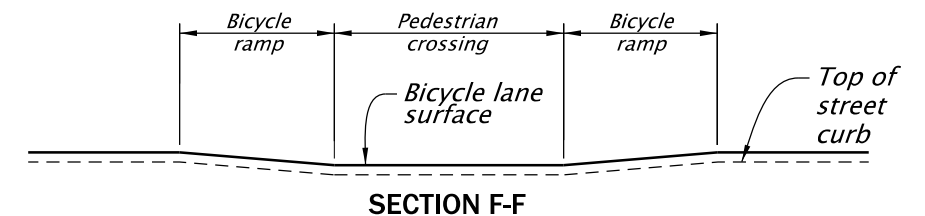
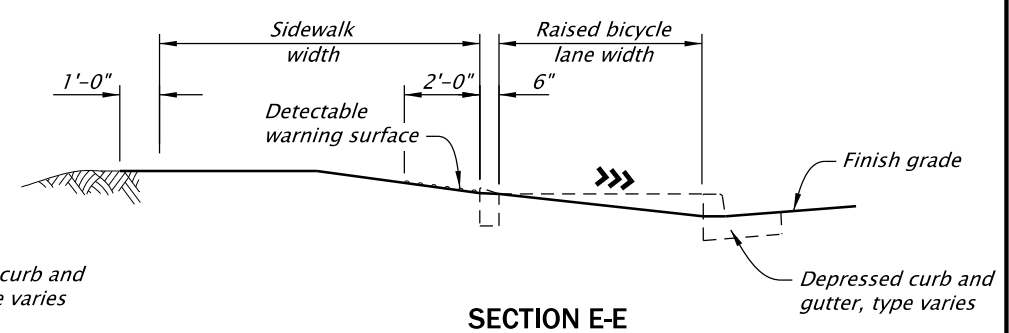
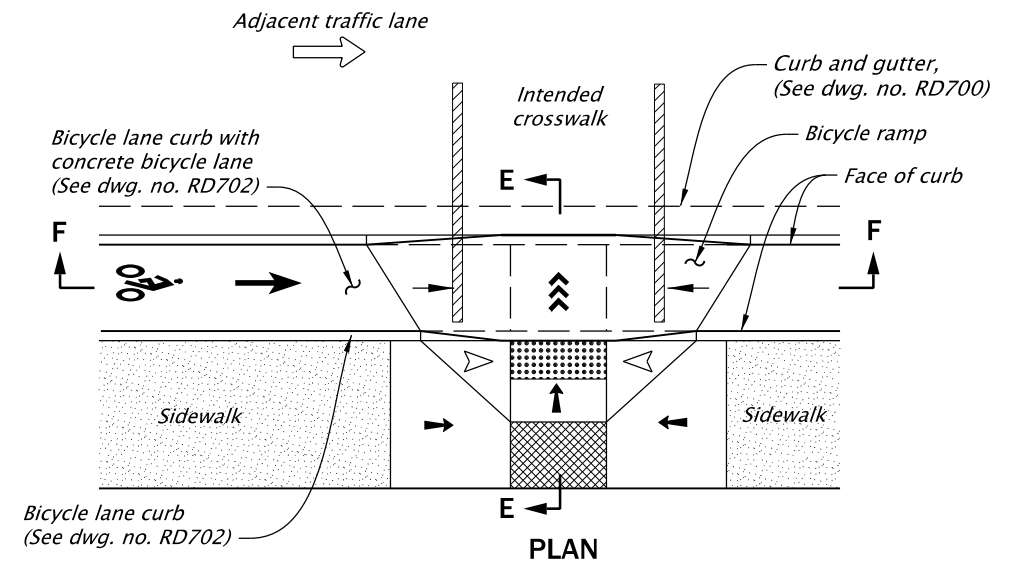
CALC. BOOK NO. <b>N/A</b>		SDR DATE <b>14-JAN-2022</b>	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>COMBINATION CURB RAMP</b>	
		2021	
		DATE	REVISION DESCRIPTION
		07-2021	DRAWING CREATED
		01-2022	REVISED DETAILS AND NOTES



**BICYCLE LANE WITH STREET BUFFER**  
(Perpendicular curb ramp shown)



**RAISED BICYCLE LANE WITH STREET BUFFER**  
(Parallel curb ramp shown)



**RAISED BICYCLE LANE WITH NO STREET BUFFER**  
(Combination curb ramp shown)

**GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:**

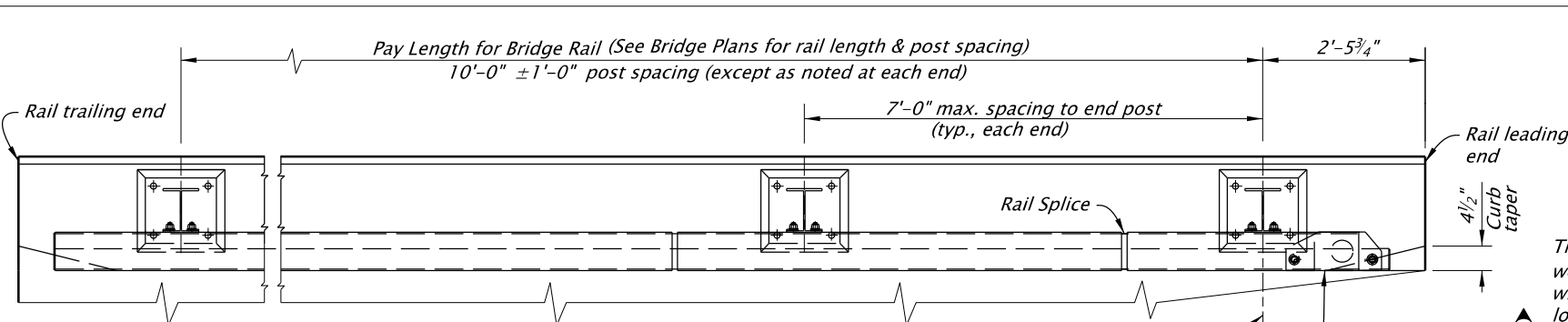
1. Separated bicycle lane Crossing details are based on applicable ODOT standard.
2. Site conditions normally require a project specific design. See project plans for details not shown.
3. See dwg. nos. RD700 and RD702 for curbs. See dwg. no. RD710 for accessible route island. See dwg. nos. TM503 and TM530 for crosswalk markings, widths, etc. See dwg. nos. RD902 through RD908 for detectable warning surface details.
4. Ramp slopes shown are relative to the true level horizon (zero bubble).
5. Lower bicycle lane curb at all curb ramp pedestrian crossings.
6. On separated bicycle lanes (where bicycle lane is apart from road shoulder), gutter pan shall not end in bicycle lane.
7. On or along state highways, where curb and gutter is required at curb ramps, add concrete bicycle lane to bicycle lane curb at curb ramps and at inlets.

**LEGEND:**

- Staggered continental crosswalk (1' white bars)
- Marked or intended crossing location
- Sidewalk or other traversable surface
- Detectable warning surface (DWS)
- Level area (turning space/landing)
- Running slope, 4.0% maximum (Maximum 4.9% finished surface slope)
- Running slope 7.5% maximum (Maximum 8.3% finished surface slope)
- Flare slope (Maximum 10.0% finished surface slope)

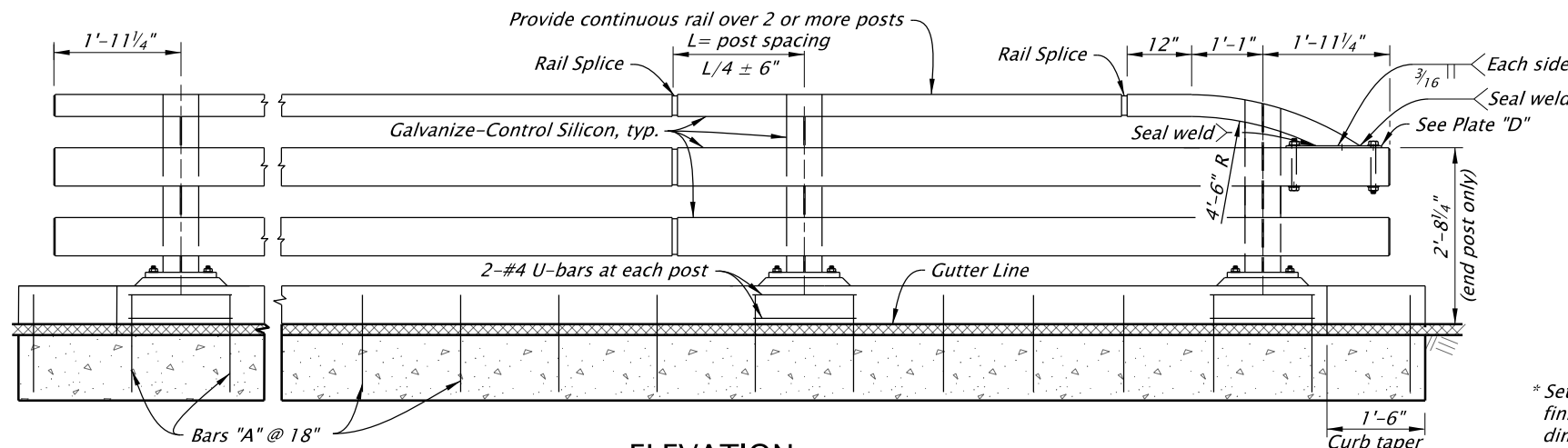
CALC. BOOK NO. <b>N/A</b>		SDR DATE <b>14-JAN-2022</b>	
Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>SEPARATED BIKE LANE CROSSING</b>	
		2021	
		DATE	REVISION DESCRIPTION
		12-2021	NEW DRAWING CREATED



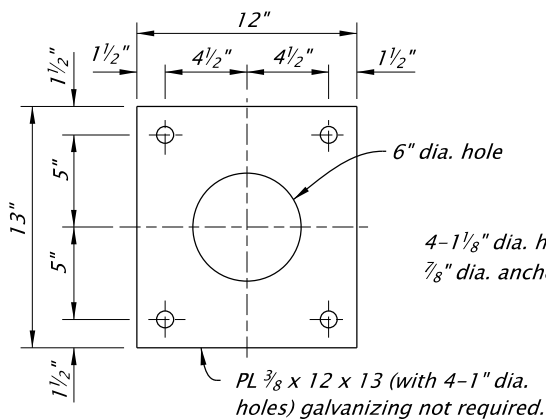


NOTE:  
Guardrail Connection may be omitted on trailing end of one way structures when omitted on detail plans. When not omitted, use connection details shown on dwg. BR209 for leading end.

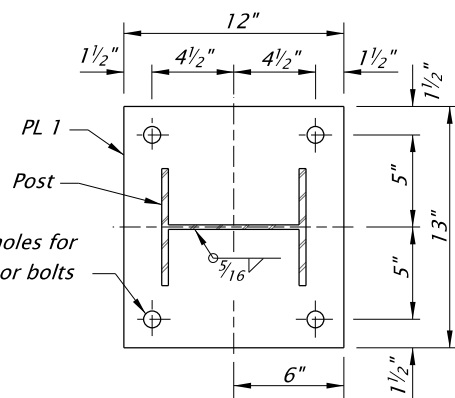
PLAN



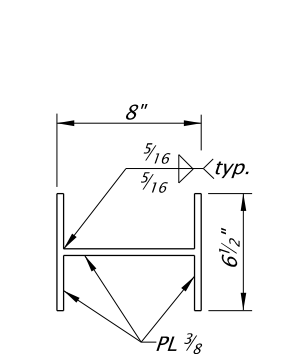
ELEVATION



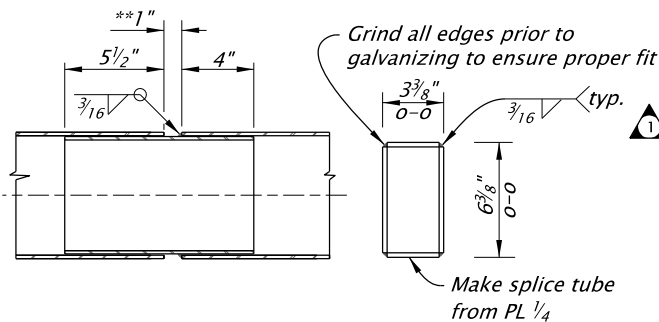
ANCHOR PLATE DETAIL



BASE PLATE DETAIL

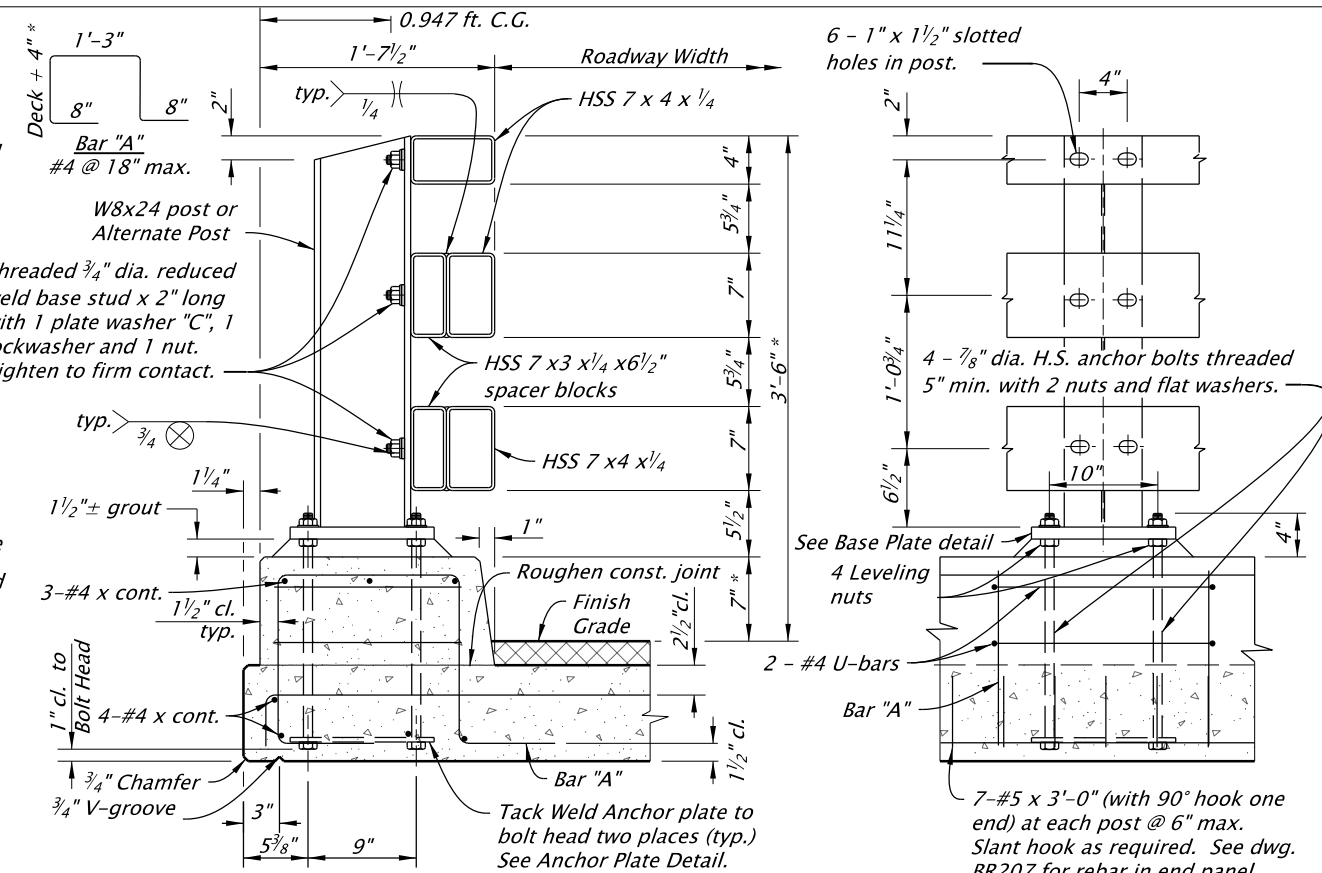


ALTERNATE POST



RAIL SPLICE DETAIL

\*\*1" gap unless noted otherwise on detail plans. Provide a Rail Splice in panel that has a deck expansion joint. If more than 2" movement needed, increase length of inner member.



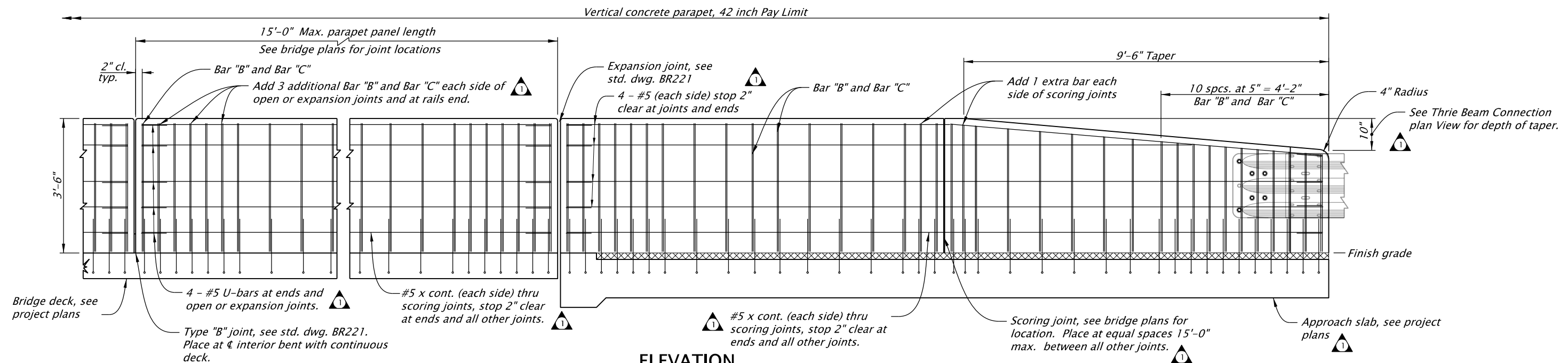
CURB AND POST DETAIL

GENERAL NOTES:

1. Rail designed and crash tested to meet MASH TL-4 requirements. Transition designed to meet MASH TL-3.
2. Provide structural tubing, steel posts and plates according to Oregon Standard Specification 2810.20.
3. Provide High Strength anchor bolts (Grade 105) according to Oregon Standard Specification 02560.30 (b).
4. Fabricate steel studs with material, welding and inspection according to AWS D1.5.
5. Provide reinforcing steel conforming to ASTM A706 or AASHTO M31 (ASTM A615) Grade 60.
6. Provide concrete Class 3300 - 1 1/2" or 3/4"
7. Construct railing conforming to the horizontal and vertical alignment of the structure. Install posts normal to grade in longitudinal direction and vertical in transverse direction.
8. Payment for the railing will include compensation for furnishing and installing the necessary guardrail connection plates and terminal connectors.
9. Hot-dip galvanized structural steel including fasteners after fabrication, except as noted. Provide Galvanize-Control Silicon according to Oregon Standard Specification 02530.70.

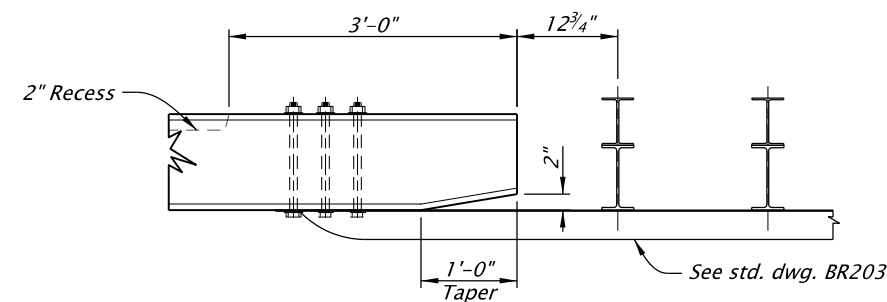
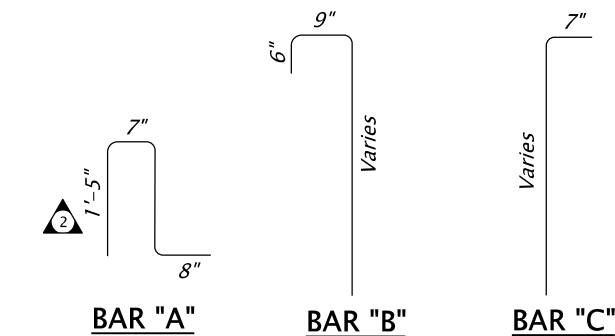
Accompanied by dwgs. BR207, BR209

CALC. BOOK NO. -		SDR DATE: 01-January-2022	
<p>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</p>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>3-TUBE CURB MOUNT RAIL</b>	
		<b>2022</b>	
		DATE	REVISION DESCRIPTION
		12-2020	Modified detail note text; added General Note 4; CAD updates
		01-2022	Modified General Note 4, removed "Clause 7" notation.
		-	-
		-	-
		-	-

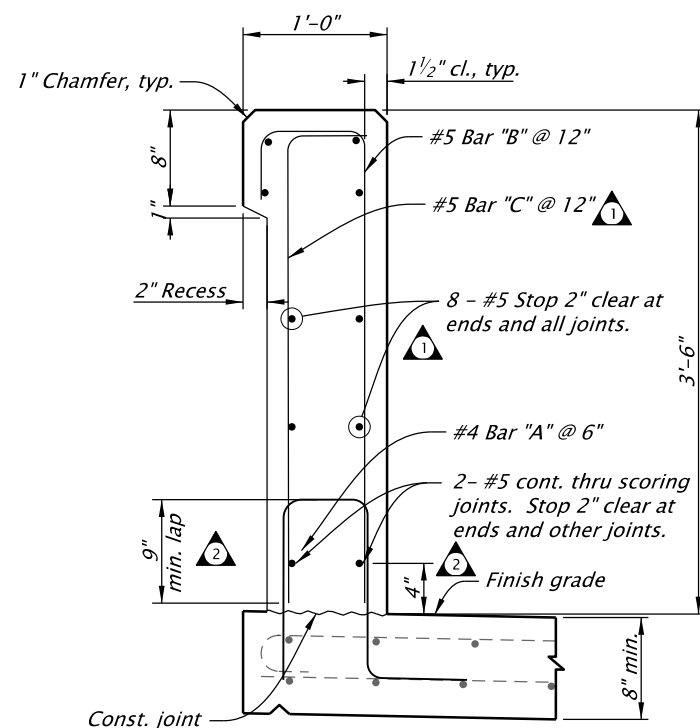


### ELEVATION

Scale:  $\frac{1}{4}" = 1'-0"$

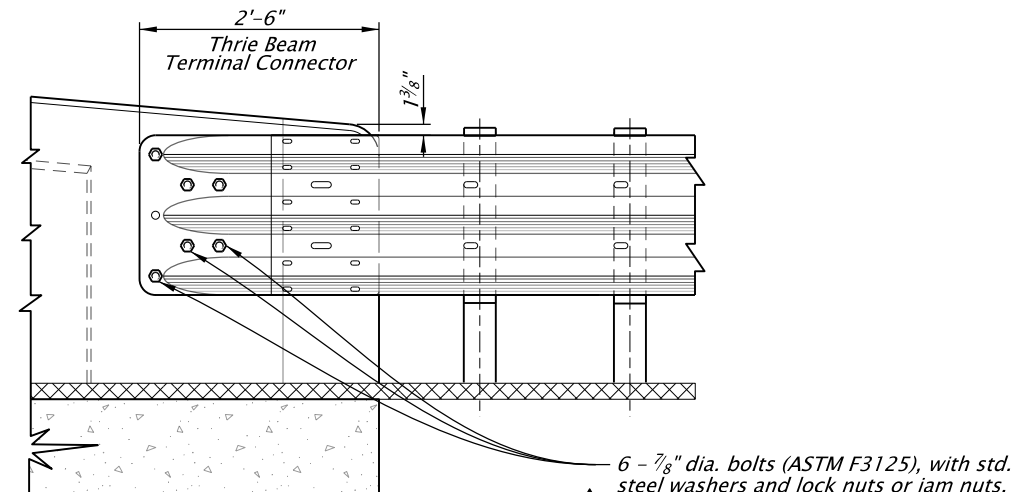


### PLAN



### TYPICAL SECTION

Scale:  $\frac{3}{4}" = 1'-0"$



### ELEVATION

### THRIE BEAM CONNECTION

Scale:  $\frac{1}{2}" = 1'-0"$

NOTE:  
Drill horizontal bolt holes (bolt dia. +  $\frac{1}{8}"$ ) in hardened concrete with low-impact rotary drill. Cut bolts after installation so they extend  $\frac{3}{4}"$  max. beyond nut. Grind smooth and cold galvanize.

### GENERAL NOTES

Rail evaluated to meet MASH TL-4 requirements. This rail can be used for speeds of 45 mph and greater when a TL-3 rated guardrail transition is used.

Provide all reinforcing steel conforming to AASHTO M31 (ASTM A615), Grade 60 or ASTM A706.

Place all bars 1 $\frac{1}{2}"$  clear of the nearest face of concrete unless shown otherwise.

Provide Class 3300 - 1 $\frac{1}{2}$  or  $\frac{3}{4}$  concrete.

Provide steel cover plates conforming to AASHTO M183 (ASTM A36). Hot dip galvanize after fabrication.

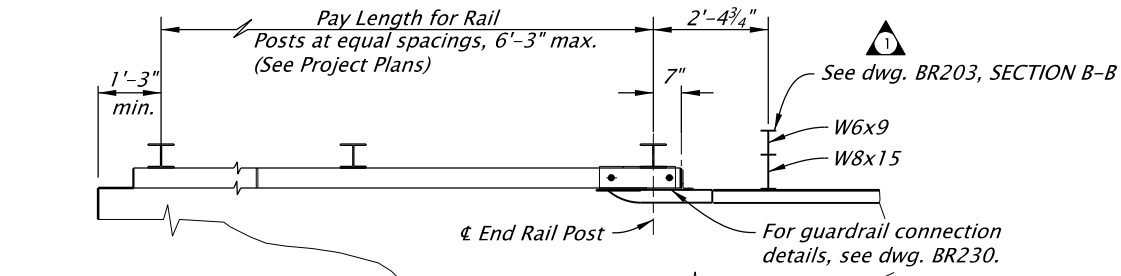
At skewed bents up to 20° make joints parallel to the bent center line.

For skews greater than 20° make joints normal to rail.

See project plans for spacing, joint locations and details not shown.

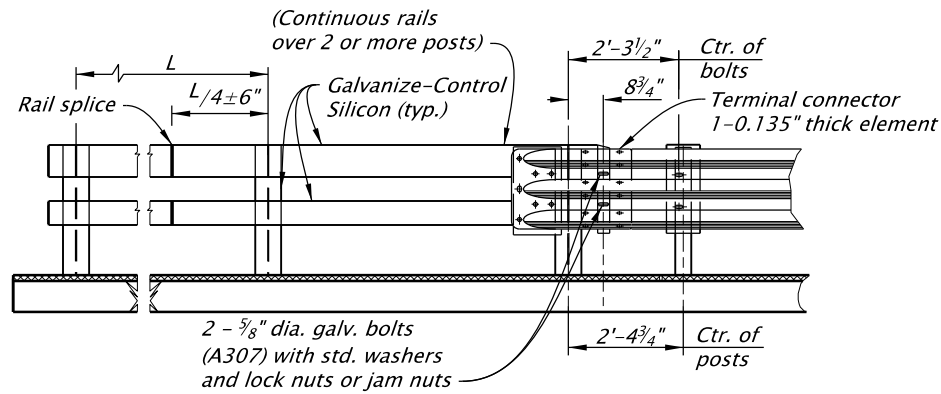
Accompanied by dwg. BR203, BR221

CALC. BOOK NO. _ _ _ _ _		SDR DATE: 01-January-2022	
<p>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</p>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>VERTICAL CONCRETE PARAPET, 42 INCH</b>	
		<b>2022</b>	
		DATE	REVISION DESCRIPTION
		07-2021	Note changes, CAD edits
		01-2022	Modified detail notes and dimensions.
		-	-
		-	-
		-	-

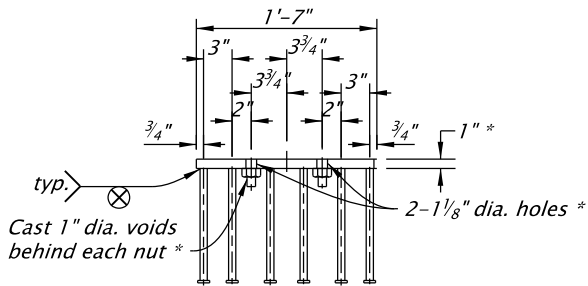


NOTE:  
Guardrail Connection may be omitted on exit end of one way structures when omitted on detail plans.

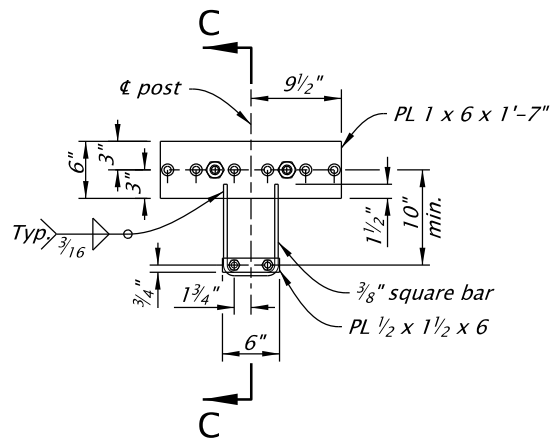
PLAN



ELEVATION

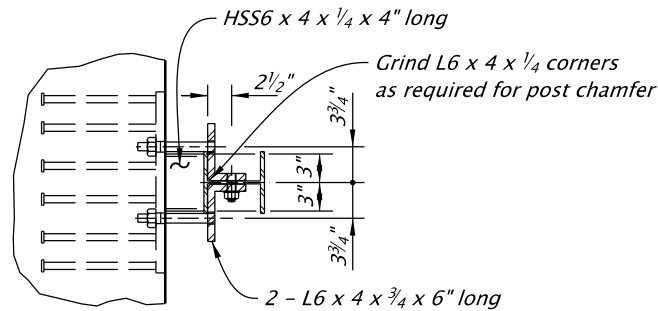


PLAN

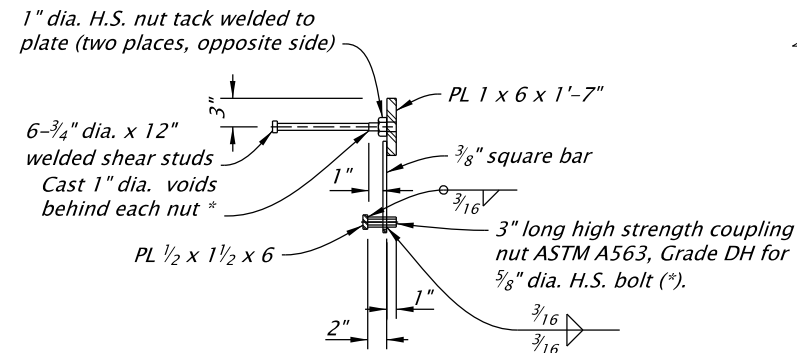


ANCHOR DEVICE

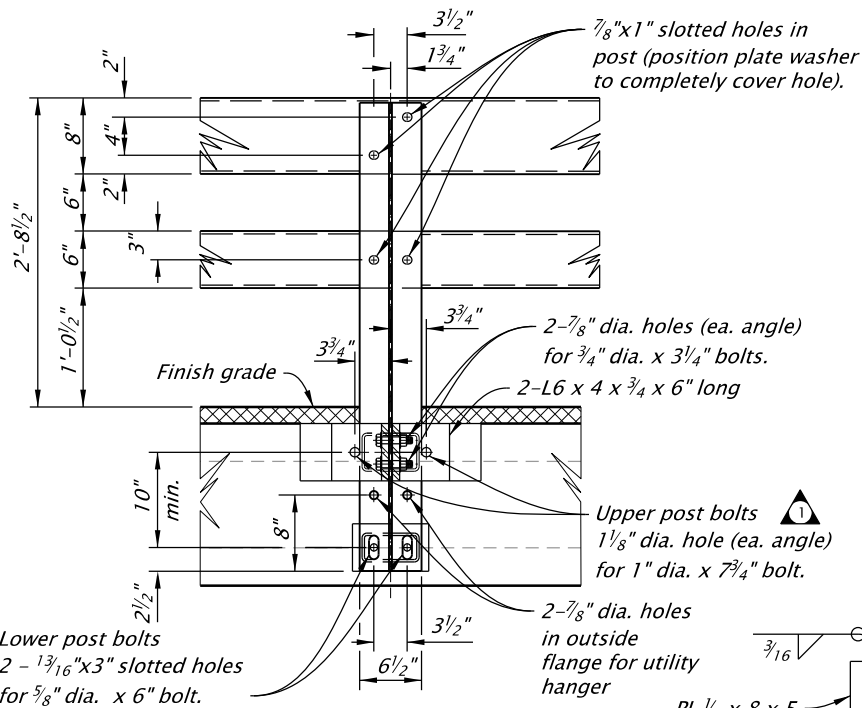
\*Plug or block off holes and threaded area during casting of slabs.



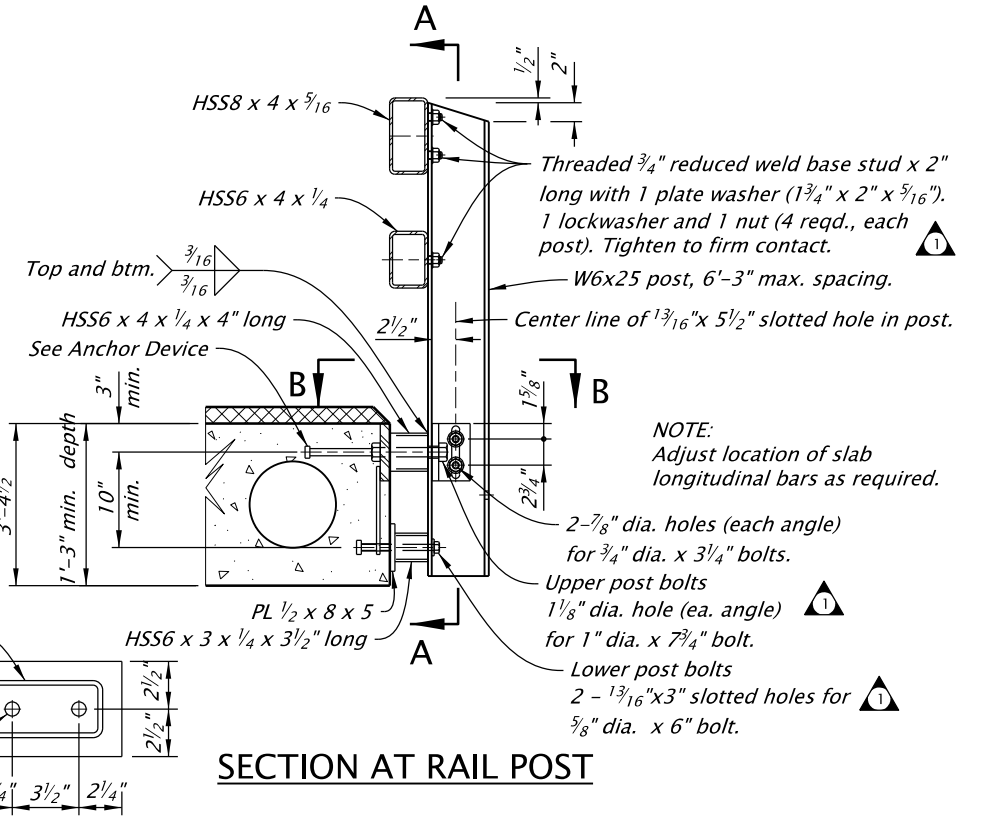
SECTION B-B



SECTION C-C



SECTION A-A



SECTION AT RAIL POST

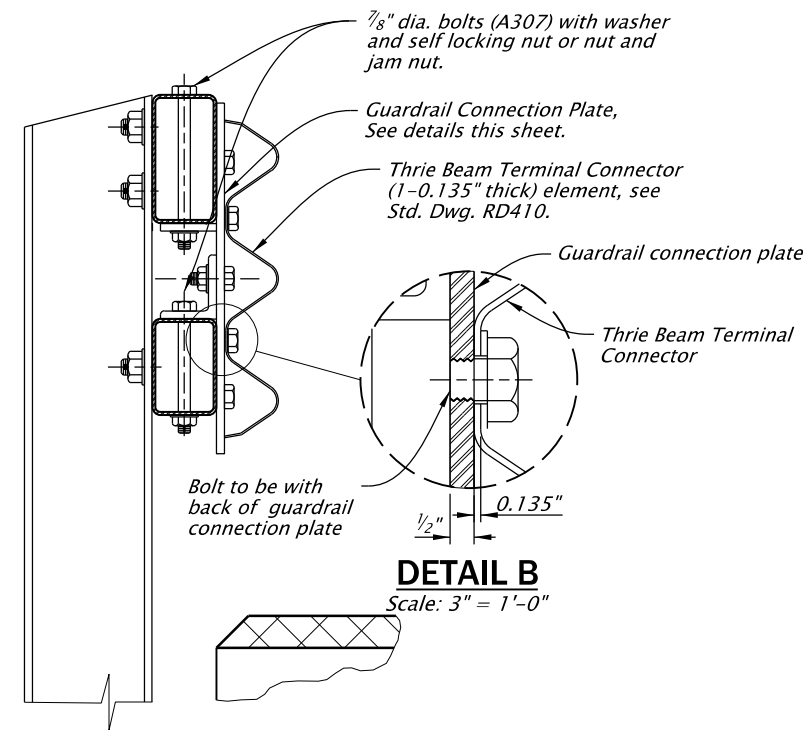
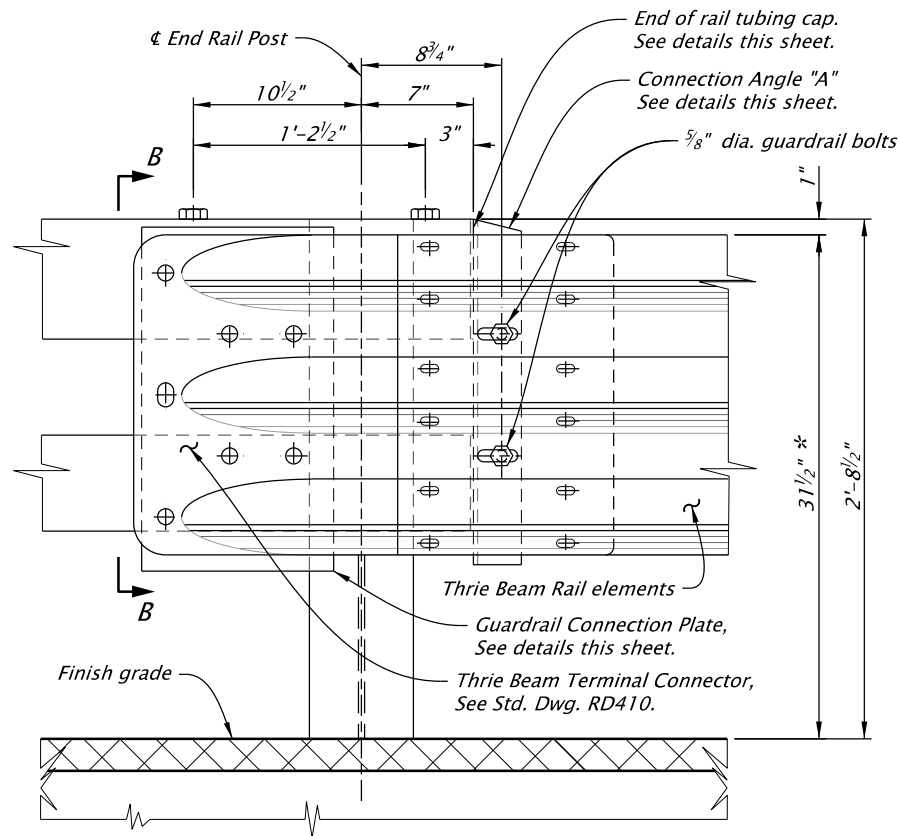
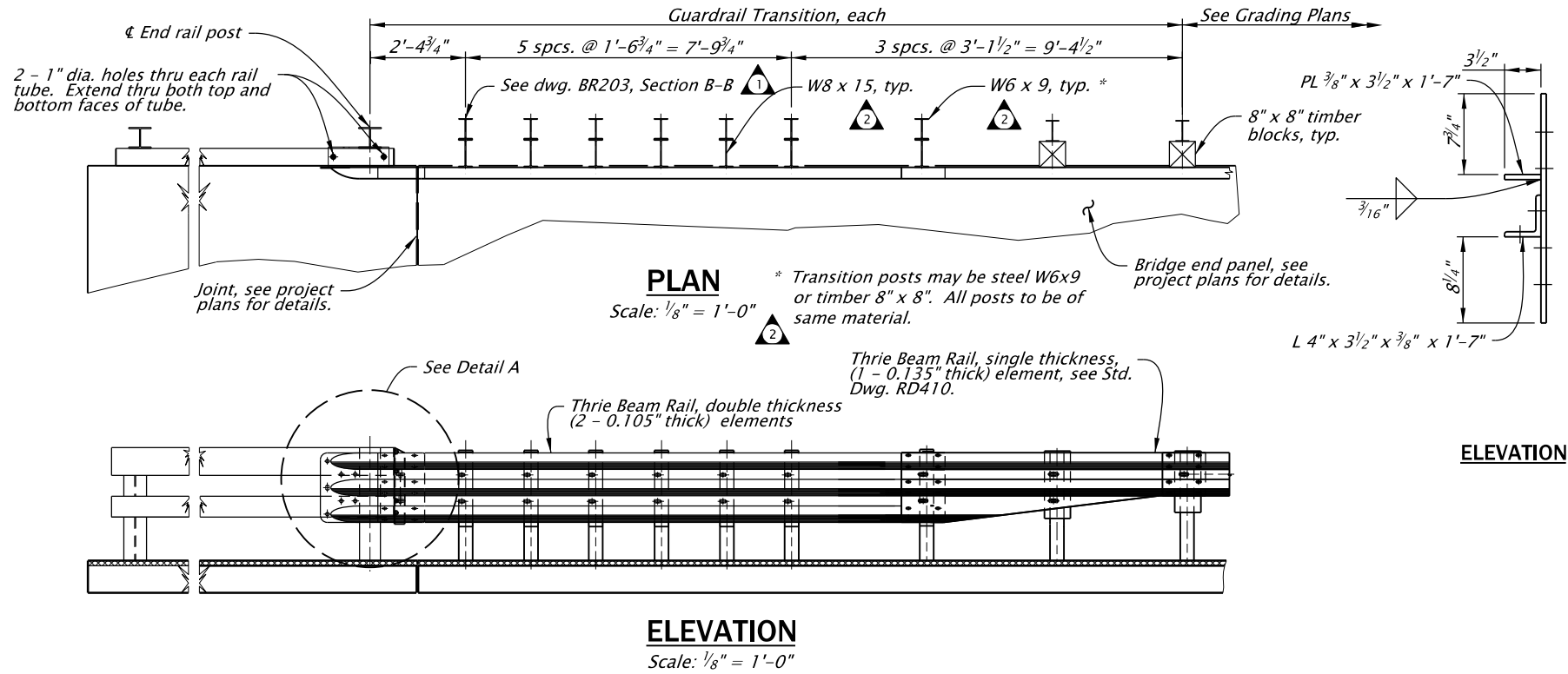
GENERAL NOTES

1. Provide structural tubing according to Oregon Standard Specification 2810.20.
2. Provide structural steel shapes and plates conforming to AASHTO Specification M183 (ASTM A36) unless otherwise noted.
3. Provide bolts conforming to AASHTO Specification M164 (ASTM A325) unless otherwise noted.
4. Fabricate steel studs with material, welding and inspection according to AWS D1.5.
5. Construct rail normal to slab in both the longitudinal and the transverse directions. When wearing surface thickness varies due to beam camber and/or superelevation, vary rail post lengths to provide uniform rail height. Field verify post lengths before fabrication.
6. Hot-dip galvanize structural steel including fasteners after fabrication. Provide Galvanize-Control Silicon posts and horizontal rail steel tubing according to ODOT Specification 02530.70. Tap nuts 0.021+0.01-0.00 oversize after galvanizing in accordance with ASTM A563.
7. Tighten upper post bolts 180° turn past snug tight condition and lower post bolts 120° turn past snug tight condition.
8. Estimated rail mass (for slab design) is 72 lb. per linear foot.
9. Do not use this rail for 12" and Slab No. 9 of the 15" Std. Precast Slabs.

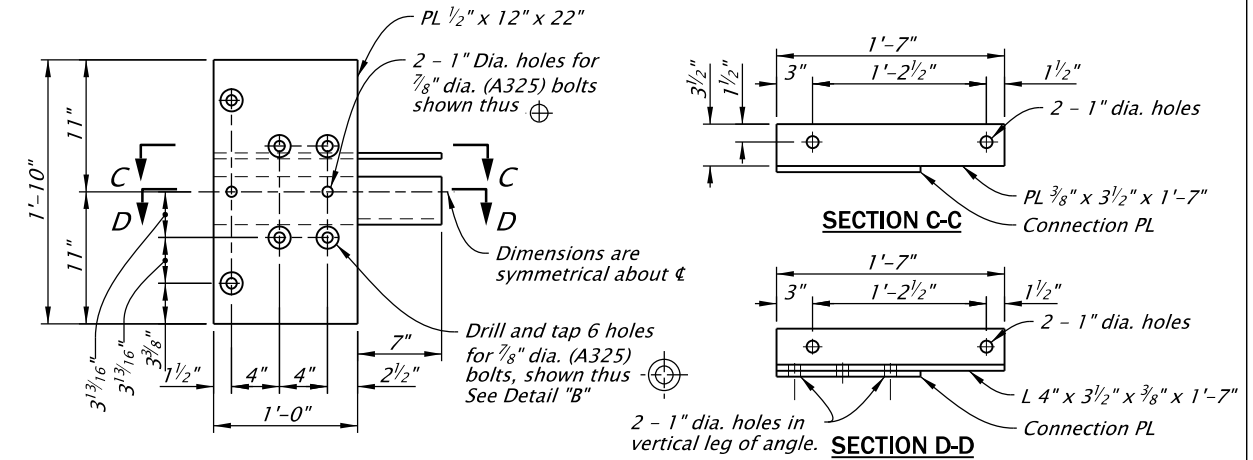
Accompanied by dwgs. BR203, BR230

CALC. BOOK NO. -		SDR DATE: 01-January-2022	
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		OREGON STANDARD DRAWINGS	
		2-TUBE SIDE MOUNT RAIL	
		2022	
		DATE	REVISION DESCRIPTION
		12-2020	Modified detail note text; changed General Notes 4 & 7; CAD updates
		01-2022	Modified General Note 4, removed "Section 7" notation.
		-	-
		-	-
		-	-

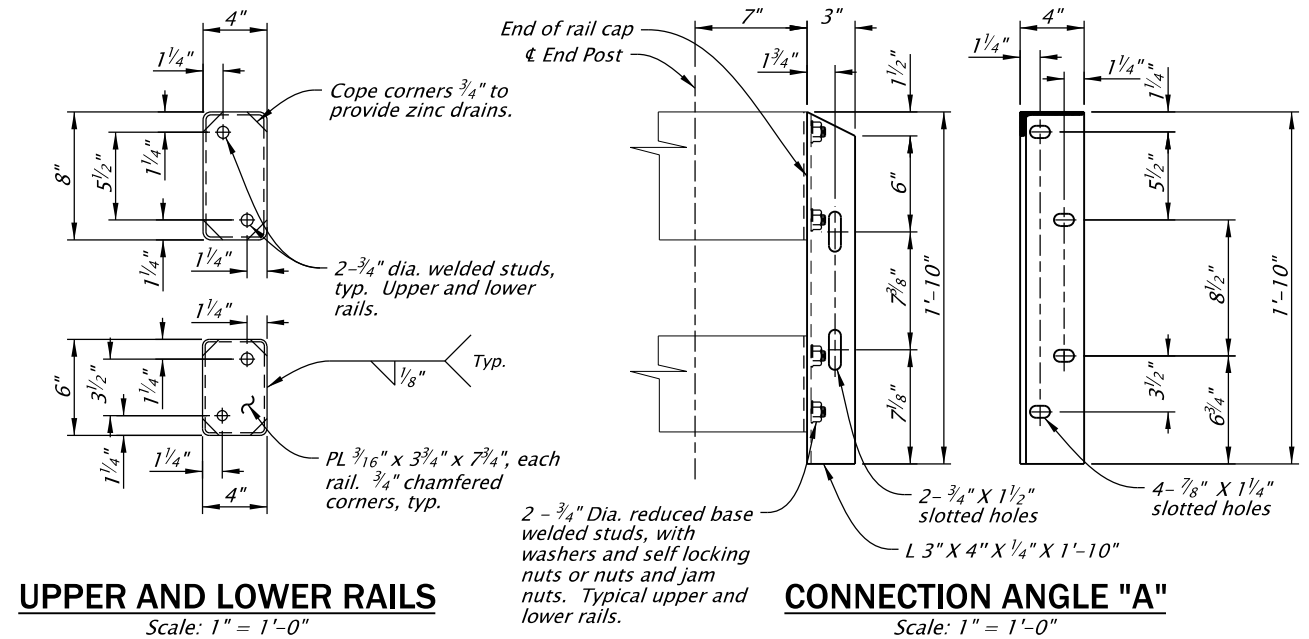




**ELEVATION**



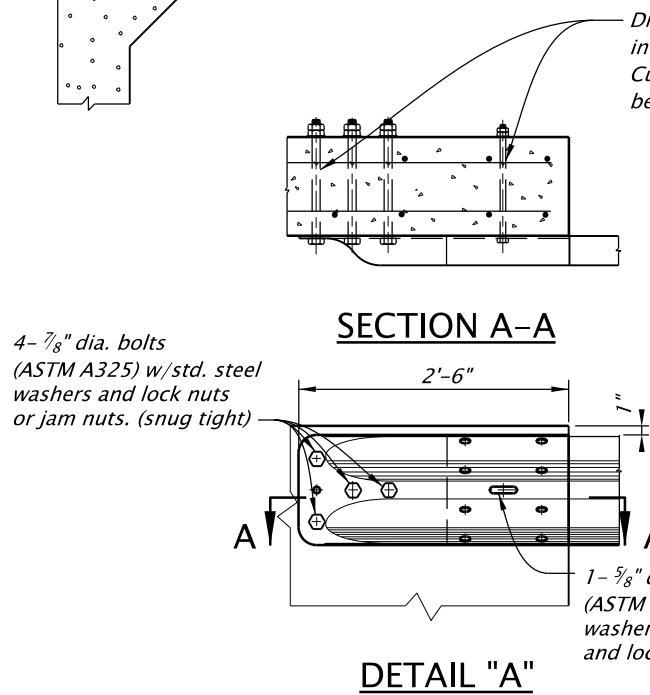
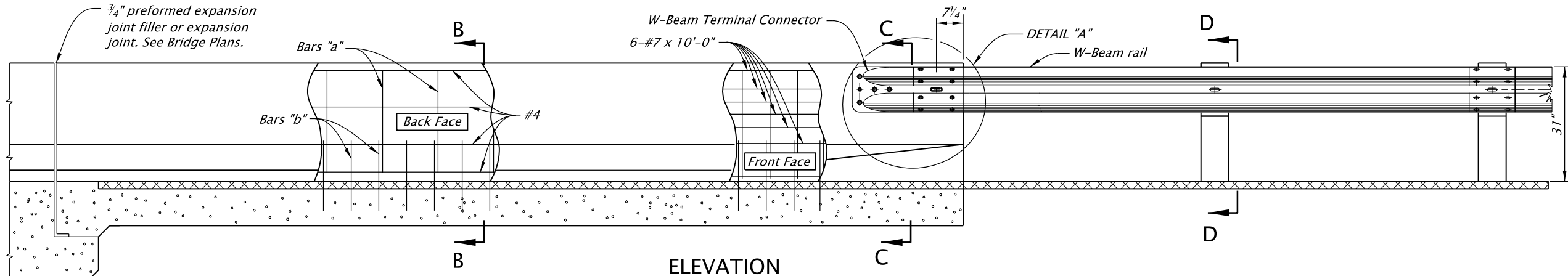
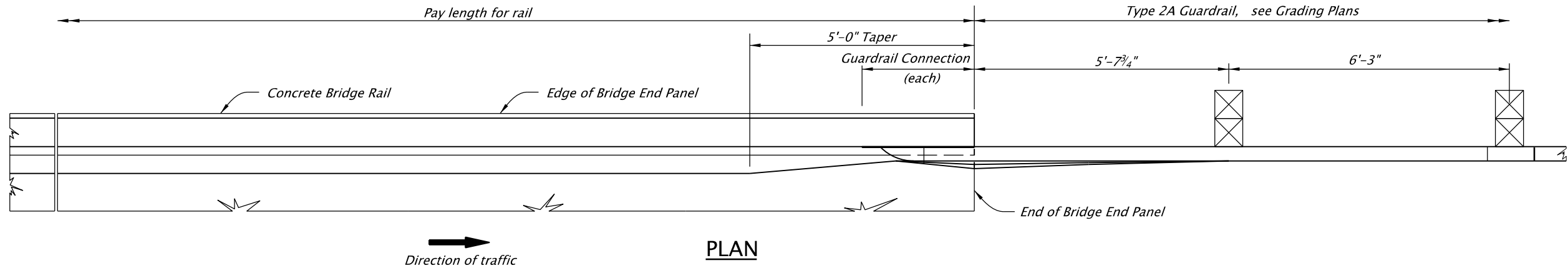
**GUARDRAIL CONNECTION PLATE DETAILS**



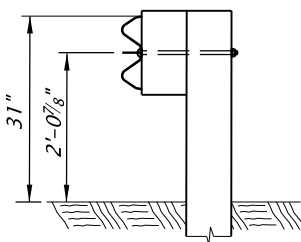
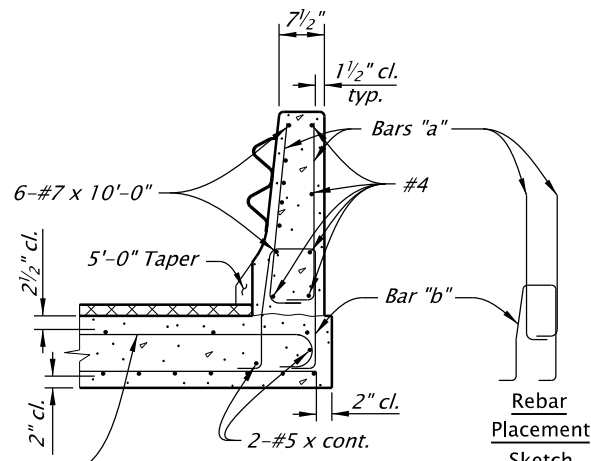
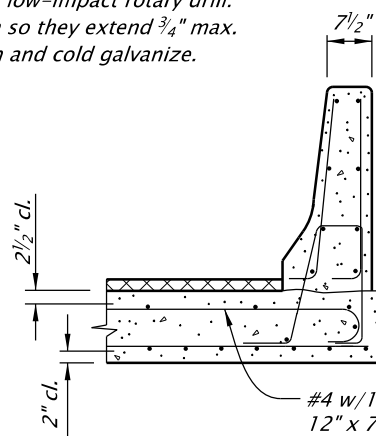
CALC. BOOK NO. _		SDR DATE: 01-January-2022	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>2-TUBE SIDE MOUNT RAIL TRANSITION</b>	
		2022	
		DATE	REVISION DESCRIPTION
		9/2/2020	Updated section note and removed note 3.
		9/2/2020	Updated to current drafting standards
		01-2022	Replaced timber block with W8x15 to be consistent to BR203.
		-	-
		-	-

br236.dgn 12/27/2022

BR236



Drill horizontal bolt holes (bolt dia. + 1/8") in hardened concrete with low-impact rotary drill. Cut bolts after installation so they extend 3/4" max. beyond nut. Grind smooth and cold galvanize.



#### GENERAL NOTES:

This drawing is to be used on one-way facilities or where the concrete bridge rail end is not exposed to approaching traffic.

For trailing ends without guardrail, provide reinforcement shown and omit bolt holes and taper.

- For details not shown see the following drawings:
- BR165 Bridge End Panel
  - BR200 Type "F" Concrete Rail
  - RD405 Guardrail and Metal Median Barrier Parts
  - RD415 Guardrail and Metal Median Barrier Parts

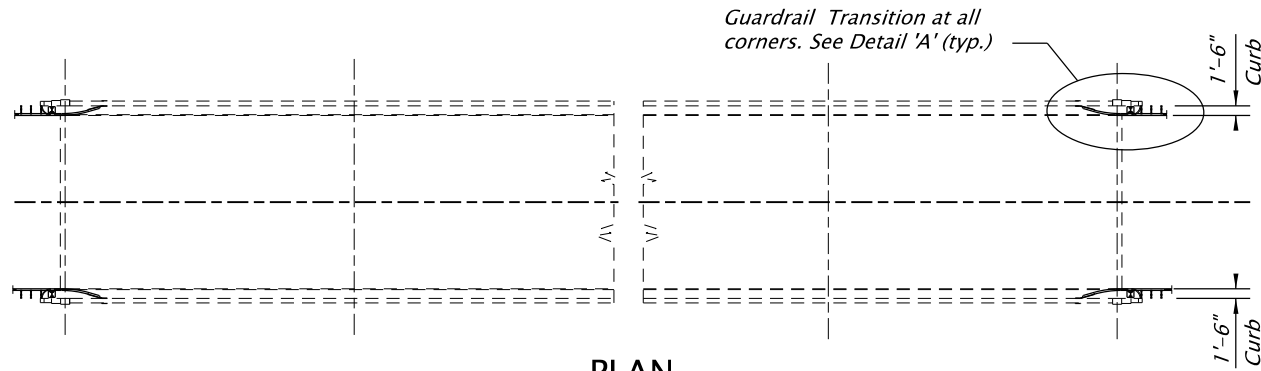
Accompanied by dwgs. BR165, BR200, RD405, and RD415

CALC. BOOK NO. -	SDR DATE: 01-January-2022
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
<b>OREGON STANDARD DRAWINGS</b>	
<b>TRAILING END BRIDGE CONNECTION TYPE "F" CONCRETE RAIL TO GUARDRAIL</b>	
2022	
DATE	REVISION DESCRIPTION
01-2022	Modified General Notes, removed call outs for RD480.
-	-
-	-
-	-
-	-

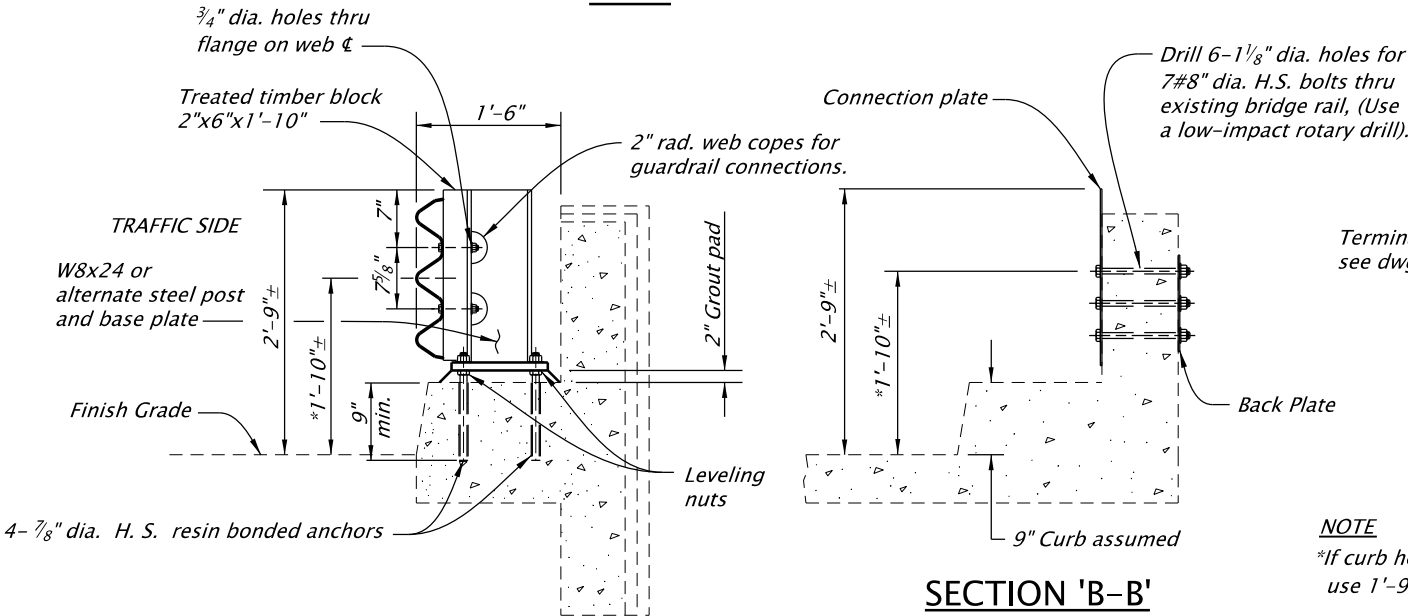
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

Effective Date: June 1, 2022 - November 30, 2022

BR236

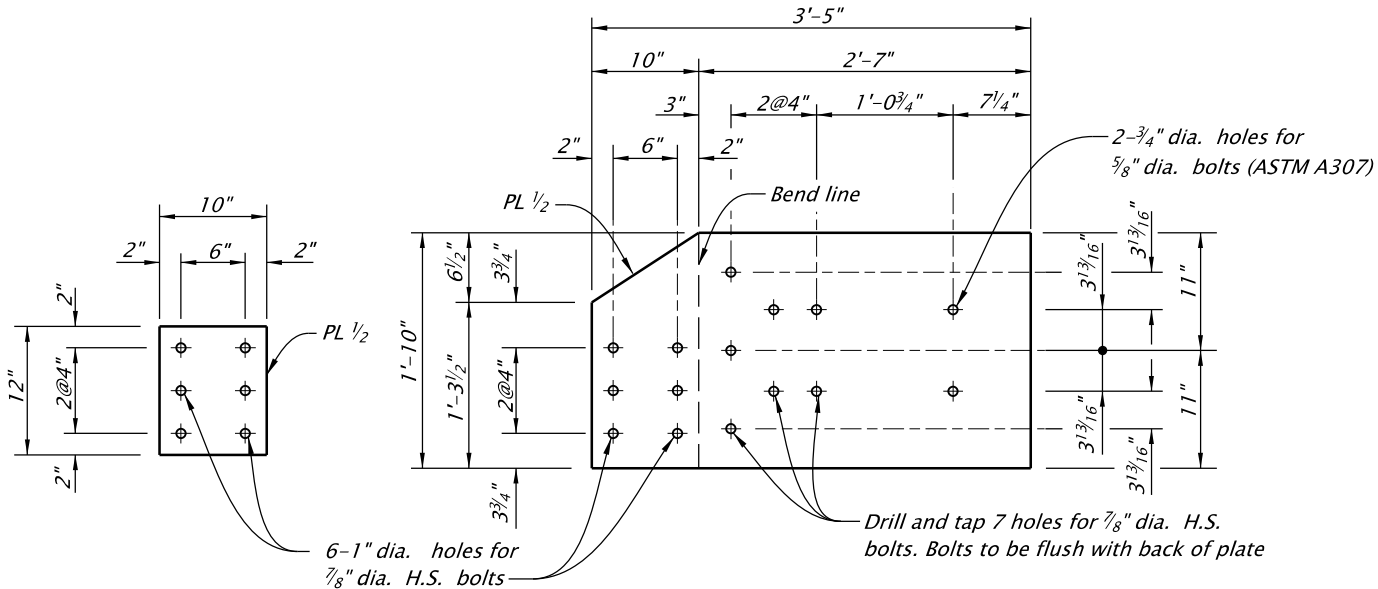


PLAN



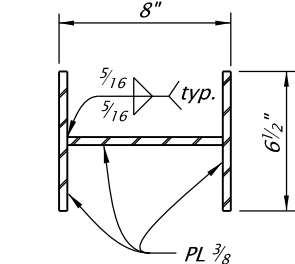
SECTION 'A-A'

SECTION 'B-B'

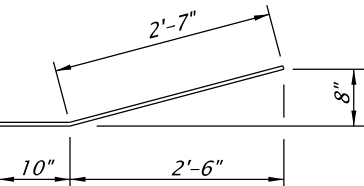


BACK PLATE

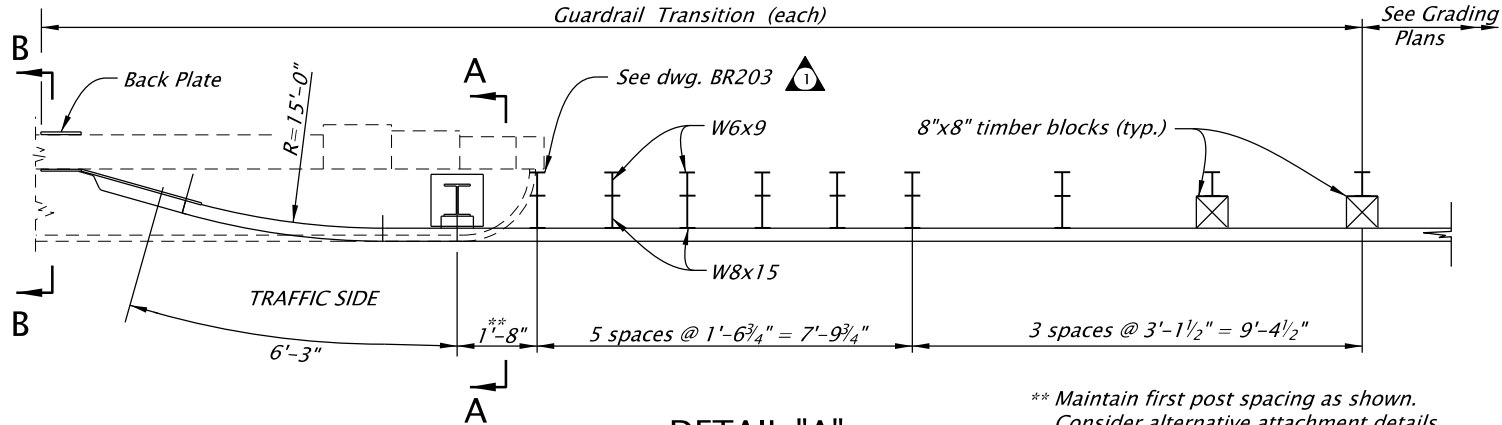
DEVELOPED VIEW: CONNECTION PLATE



ALTERNATE POST

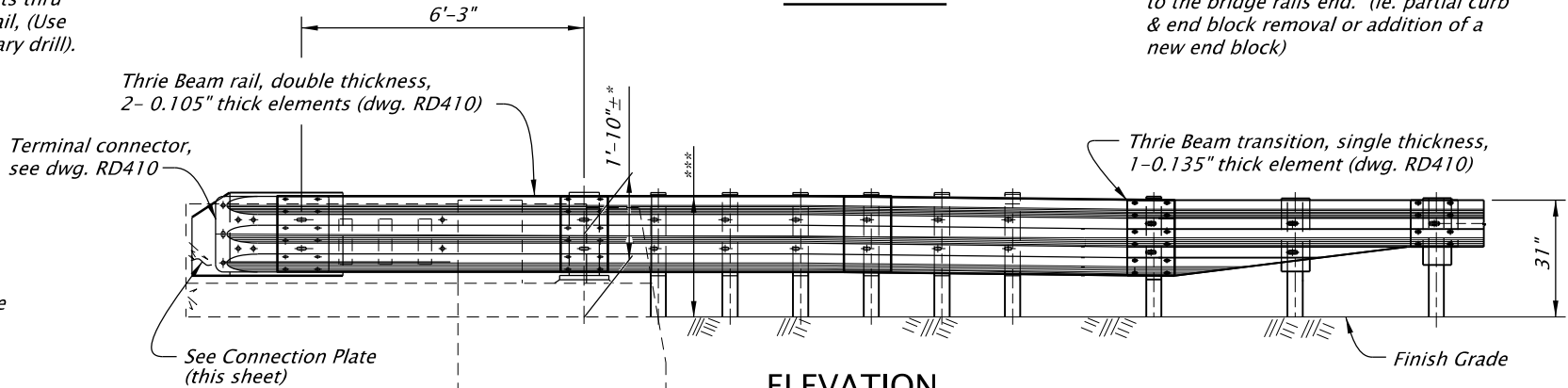


CONNECTION PLATE BEND DETAILS



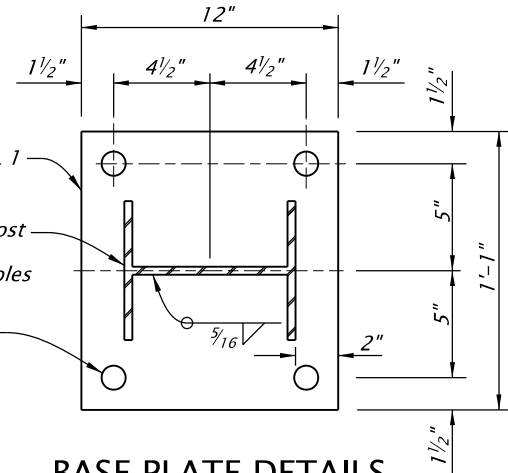
DETAIL "A"

\*\* Maintain first post spacing as shown. Consider alternative attachment details to the bridge rails end. (ie. partial curb & end block removal or addition of a new end block)



ELEVATION

NOTE  
\*If curb height is less than 8", use 1'-9 1/2" for this dimension.



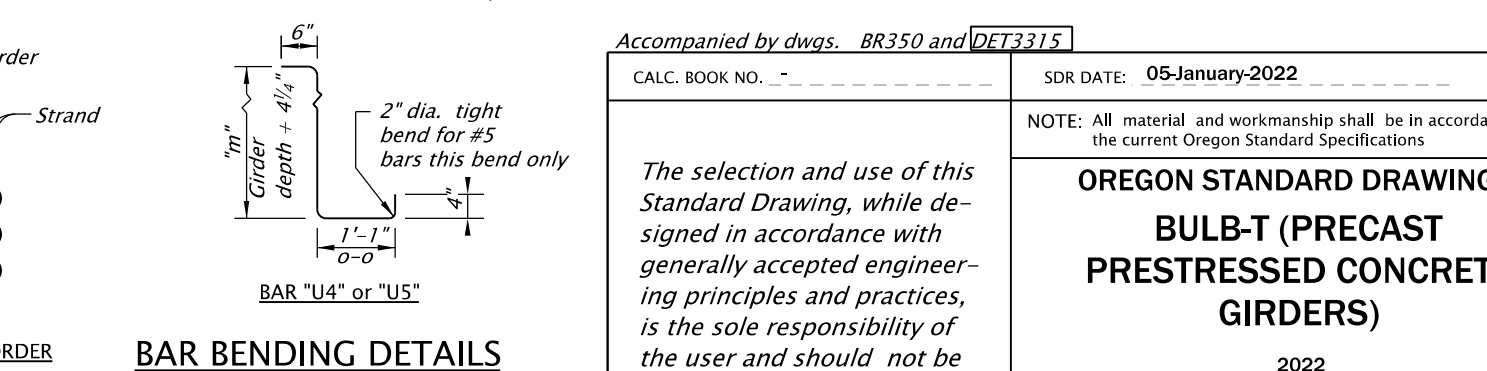
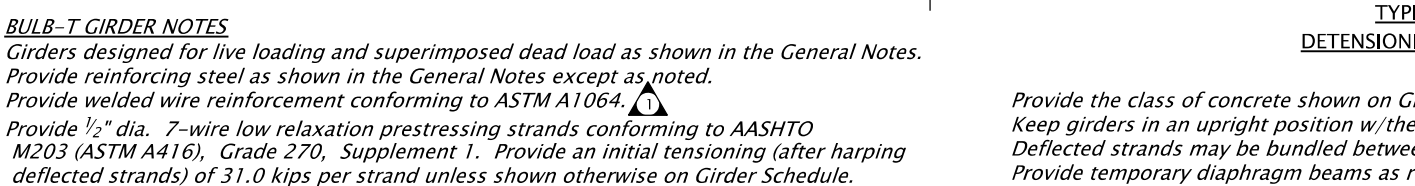
BASE PLATE DETAILS

GENERAL NOTES  
Provide non-epoxy grout for the 2" nominal grout pads as noted in Section 02080.  
Provide structural steel conforming to AASHTO Specification M183 (ASTM A36).  
Provide all H.S. bolts conforming to AASHTO M164 (ASTM A325).  
Provide and install High Strength resin bonded anchors (Grade 105) according to ODOT Specification 00535.  
Hot-dip galvanize all anchor rods, washers, and nuts after fabrication.  
Hot-dip galvanize all connection plate bolts, plates, and washers after fabrication of plates.  
Field verify before fabrication.

\*\*\*Transition top of rail height to match 31" approach rail.

Accompanied by dwgs. BR203, RD405, RD410

CALC. BOOK NO. -		SDR DATE: 01-January-2022	
<p>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</p>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>RAIL TRANSITION FROM FLEX BEAM RAIL TO CURB AND PARAPET RAIL</b>	
		<b>2022</b>	
		DATE	REVISION DESCRIPTION
		01-2022	-Modified detail note text; removed (NOTE 3 and Section D-D) notation.
		-	-
		-	-
		-	-
		-	-



Effective Date: June 1, 2022 - November 30, 2022 BR310

br321.dqn 12/28/21



## TYPICAL ELEVATION



**NOTE**  
Cards in a  
about

8	1	2	7
9	4	3	10
12	5	6	11



AHEAD END OF GIRDER  
(on stationing)



CALC. BOOK NO.

SDR DATE: 05-January-2022

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

**OREGON STANDARD DRAWINGS  
BT90 AND BT96 (PRECAST  
PRESTRESSED CONCRETE  
GIRDERS)**

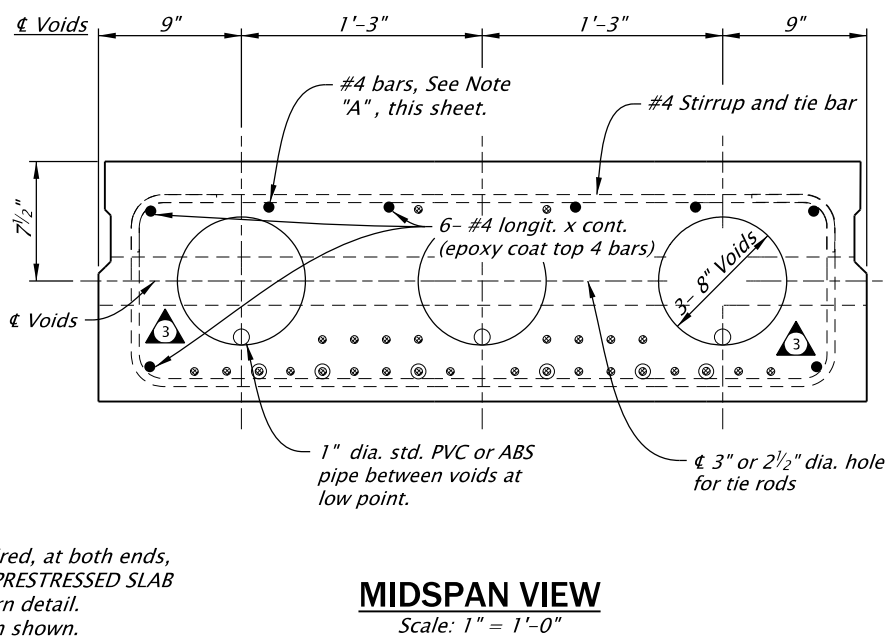
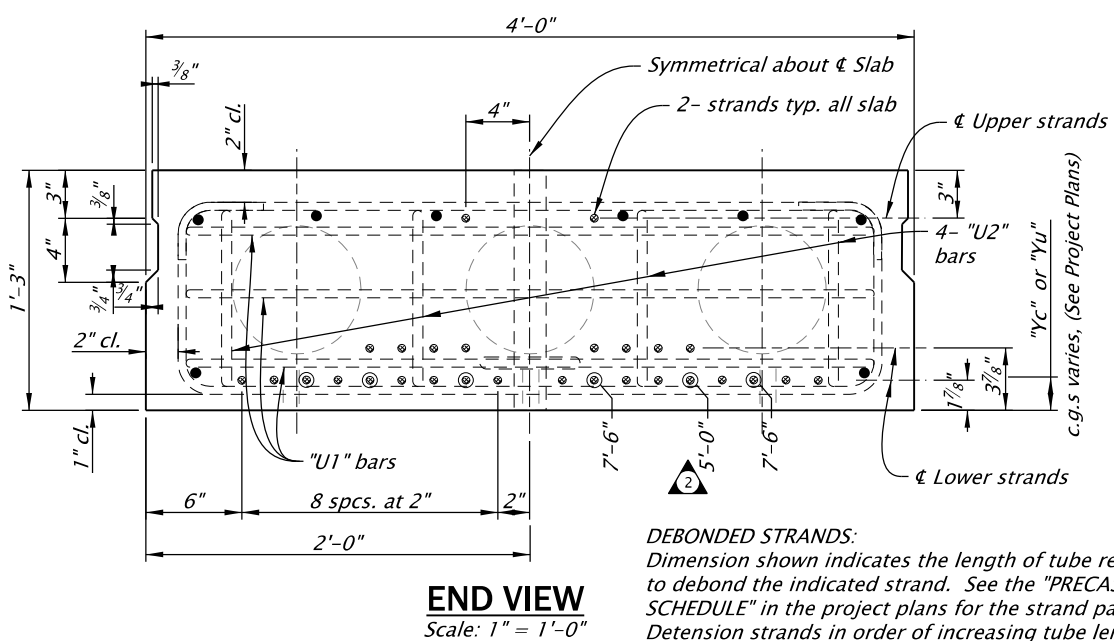
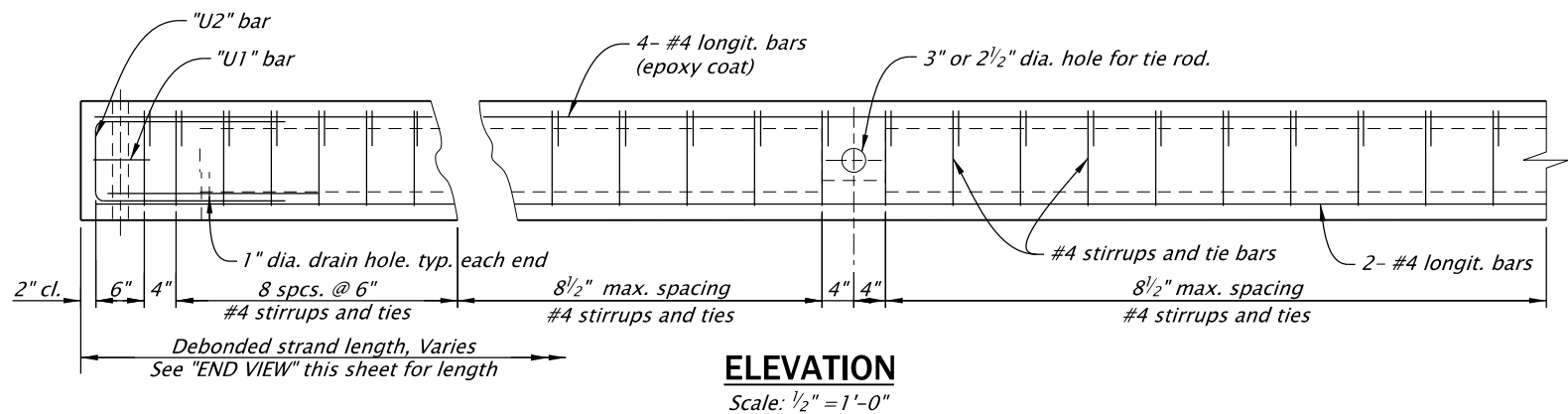
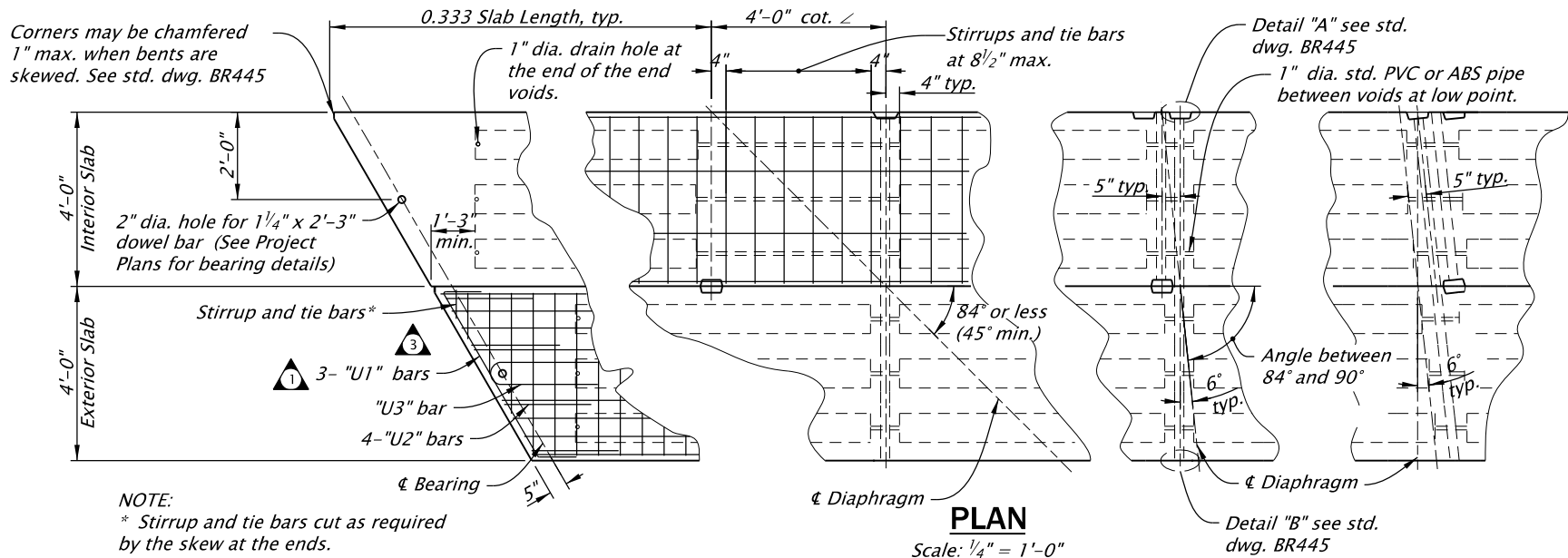
2022

DATE	REVISION DESCRIPTION
01-2022	Revised welded wire reinforcement specification.
-	-
-	-
-	-
-	-

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*

**Effective Date: June 1, 2022 - November 30, 2022**

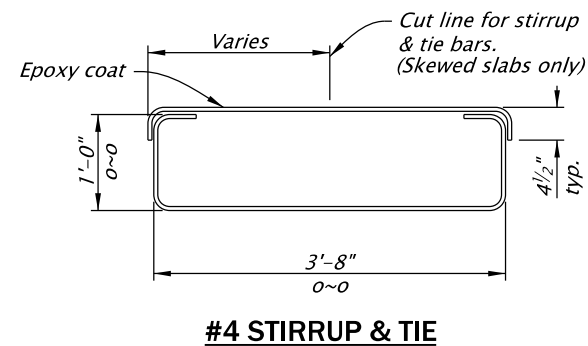
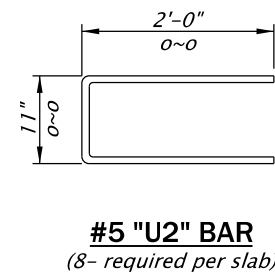
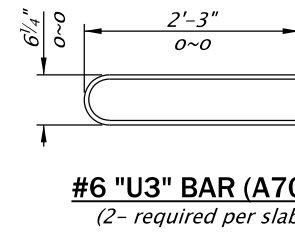
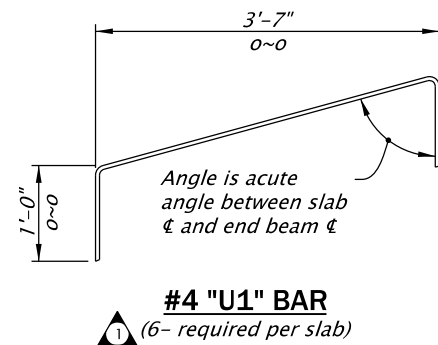
BR321



**NOTE "A" (Slab End Bars)**  
2- #4 x 7'-6", slab 5  
2- #4 x 10'-0", slabs 6, 7, and 8  
2- #4 x 12'-6", slab 9  
Place bars each end of each slab (Epoxy coat).

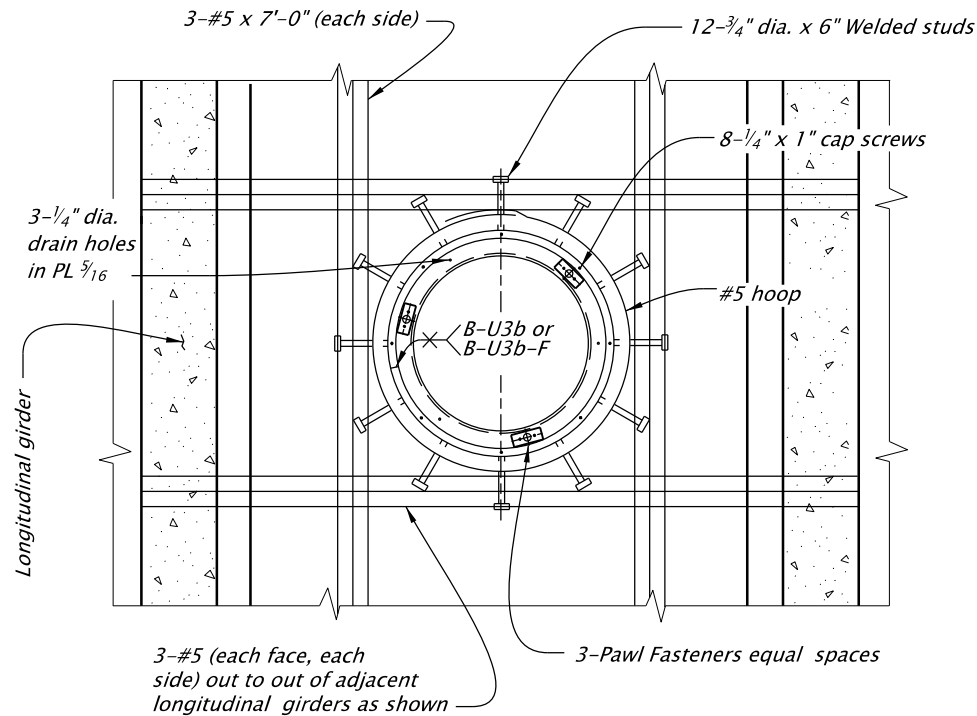
**NOTE:**  
Grout keyway as specified in General Notes.  
Omit keyway on exterior side of exterior slabs.  
Keyway is continuous.

SECTION PROPERTIES	
Area =	562in <sup>2</sup>
c.g. =	7.45 in
I =	12,769 in <sup>4</sup>
St =	1691 in <sup>3</sup>
Sb =	1714 in <sup>3</sup>
Weight =	605 lbs/ft
J =	31,900 in <sup>4</sup>
K =	0.69
V/S =	4.46
Form wt =	10 lbs/ft (tubes)
Total wt	
w/forms=	615 lbs/ft
Diaphragm Weight	
No Skew	170 lb
15° Skew	270 lb
30° Skew	470 lb
45° Skew	750 lb



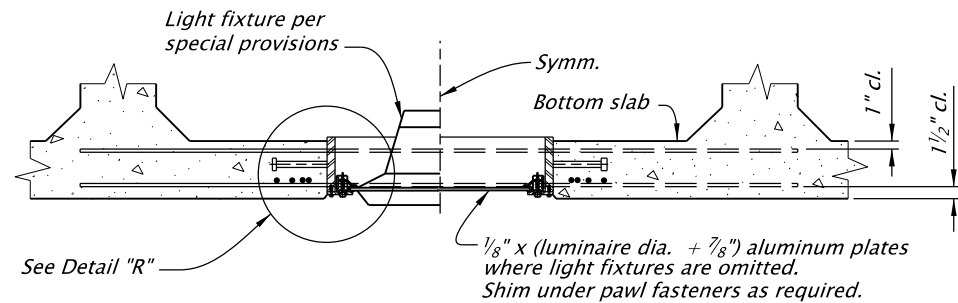
Accompanied by dwg. BR445

CALC. BOOK NO. -		SDR DATE: 05-January-2022	
<p>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</p>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>15" PRECAST PRESTRESSED SLAB</b>	
		<b>2022</b>	
		DATE	REVISION DESCRIPTION
		07/2020	Added end zone reinf.
		07/2020	Revised debonded lengths
		07/2020	Updated drawing to current stds.
		01/2022	Revised #4 bars to be inside of #4 stirrup, Removed "D1" hoop notation.
		-	-

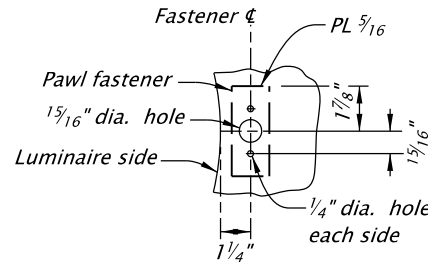


**PLAN: UNDERDECK LUMINAIRE**

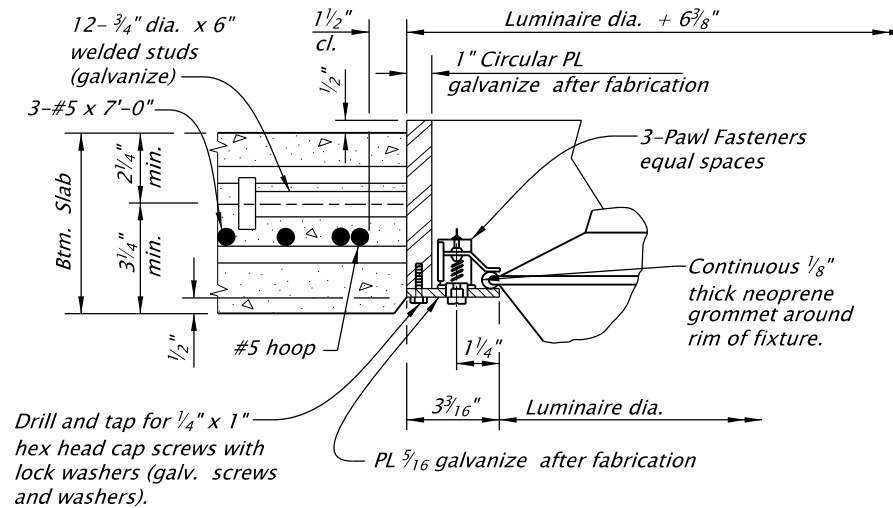
Note  
Bottom slab rebar not shown.



**SECTION: UNDERDECK LUMINAIRE**



**MOUNTING PLAN FOR  
PAWL FASTENER**  
(3 Places each luminaire)

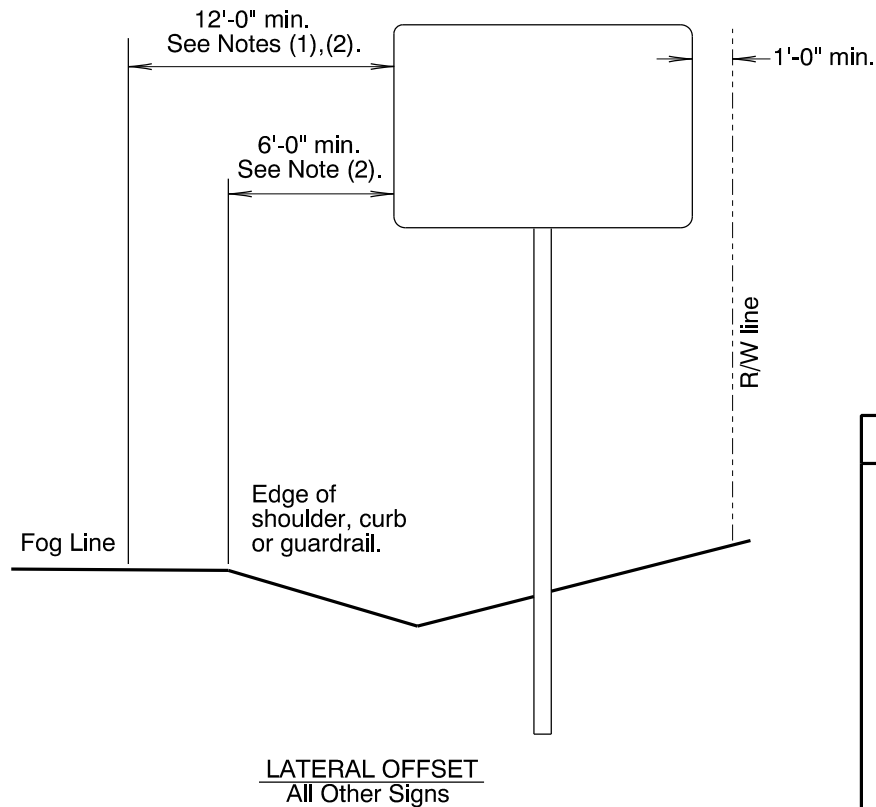
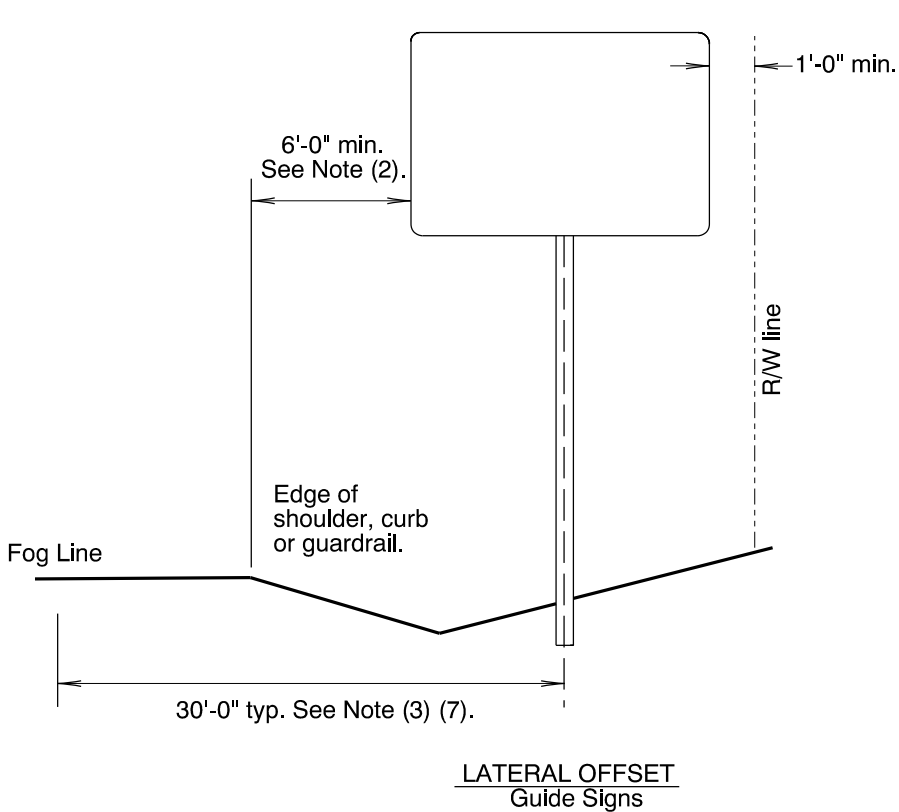
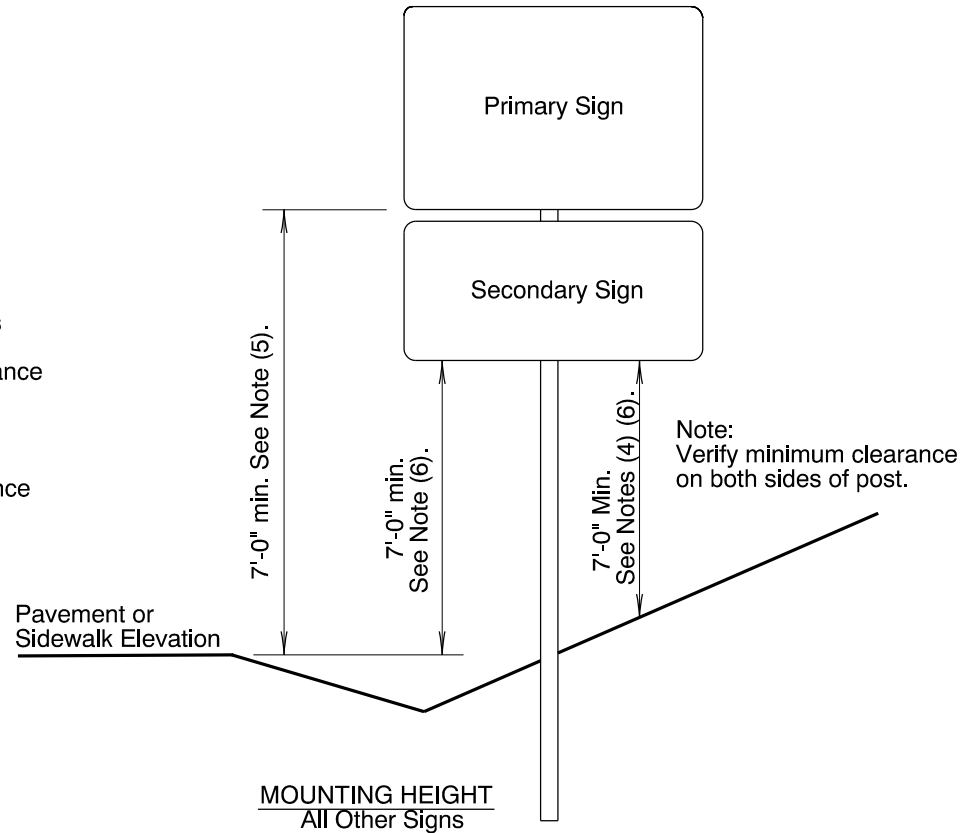
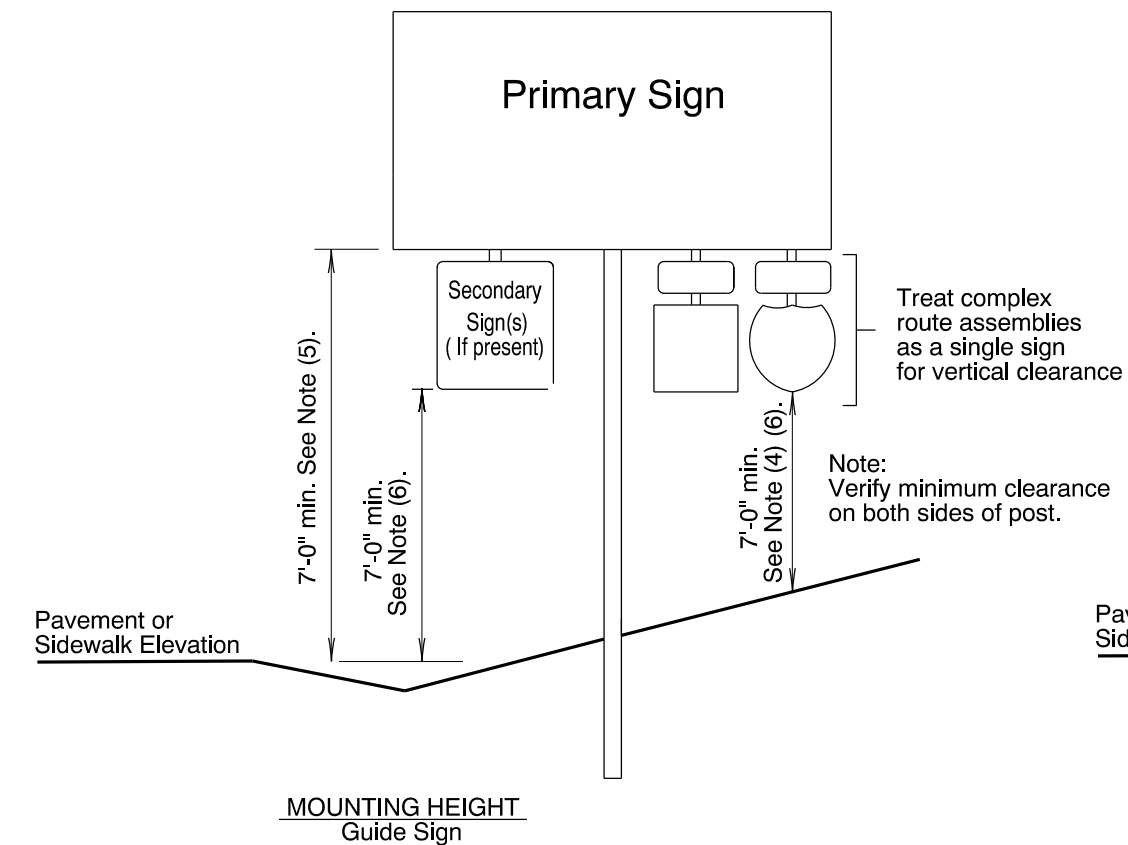


**DETAIL "R"**

GENERAL NOTES:  
See project plans for concrete in box girder.  
Provide reinforcing steel according to ASTM A706, or AASHTO M31 (ASTM A615) Grade 60.  
Stop bottom slab reinforcing steel 1" clear of circular plate.  
Provide other steel according to AASHTO Specifications M183 (ASTM A36).  
Fabricate welded studs with material, welding and inspection according to AWS D1.1.  
See dwgs. TM629 and TM630 for other luminaire support details.

Accompanied by dwgs. TM629 and TM630.

CALC. BOOK NO. - - - - -		SDR DATE: 01-January-2022	
<p>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</p>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>UNDERDECK LUMINAIRE WITH MOUNTING DETAILS</b>	
		2022	
		DATE	REVISION DESCRIPTION
		01-2022	Modified General Notes, removed "Section 7" notation.
		-	-
		-	-
		-	-
		-	-



General Installation Notes:

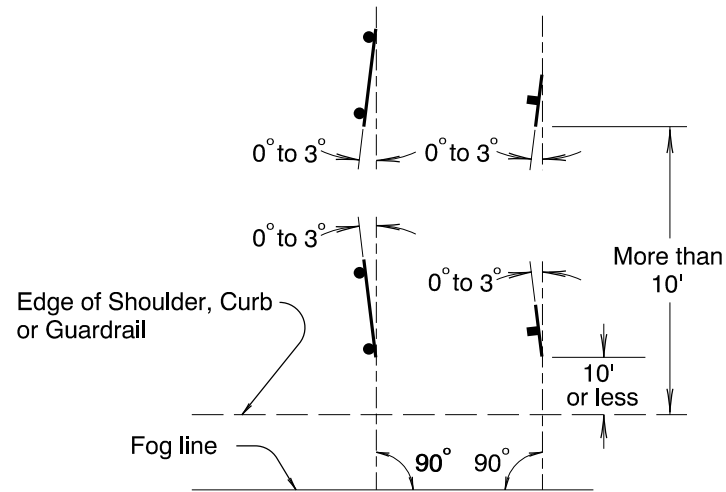
- a. Signing details shown on this sheet are intended to convey "typical" conditions only. Individual locations may require installation different from those shown.  
For guidance regarding unique installations or exceptions call the Project Sign Designer or Region Traffic Section.
- b. Locate breakaway supports away from ditches to avoid problems with erosion, corrosion, debris, maintenance and breakaway performance. See Dwg. No. TM635 for more information.
- c. For wood post support details see Dwg. No. TM670.
- d. For perforated steelsquare tube support details see Dwg. No. TM681.
- e. For triangular base breakaway support details see Dwg. No. TM602.
- f. For multi-post breakaway support details see Dwg. No. TM600.
- g. Mounting heights should not be more than 3 inches more than the minimum heights shown, where practical.
- h. 2" vertical spacing between all signs.

Notes:

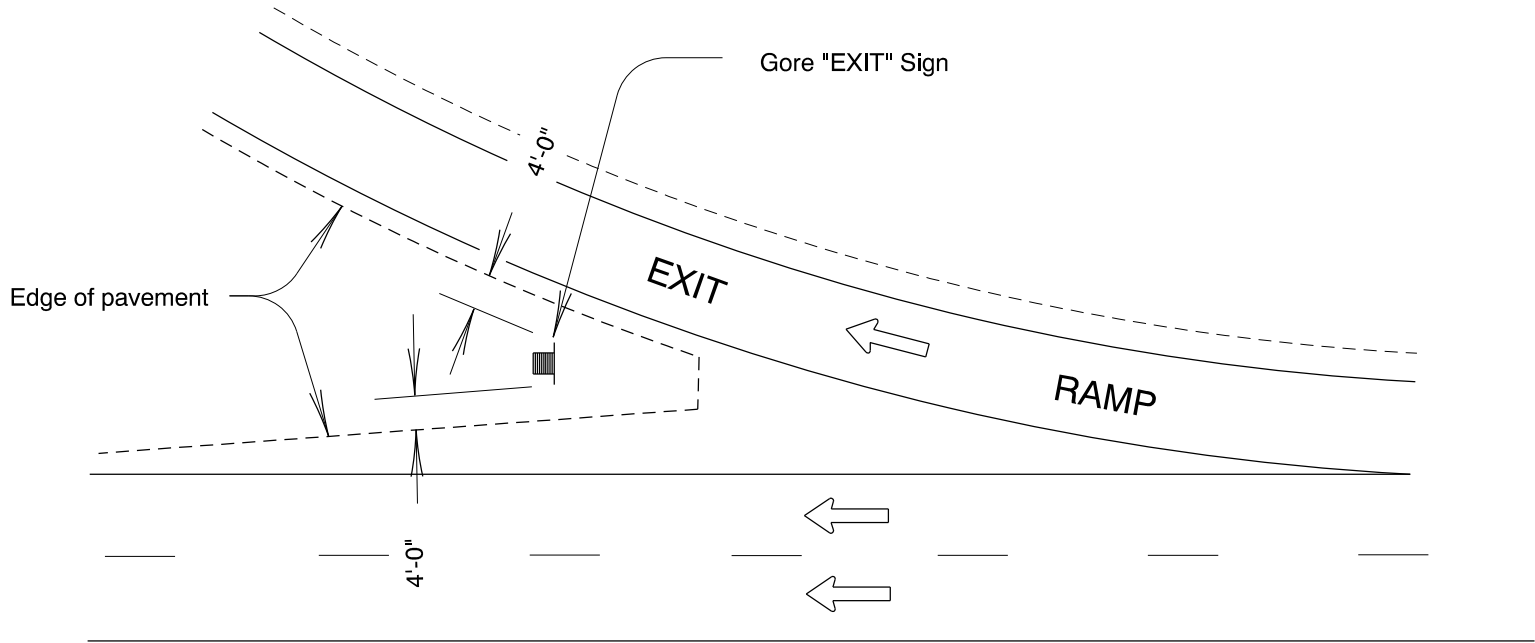
- 1). 6' minimum if behind barrier.
- 2). 2' minimum if restricted R/W.
- 3). 20' for ramp terminals.
- 4). 8' minimum if bicycle path underneath.
- 5). 8' minimum if secondary signs attached.
- 6). 5' minimum if outside clearzone, in rural areas and no pedestrians underneath.
- 7). For multi-post installations measure distance from post closest to roadway.

CALC. BOOK NO. N/A		SDR DATE 01/07/2022	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		OREGON STANDARD DRAWINGS	
		SIGN INSTALLATION DETAILS	
		2021	
		DATE	REVISION DESCRIPTION
		1/07/22	Edited elevation text in Mounting Height details

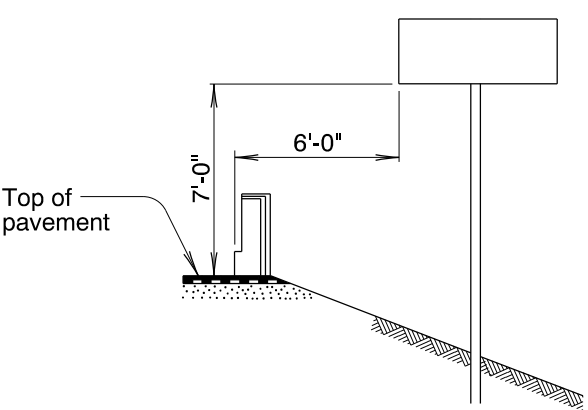




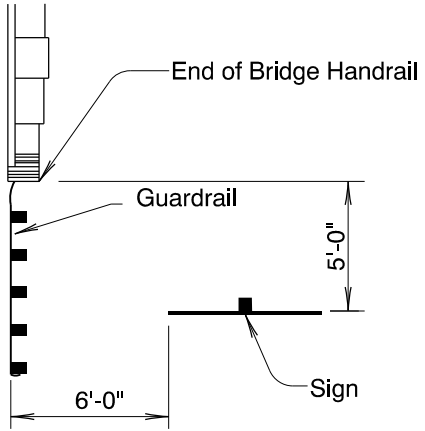
SIGN PLACEMENT



TYPICAL "EXIT" SIGN INSTALLATION



ELEVATION

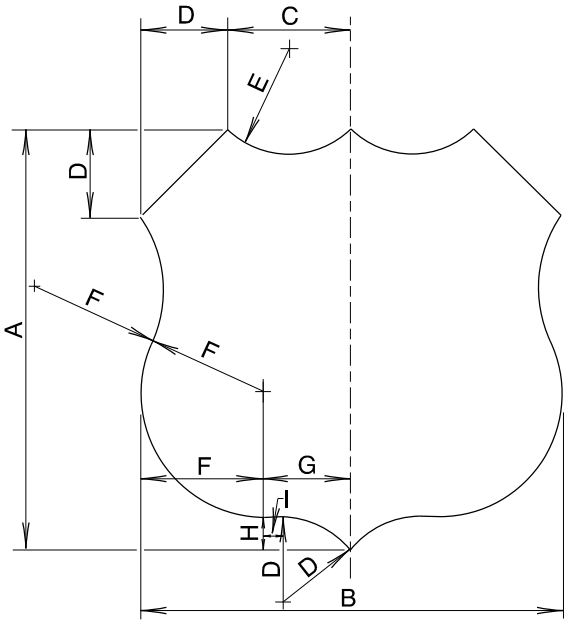


PLAN

SIGN LOCATION FOR FREEWAY OVERCROSSING  
(MINIMUM VALUES)

CALC. BOOK NO. <u>N/A</u>		SDR DATE <u>1-07-22</u>	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>MISCELLANEOUS SIGN PLACEMENT DETAILS</b>	
		2021	
		DATE	REVISION DESCRIPTION
		1/07/22	Changed angle dimension in Sign Placement detail

U.S. ROUTE MARKERS



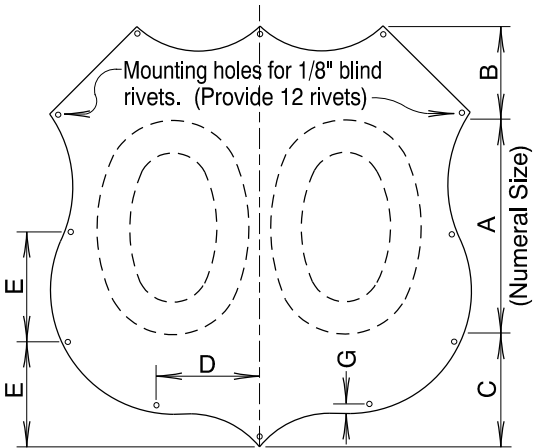
BASIC U.S. ROUTE DESIGN

SIZE	A	B	C	D	E	F	G	H	I
18	18	18	5¼	3¾	3¾	5¼	3¾	1½	¾
18	18	22½	7½	3¾	6¾	5¼	6	1½	2¾

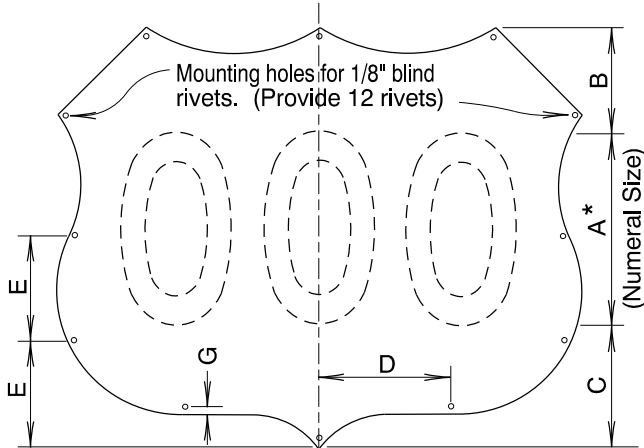
NOTE: Use sheet aluminum overlay with rivet holes for mounting on extruded aluminum panel signs.

2- OR 3-DIGIT U.S. ROUTE MARKERS

SHIELD SIZE		NO. OF DIGITS	A*	B	C	D	E	G
HEIGHT	WIDTH							
18	18	2	9" D	4 1/8	4 7/8	4½	4½	¾
18	22½	3**	9" D	4 1/8	4 7/8	5 5/8	4½	¾



For 2 Digit U.S. Routes



For 3 Digit U.S. Routes

Notes: The Federal Highway Administration's standard rounded capital letter alphabets and letter spacing shall be used. The series for the numeral and the size and series for the letter suffix of the route number shall be as shown hereon. The letter shall be placed beside the numerals.

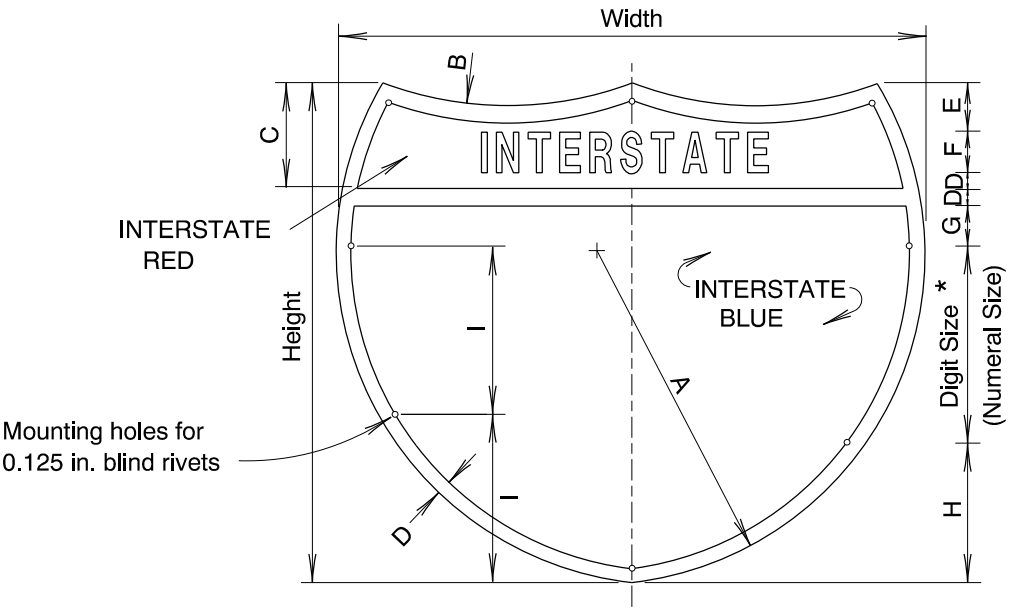
US Route Markers shall have non-reflectorized black letters, symbols and borders on a white ASTM Type III or Type IV retroreflective sheeting background. Use white ASTM Type IX or XI retroreflective sheeting background for overhead installations.

The Interstate Route Marker shall have white ASTM Type III or Type IV retroreflective sheeting overlaid with Standard Interstate red and blue transparent past background with white ASTM Type III or Type IV retroreflective sheeting letters and symbols. Use white Type IX or XI sheeting background and white Type IX or XI letters and symbols for overhead installations.

\* In a few cases numerals cannot be accommodated within the space available. For these situations, the Standard Series "D" numeral may be reduced to Series "C", or as a second choice to the next smaller height commonly available. Where the numerals are reduced in height the reduction shall be divided equally and added to the dimensions "B" & "C".

\*\* If at least 2 of the 3 digits are "1", then use shield size corresponding to a 2 digit number.

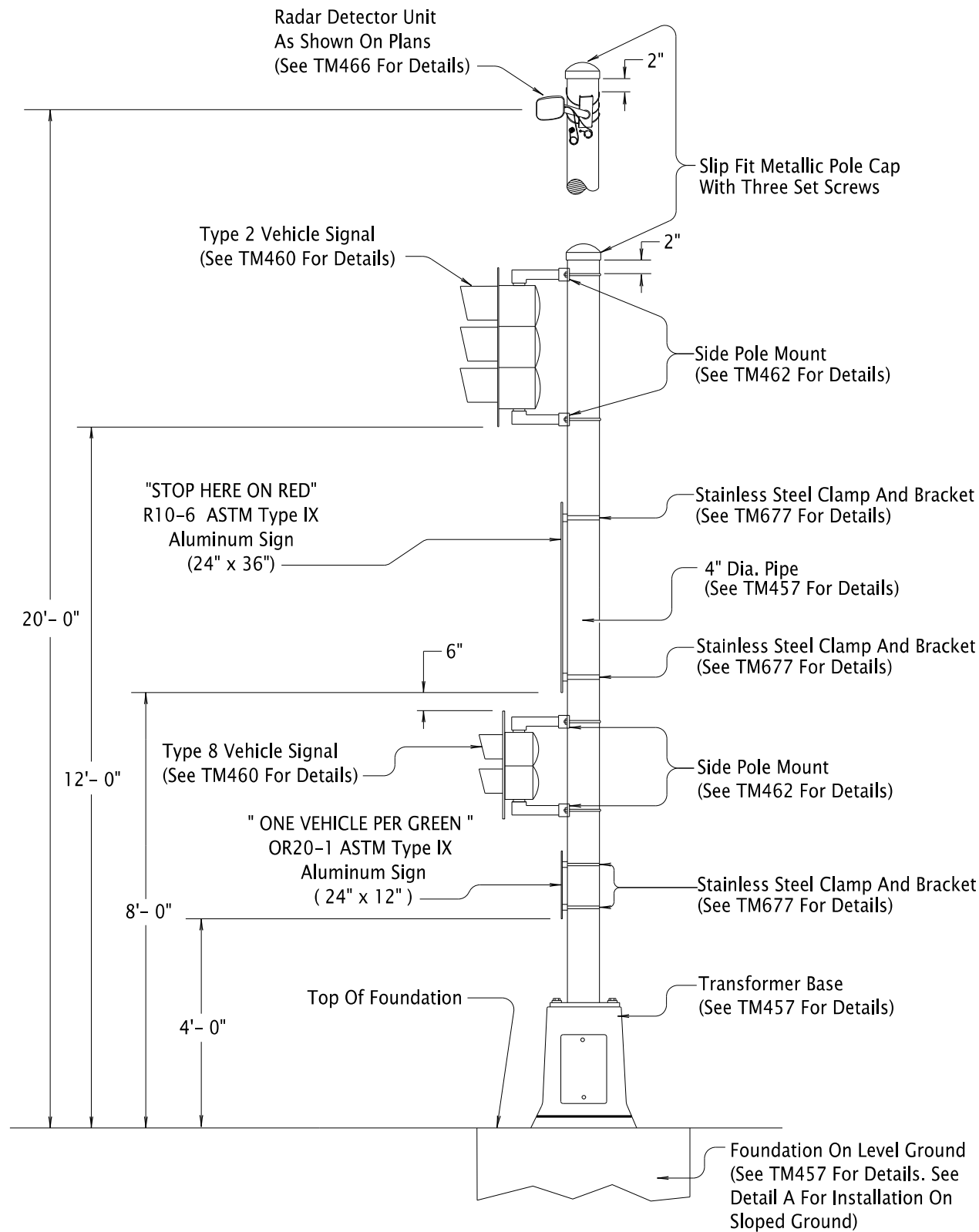
INTERSTATE ROUTE MARKERS



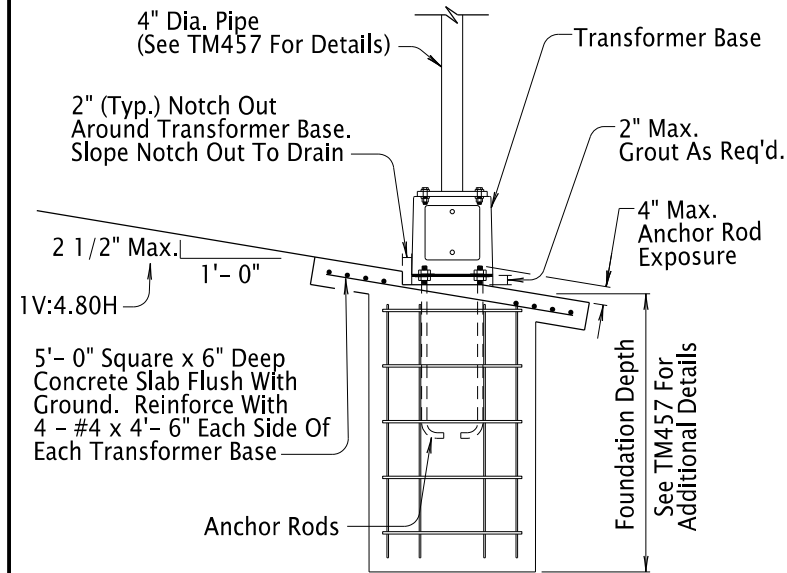
INTERSTATE ROUTE MARKERS

Shield Size	Digit Size *	No. of Digits	Height	Width	A	B	C	D	E	F	G	H	I
18	9" D	1, 2	18	18	11¼	11¼	3¾	3/8	1½	1 7/8C	¾	4 1/8	6
	9" D	3**	18	22½	12¾	18	3¾	3/8	1½	1 7/8C	¾	4 1/8	6

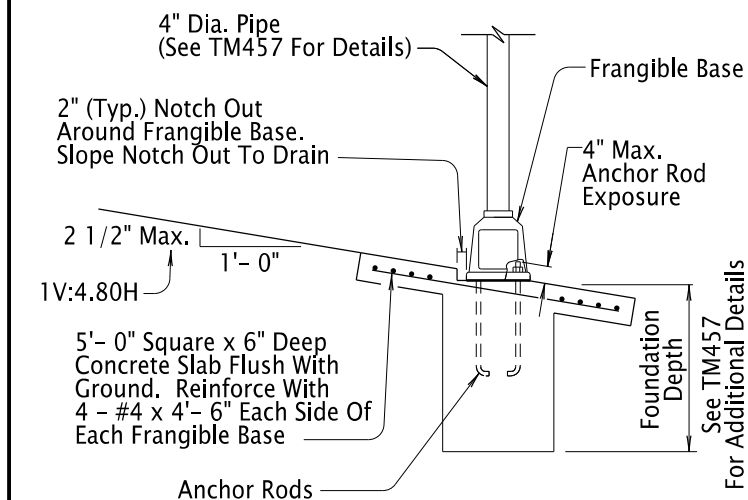
CALC. BOOK NO. N/A		SDR DATE 1/07/2022	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		OREGON STANDARD DRAWINGS	
		SIGNING DETAILS	
		US & INTERSTATE ROUTE SHIELDS	
		2021	
DATE		REVISION DESCRIPTION	
6/30/21		Replaced references to "silver-white" text with "white."	
1/07/22		Replaced a reference to "silver-white" text with "white."	



**RAMP METER PEDESTAL ASSEMBLY**  
(See TM457 (Vehicle Signal Pedestal) For Additional Details)



**DETAIL A: SLOPED CONCRETE SLAB  
FOR VEHICLE SIGNAL PEDESTAL**  
(See TM457 (Vehicle Signal Pedestal) For Additional Details)

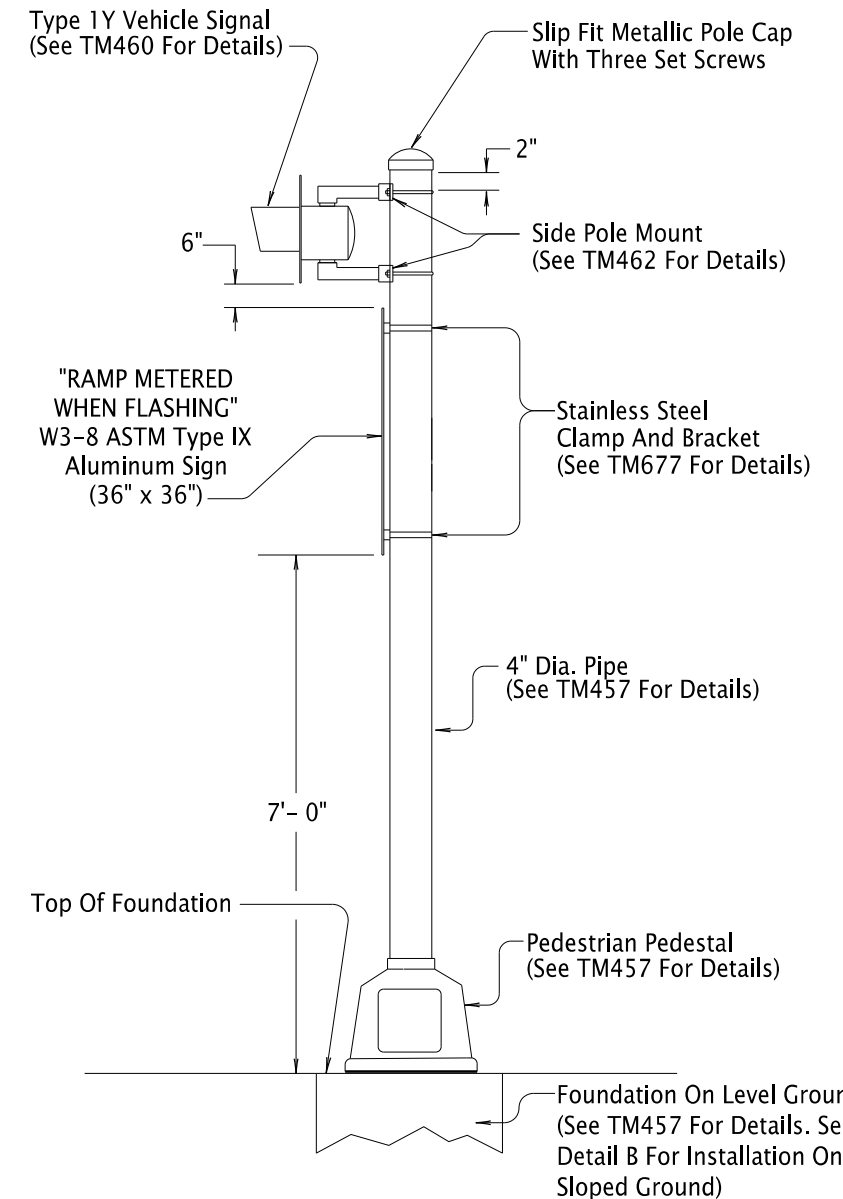


**DETAIL B: SLOPED CONCRETE SLAB  
FOR PEDESTRIAN SIGNAL PEDESTAL**  
(See TM457 (Pedestrian Signal Pedestal) For Additional Details)

**General Notes:**

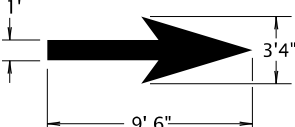
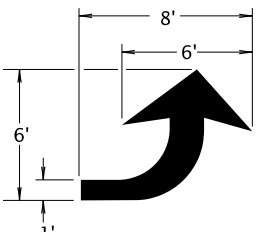
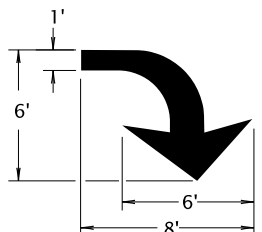
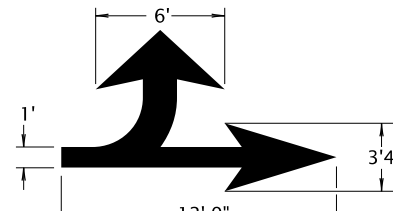
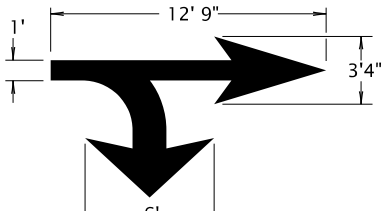
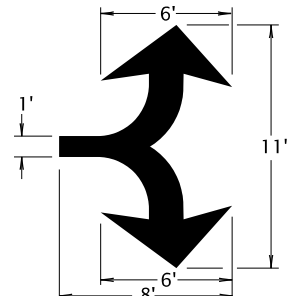
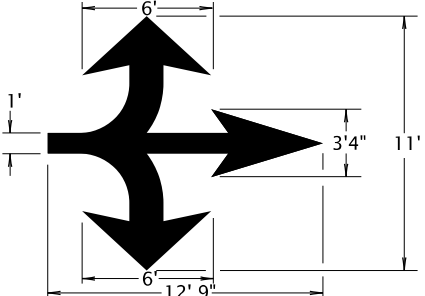
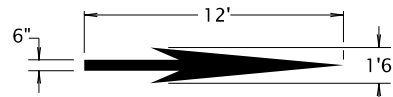
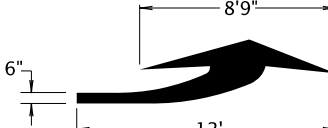
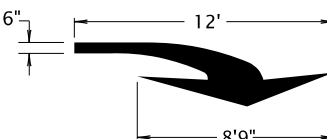
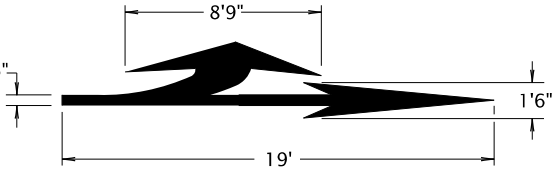
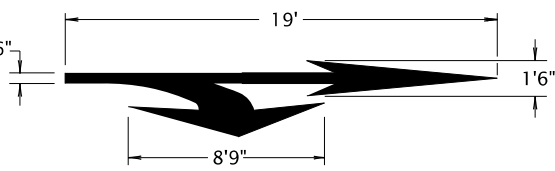
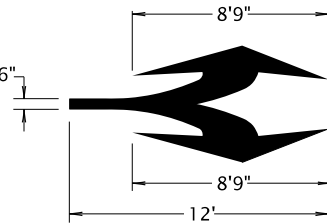
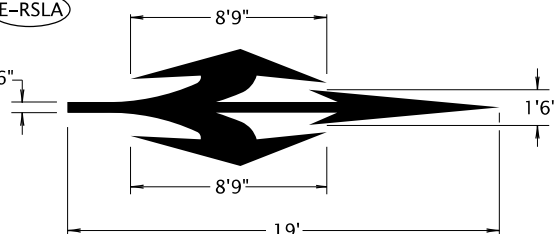
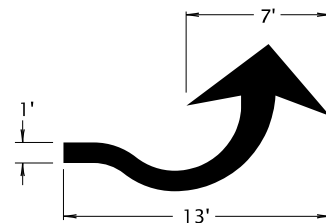
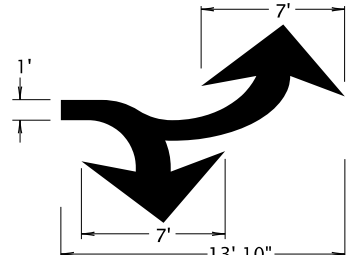
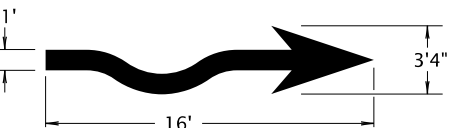
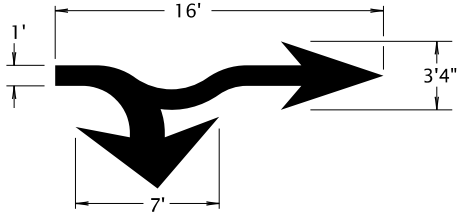
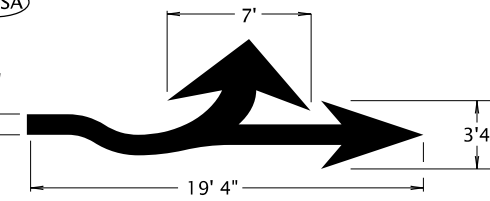
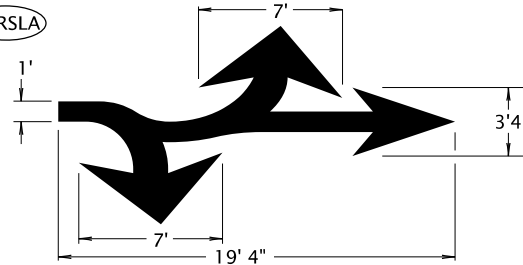
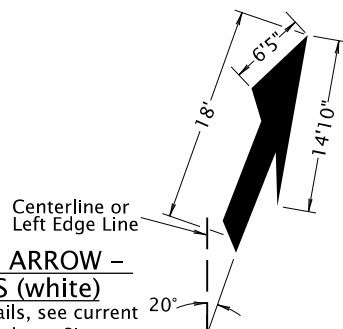
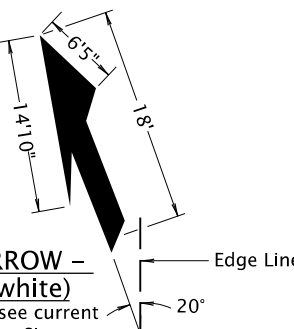
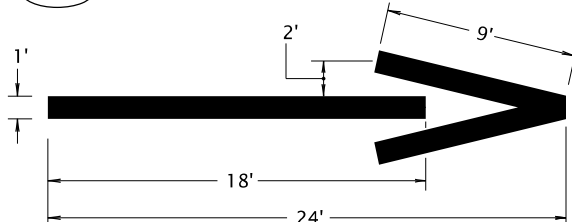
1. Do NOT Install Signal Poles Within Paved Gore Area.
2. Locate Ramp Meter Pedestal 25'-0" Beyond Stop Line Or As Shown.
3. Field Verify Pole Lengths To Maintain Clearances.

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*



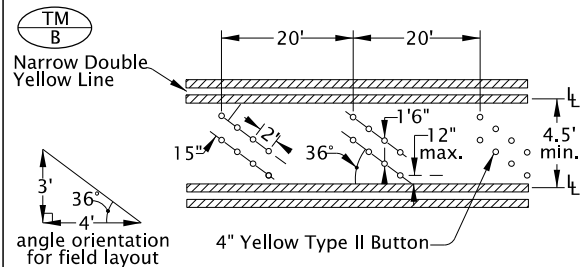
**RAMP METER ADVANCE WARNING SIGN ASSEMBLY**  
(See TM457 (Pedestrian Signal Pedestal) For Additional Details)

CALC. BOOK NO. _ N/A _ _ _		SDR REPORT DATE 4-Jan-2022 _ _ _	
<p><i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i></p>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		OREGON STANDARD DRAWINGS	
		RAMP METER PEDESTAL DETAILS	
		2021	
		DATE	REVISION DESCRIPTION
		01/21	Revised Drafting, Added Radar Mount Reference, Added Sloped Ground Details, Changed Note 2 From 10 To 25 Feet.
		1/22	Referenced TM457 for all pipe info

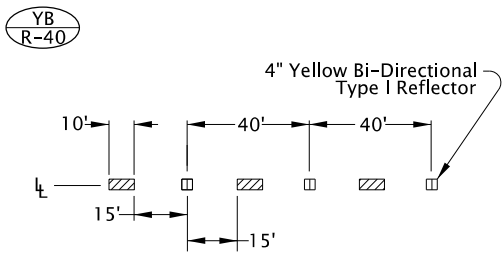
<div>SA</div>  <div>STRAIGHT ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>LA</div>  <div>LEFT TURN ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>RA</div>  <div>RIGHT TURN ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>LSA</div>  <div>LEFT TURN STRAIGHT ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>RSA</div>  <div>RIGHT TURN STRAIGHT ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>
<div>RALA</div>  <div>RIGHT TURN LEFT TURN ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>RSLA</div>  <div>RIGHT TURN STRAIGHT LEFT TURN ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>E-SA</div>  <div>ELONGATED STRAIGHT ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>E-LA</div>  <div>ELONGATED LEFT TURN ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>E-RSA</div>  <div>ELONGATED RIGHT TURN ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>
<div>E-LSA</div>  <div>ELONGATED LEFT TURN STRAIGHT ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>E-RSA</div>  <div>ELONGATED RIGHT TURN STRAIGHT ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>E-RALA</div>  <div>ELONGATED RIGHT TURN LEFT TURN ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>E-RSLA</div>  <div>ELONGATED RIGHT TURN STRAIGHT LEFT TURN ARROW (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>F-LA</div>  <div>FISH-HOOK LEFT TURN ARROW (white) For arrow proportion details, see the current ODOT Traffic Line Manual</div>
<div>F-RALA</div>  <div>FISH-HOOK RIGHT TURN LEFT TURN ARROW (white) For arrow proportion details, see the current ODOT Traffic Line Manual</div>	<div>F-SA</div>  <div>FISH-HOOK STRAIGHT ARROW (white) For arrow proportion details, see the current ODOT Traffic Line Manual</div>	<div>F-RSA</div>  <div>FISH-HOOK RIGHT TURN STRAIGHT ARROW (white) For arrow proportion details, see the current ODOT Traffic Line Manual</div>	<div>F-LSA</div>  <div>FISH-HOOK LEFT TURN STRAIGHT ARROW (white) For arrow proportion details, see the current ODOT Traffic Line Manual</div>	<div>F-RSLA</div>  <div>FISH-HOOK RIGHT TURN STRAIGHT LEFT TURN ARROW (white) For arrow proportion details, see the current ODOT Traffic Line Manual</div>
<div>LRA-L</div>  <div>LANE REDUCTION ARROW – LEFT LANE ENDS (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>LRA-R</div>  <div>LANE REDUCTION ARROW – RIGHT LANE ENDS (white) For arrow proportion details, see current version of Standard Highway Signs</div>	<div>WWA</div>  <div>WRONG-WAY ARROW (white)</div>	<div>CALC. BOOK NO. _ _ _ N/A _ _ _ _ _</div> <div>SDR DATE _ _ _ 01/03/2022 _ _ _ _ _</div> <div>NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications.</div> <div>OREGON STANDARD DRAWINGS</div> <div>PAVEMENT MARKING STANDARD DETAIL BLOCKS</div> <div>2021</div> <div>DATE REVISION DESCRIPTION</div> <div>07/2020 Some Detail Blocks moved to new Std. Drawing TM504</div> <div>01/2022 Fish-hook Arrows added, LRA split into LRA-L and LRA-R</div> <div>01/2022 Corrected bubble callout of LRA-L and typo in LRA-R</div> <div></div> <div></div>	

General Note:

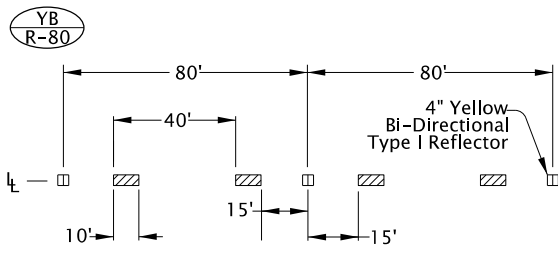
- Center pavement markings within the lane width.
- Arrow and letter dimensions nominal, excluding WWA.



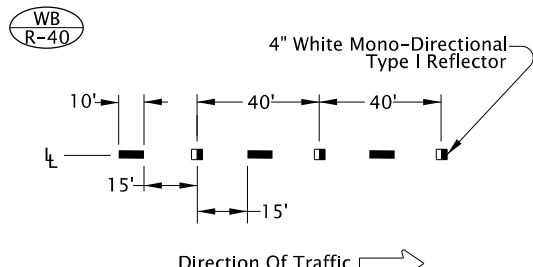
TRANSVERSE MEDIAN BAR SUBSTITUTION  
BUTTON



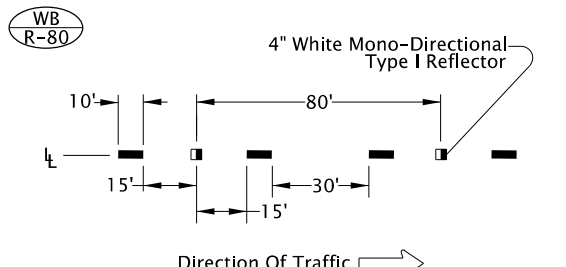
YELLOW BROKEN LINE SUPPLEMENTATION  
REFLECTORS WITH 4" YELLOW BROKEN LINE



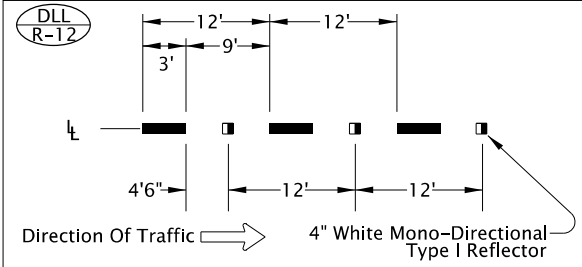
YELLOW BROKEN LINE SUPPLEMENTATION  
REFLECTORS WITH 4" YELLOW BROKEN LINE



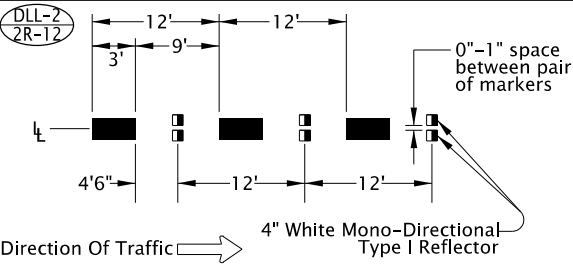
WHITE BROKEN LINE SUPPLEMENTATION  
REFLECTORS WITH 4" WHITE BROKEN LINE



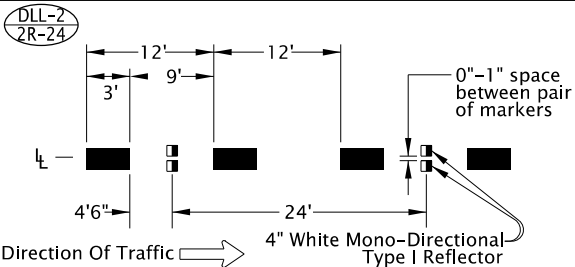
WHITE BROKEN LINE SUPPLEMENTATION  
REFLECTORS WITH 4" WHITE BROKEN LINE



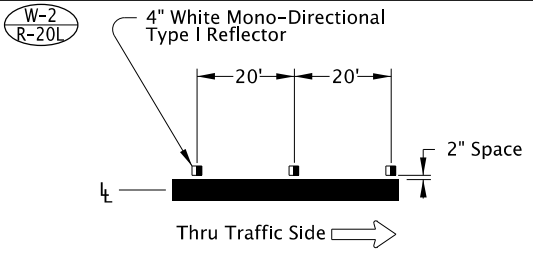
WHITE DOTTED LANE LINE SUPPLEMENTATION  
REFLECTORS WITH 4" WHITE DOTTED LANE LINE



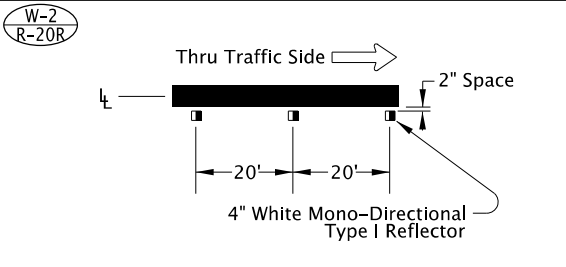
WIDE DOTTED LANE LINE SUPPLEMENTATION  
REFLECTORS WITH 8" WHITE DOTTED LANE LINE



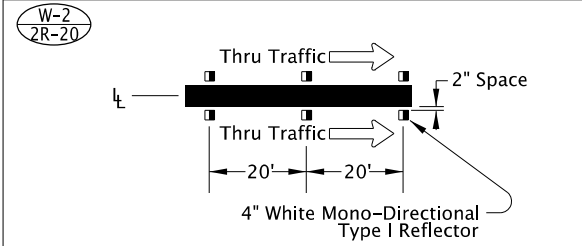
WIDE DOTTED LANE LINE SUPPLEMENTATION  
REFLECTORS WITH 8" WHITE DOTTED LANE LINE



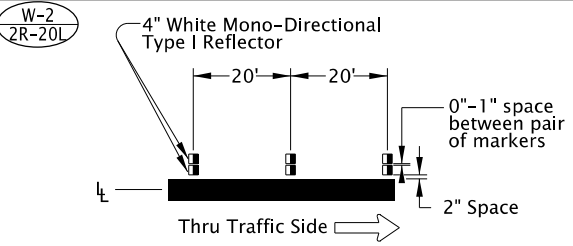
CHANNELIZING LINE POSITIONING GUIDE  
REFLECTORS WITH 8" WHITE LINE



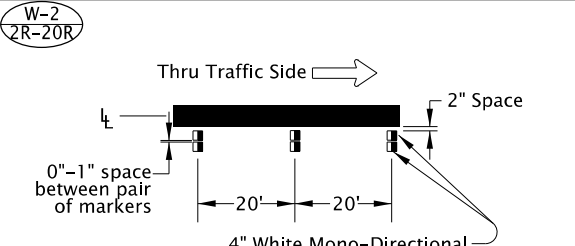
CHANNELIZING LINE POSITIONING GUIDE  
REFLECTORS WITH 8" WHITE LINE



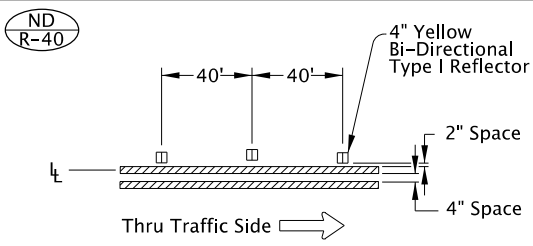
CHANNELIZING LANE LINE POSITIONING GUIDE  
REFLECTORS WITH 8" WHITE LINE



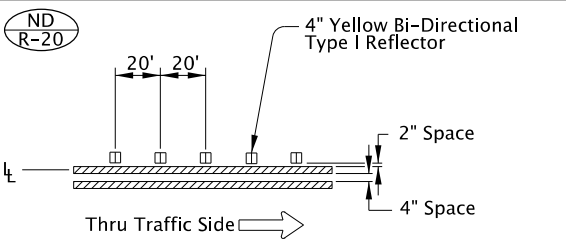
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REFLECTORS WITH 8" WHITE LINE



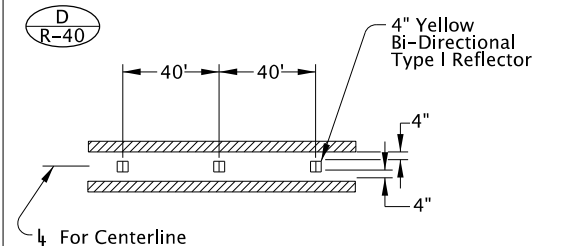
CHANNELIZING LINE SUPPLEMENTATION  
REFLECTORS WITH 8" WHITE LINE



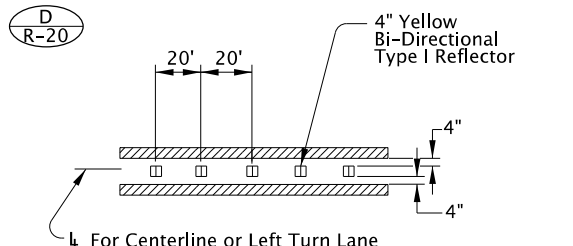
NARROW DOUBLE YELLOW POSITIONING GUIDE  
REFLECTORS WITH TWO 4" YELLOW LINES



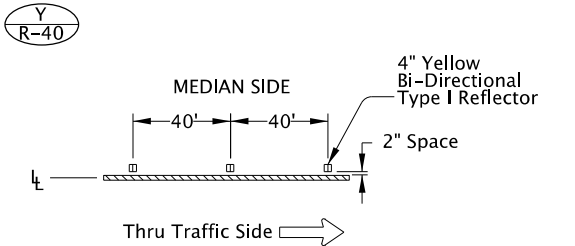
NARROW DOUBLE YELLOW POSITIONING GUIDE  
REFLECTORS WITH TWO 4" YELLOW LINES



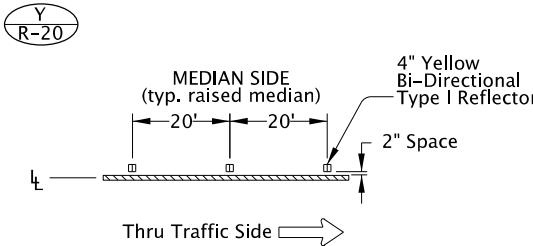
DOUBLE NO-PASS POSITIONING GUIDE  
REFLECTORS WITH TWO 4" YELLOW LINES



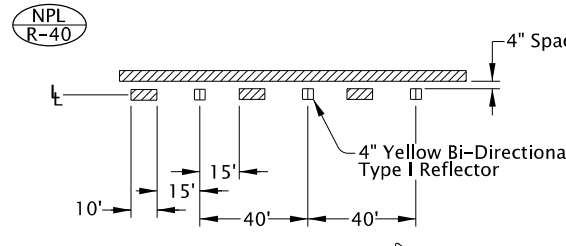
DOUBLE NO-PASS POSITIONING GUIDE  
REFLECTORS WITH TWO 4" YELLOW LINES



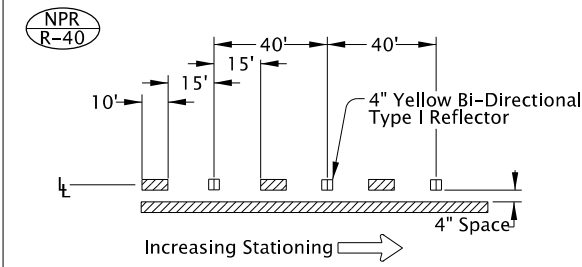
YELLOW LINE POSITIONING GUIDE  
REFLECTORS WITH 4" YELLOW LINE



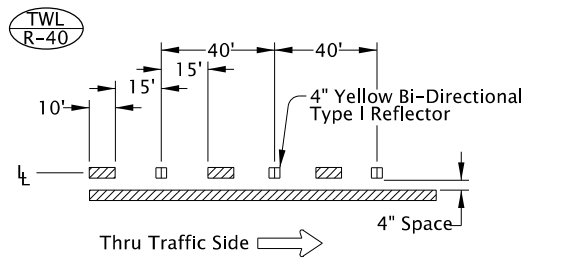
YELLOW LINE POSITIONING GUIDE  
REFLECTORS WITH 4" YELLOW LINE



NO-PASS LEFT POSITIONING GUIDE  
REFLECTORS WITH 4" YELLOW LINES



NO-PASS RIGHT POSITIONING GUIDE  
REFLECTORS WITH 4" YELLOW LINES

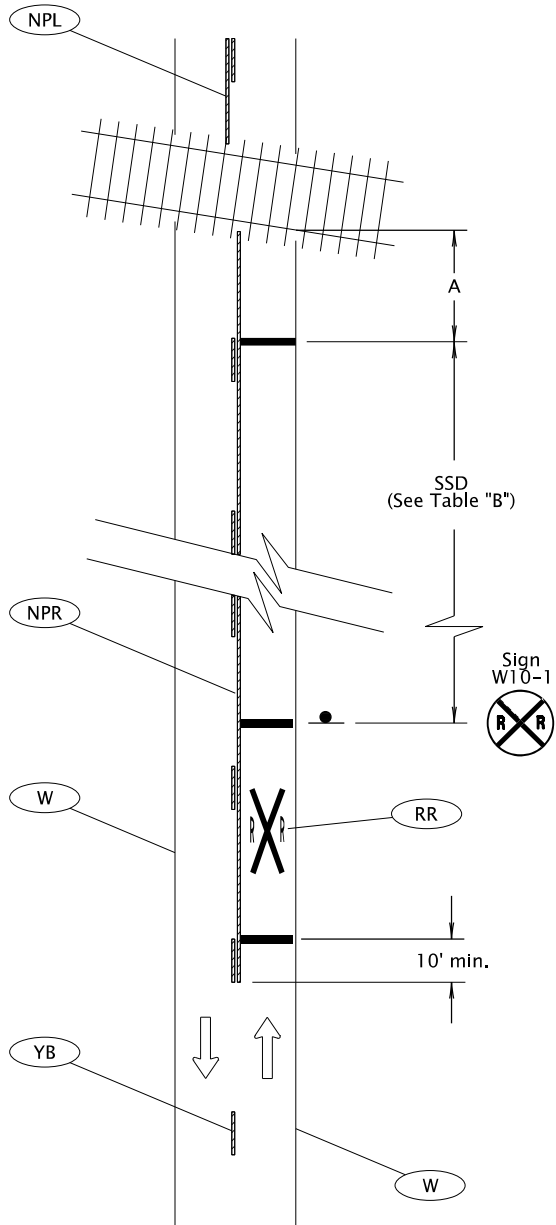


TWO WAY LEFT TURN POSITIONING GUIDE  
REFLECTORS WITH 4" YELLOW LINES

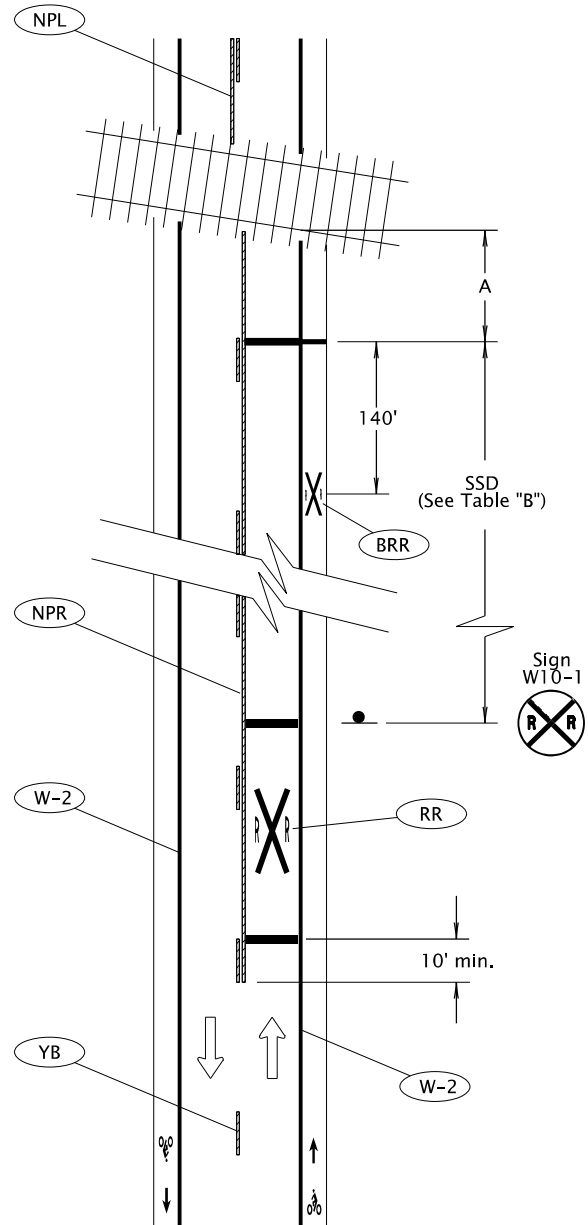
General note:  
1) Surface mount Raised Pavement Markers (RPMs) unless otherwise specified.

- LEGEND
- Direction Of Travel, Increasing Stationing or Thru Traffic Side
  - Lane line dimensions are shown on the striping plans
  - Mono-directional crystal white marker reflects white to the left in this symbol
  - Bi-directional yellow marker reflects yellow both left and right in this symbol

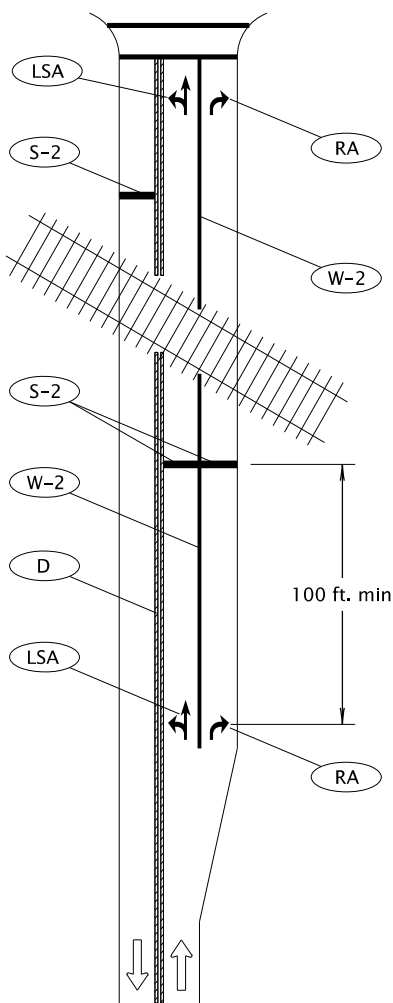
CALC. BOOK NO. _ _ _ _ _ N/A _ _ _ _ _		SDR DATE _ _ _ _ _ 01/03/2022 _ _ _ _ _	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications.	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>PAVEMENT MARKING STANDARD DETAIL BLOCKS</b>	
		2021	
		DATE	REVISION DESCRIPTION
		07/2020	Changed min. width of TM/B from 6' to 4.5'
		01/2022	Removed 'LANE' from W-2/R-20R title



TYPICAL RAILROAD GRADE CROSSING MARKINGS  
NO BIKE LANE



TYPICAL RAILROAD GRADE CROSSING MARKINGS  
WITH BIKE LANE



LANE USE ARROW MARKINGS APPROACHING  
RAILROAD GRADE CROSSING  
AT INTERSECTIONS WITH MULTIPLE LANES

Do not place lane use arrows  
between the RxR stop bar and  
the tracks.

Lane use signing required if  
lane use arrows cannot be installed.

Table "B"	
Posted Speed (mph)	Safe Stopping Distance SSD (In feet)
10	50 (100 Standard)
15	80 (100 Standard)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

A = 12' min. from nearest rail or 1' in advance of the location where an automatic gate arm crosses the roadway. Install stop bar perpendicular to roadway.

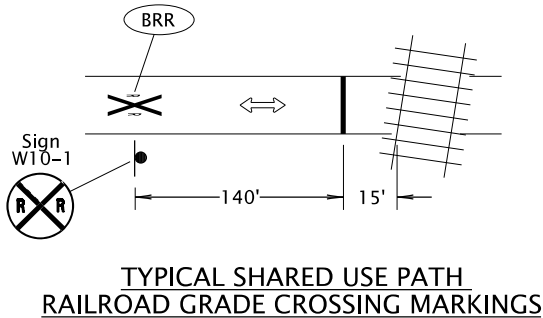
- General Notes:
- 1) See OAR Chapter 741-110 for details.
  - 2) Install all markings per Crossing Order or as shown.
  - 3) Start and end all longitudinal lines within 2 ft. of the nearest rail.
  - 4) See TM504 for RR and BRR legend dimensions.

LEGEND

Increasing stationing from bottom to top

← Direction of Travel

This sheet to be accompanied by Std. Dwg. Nos. TM500 thru TM504



TYPICAL SHARED USE PATH  
RAILROAD GRADE CROSSING MARKINGS

CALC. BOOK NO. \_ \_ \_ N/A \_ \_ \_ \_ \_ SDR DATE \_ \_ \_ 01/03/2022 \_ \_ \_ \_ \_

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications.

OREGON STANDARD DRAWINGS

RAIL CROSSING  
PAVEMENT MARKINGS

2021

DATE	REVISION DESCRIPTION
07/2020	Extended accompanied by drawings to include TM504
01/2022	Corrected notes to reference TM504 instead of TM501
	Added 70 and 75 mph matching the Traffic Line Manual

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

tm607.dgn 07-JAN-2022

TM607

GENERAL NOTES:

Standard Truss Type VMS Bridges are designed in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals 4th edition, 2001 and 2002 interim revisions. Basic wind speed (3 second gust) used for sign bridge design is 110 mph.  $G = 1.14$ ,  $I_r = 1.0$  (50 year recurrence interval) and Exposure C were used for design.  $C_o = 1.7$  was used for the VMS.

Material for square hollow structural sections (HSS) members shall be ASTM A500 Grade B, or ASTM A500 Grade C.

The design Type One VMS sign mass is 4250 lbs (not including W 6 x 15 support arms and walkway). The design sign is "XL" feet from the left End Truss and "XR" feet from the right End Truss. The bridge has been designed for all possible positioning of the sign on the span. The sign is to be positioned in coordination with Traffic/ITS designer. Chord end connection plates and truss field splice plates shall conform to ASTM A709, Grade 50 or ASTM A572, Grade 50.

Notch toughness of all structural steel members and plates greater than 1/2" thick shall conform to Zone 2 non-fracture critical requirements of ASTM A709.

All other structural steel shall conform to ASTM A36, or A992.

High strength bolts shall conform to ASTM A325, Type 1.

Nuts for high strength bolts shall be heavy hex and conform to ASTM A563 Grade DH, with supplementary requirements "S1" and "S2".

Bolts and rods connecting galvanized steel members to aluminum members shall meet the requirements of ASTM A193 Class 2 Grade B8M. Nuts used with A193 bolts shall be heavy hex, and shall meet the requirements of ASTM A194 Grade 8M with supplementary requirement "S1". Use a stainless steel flatwasher and double nut at each bolt.

Hardened steel washers shall conform to ASTM F436, Type 1. Use washers under turning element in tightening unless otherwise specified.

Final elevations shall be field verified prior to the fabrication of the end truss members and footing reinforcement.

All fasteners, except mechanically galvanized direct tension indicator (DTI) washers, shall be hot-dip galvanized (except stainless steel and non-ferrous fasteners).

All structural steel shall be hot-dip galvanized after fabrication, unless noted otherwise.

The silicon content of the base metal shall be in the ranges of 0.0% to 0.06% or 0.13% to 0.25% for all hot-dip galvanized steel, unless noted otherwise. The maximum carbon equivalent (CE) is 0.40% for the base metal. Use the AWS D1.1 CE formula. Preheat according to AWS D1.5 Annex F using the hydrogen control method and high degree of restraint when the carbon equivalent (CE) of the steel exceeds 0.40%.

All H.S. bolts shall be considered slip critical and tightened according to 00930.40(d)(2)a, unless noted otherwise. Design slip resistance for bolts shall conform to the Bolt Specifications for Class C slip coefficient = 0.33.

Selection of the End Truss Posts shall be based on the larger "HP" in the case of unequal post heights. All End Truss Posts shall be the same cross section. This Standard Truss Type VMS Bridge has been designed for both equal and unequal post heights.

This Standard Truss Type VMS Bridge has been designed for the stated loading only. No additional signs or additional loadings are permitted. Other uses and loadings shall be considered non-standard, and are outside the scope of this design.

Welded splices in posts or chords and welds connecting posts or chords to base connection plates shall be full penetration welds as shown on Dwgs.# TM608 and TM609.

Root gap for T-Y-K tubular connections welds shall not exceed 1/16". Fabrication drawings shall show the weight of all parts.

Conduit diameters shown on plans are nominal or trade sizes.

Wherever possible truss member centerlines shall intersect at a common work point, unless shown otherwise on these standards. Where it is not possible to line up member centerlines at a common work point, the maximum allowable centerline eccentricity is 2 inches. Verify that tops of pedestals are level and at correct elevations, prior to vertical end truss installation.

A preconstruction meeting is recommended to make sure the contractor understands ODOT requirements and that ODOT understands the contractor's plan.

If a 20 minute rolling traffic stop is used to install the overhead sign support truss bridge, the rolling stop shall meet the following requirements:

- a) Verify (prior to span truss lift) adequate crane capacity and boom length to perform complete installation from side of road.
- b) Set crane(s) on side of road and do not re-set crane during lift.
- c) Verify (prior to span truss lift) that lifting equipment and lifting points meet requirements of plans.
- d) Verify (prior to span truss lift) that vertical end trusses are at the correct elevations, plumb, and that the (hole to hole) distance between the two end trusses matches the span truss (hole to hole) length.
- e) Pre-assemble span truss within reach of crane(s).
- f) Rig lift before beginning rolling stop.
- g) Make sure all required tools and hardware are on site.
- h) Do not resume traffic until span truss to saddle bolts are at least snug tight.
- i) Rolling stops shall be at night and shall conform to the Special Provisions.
- j) Follow all required safety procedures.

If required, installation of temporary guard rail or temporary barrier should precede any other work involving the construction of the footing.

Use single self locking nuts or double nuts on non-high strength (H.S.) bolts, unless otherwise shown or specified.

See Dwg.# TM608 for typical high strength bolt connection.

At ends of square HSS, welding shall be carried continuously around corners, with corners fully built up and all weld starts and stops within flat faces. Perform magnetic particle testing of areas within 2 inches of welds prior to pickling, and report findings to ODOT. If cracks are found, do not galvanize until directed to do so. Perform a detailed 100% visual inspection of the entire structure after galvanizing.

Prior to galvanizing, the fabricator shall assemble the span truss and measure the camber and the horizontal span distance between the four centers of the outside slotted saddle holes, in the presence of the ODOT inspector. With the span truss resting on its side and the camber in the horizontal direction, a string line shall be used to check the camber. The allowable variation from required camber at shop assembly is -0% to +25%. The length between the saddle holes shall be measured using a steel tape or other approved measuring method and shall have an allowable variation of -1/8" to +1/8".

FOUNDATION NOTES:

Provide shoring for each footing if required.

Top surface of concrete pedestal (including area under base plate and around anchor bolts) shall be floated and troweled to a flat and level surface. This surface shall not vary more than 1/8" from a horizontal plane. Provide a 3/4" chamfer on all exposed edges of the pedestal.

All concrete shall be Class 3600 - 3/4" Commercial Grade Concrete classified as a structural item.

Place bars 2 inches clear of the nearest face of concrete, unless shown otherwise.

Concrete shall be placed using a tremie when free fall exceeds 4'-0". Cold joints shall be cause for rejection of the foundation, except between footing and pedestal.

All reinforcing steel shall conform to ASTM A706 or A615 Gr. 60.

Anchor rods shall conform to ASTM F1554, Gr. 55, with supplementary requirements "S2" that includes grade and manufacturer's identification and "S4".

Anchor rod washers shall conform to ASTM F436.

Anchor rod nuts shall conform to ASTM A563 Grade DH with supplementary requirements "S1" and "S2".

Anchor rod template, temporary support members, and anchor plate shall conform to ASTM A36.

Anchor rods shall be hot-dip galvanized full length.

Where the footing of a Std. Truss Type VMS Bridge interferes with guard rail posts the depth of footing may be increased to the maximum shown on Dwg.# TM611, or concrete barrier may be used instead of guard rail, or guard rail posts may be attached to footing in accordance with Dwg.# BR266. All buried steel shall be coated for immersion exposure with an approved product from the qualified products for structural coatings. Prepare and coat surfaces according to Section 00594 of Oregon Standard Specifications.

The elevation and location of anchor rods is critical. Use survey techniques to verify the elevation, location, and orientation of anchor bolt groups prior to placement of foundation concrete.

CONSTRUCTION PROCEDURE AND SEQUENCE:

1. Construct foundation according to plans. Verify elevation, location and orientation of anchor bolts. Steel templates shall be used to accurately locate and hold the anchor rods plumb and in proper alignment. Hole diameter in template shall be the nominal bolt diameter plus 1/16". This template shall be in place during concrete placement and shall remain in place for a minimum of 24 hours after the concrete placement has been complete. Out of position anchor rods and anchor rods greater than 1:40 out of plumb are cause for rejection of the foundation. Bending of anchor rods to straighten or move them into position, or alterations of the base plate shall not be permitted and are cause for rejection of the foundation and/or post weldment. See Template Detail on Dwg.# TM610.
2. After 7 days min. of spread footing concrete cure time (excluding days when the surrounding temperature is below 40° Fahrenheit for over 4 hours) and when tests indicate that the concrete has reached full design strength (100%), the pedestal pour may begin. The post erection may begin after 7 days of concrete cure time of the pedestal and when test indicate that the concrete pedestal has reached full design strength (100%).
3. Install bearing nuts on anchor rods. Level the bearing nuts. Install hardened flat washers above bearing nuts.
4. Use crane to lift end truss onto anchor rods. Maintain crane connection as a safety measure until post installation is 100% complete. No grout shall be used under the base plate. Install hardened flat washers above base plate.
5. Generously apply approved bolting lubricant (Castrol Stick Wax or approved equal) to the top nut bearing surface and internal threads, and install nut on anchor rods to snug tight condition. Snug tight is defined as the condition when all plies are in firm contact and can usually be obtained by the full effort of a worker on a 12 inch long wrench or a few impacts of an impact wrench. Several passes may be required to obtain uniform tightness.
6. Tighten bearing nuts upward against base plate in a similar manner, to assure a uniform snug tight condition. Assume that the hole to hole span distance between saddles at opposite ends of the sign bridge matches the hole to hole span distance between opposite ends of the span truss. The end trusses may be up to 1/2" out of plumb to help accommodate construction tolerances and temperature effects. Adjust bearing nut as required and repeat snug tightening.
7. Mark position of each anchor rod and top nut with a felt tip pen so subsequent nut rotation can be verified. Rotate all top nuts an additional 1/6 turn in two passes (1/12 turn per pass).
8. Assemble VMS bridge span truss field splices and fully tighten high strength connection bolts according to Section 00930.40(d)(2)(a) of the Standard Specifications and Special Provisions.
9. Verify positions of saddles relative to VMS bridge chord end connections.
10. Assemble vertical VMS mounts, VMS, and span together. Provide adequate time for engineer to inspect the bolt tightening on the assembly in accordance with 00930.40(e) and tighten or replace bolts as required prior to lifting assembly.
11. Verify VMS, mounts, and span truss total weight before lifting. Lift the VMS and span truss using one or two cranes as required to meet the following conditions. A qualified person shall be in charge of the lifting operation. VMS and span truss shall be lifted at four equally loaded lift points, see TM606. Extreme care must be used when lifting the assembly the first time to make sure that it does not rotate from the eccentric VMS load.
12. Lift the VMS and span truss assembly into position on the saddles.
13. Install H.S. saddle bolts and tighten according to Section 00930.40(d)(2)(a).

WALKWAY NOTES:

Grating shall be welded steel grating with 1 1/2" x 1/8" bearing bars spaced at 13 1/16" centers and 1/2" x 1/4" nominal square cross bars (or equivalent) spaced at 4" centers.

Steel plates and bars including grating elements shall conform to ASTM A36 or approved equal.

Rail members and post brackets shall be structural steel tubing conforming to ASTM Specification A500, Grade A or B.

Grating may be spliced at an interior support by welding 1/8" x 1 1/2" bars to ends of bearing bars across full width of grating and bolting bars together with 1/4" dia. bolts at 12 inch maximum centers.

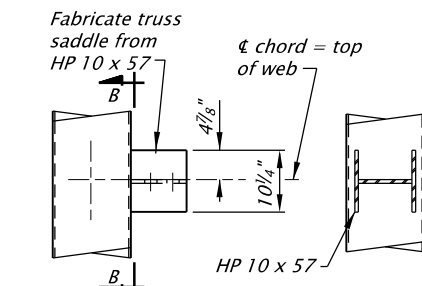
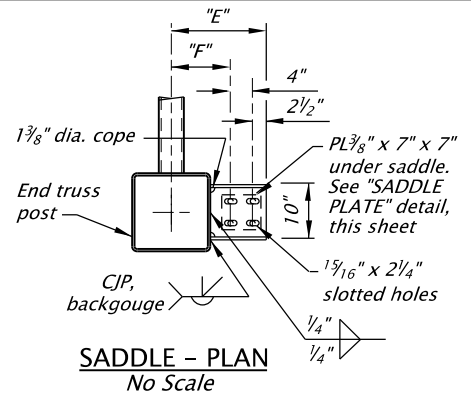
Top of walkway grating shall not be more than 6 inches below the threshold into the VMS cabinet.

Walkway contractor to verify prior to fabrication that walkway, grating and rails do not interfere with VMS door or VMS housing. No gaps greater than 1 inch between walkway rails, grating and toe board, and VMS housing are allowed.

All bolts, including U-bolts, shall conform to ASTM Specification A307, unless otherwise noted.

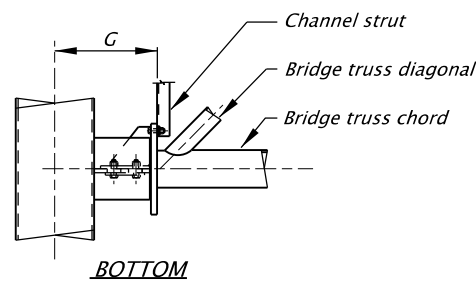
Accompanied by dwgs. TM606, TM608, TM610, TM611, TM612

CALC. BOOK NO. 5014/6133		SDR DATE 07-JAN-2022	
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		OREGON STANDARD DRAWINGS	
		STANDARD TRUSS TYPE VMS BRIDGE 50' TO 167' SPAN RANGE NOTES	
		2021	
		DATE	REVISION DESCRIPTION
		01/22	Updated silicon content ranges and AWS D1.5 Annex G to Annex F.

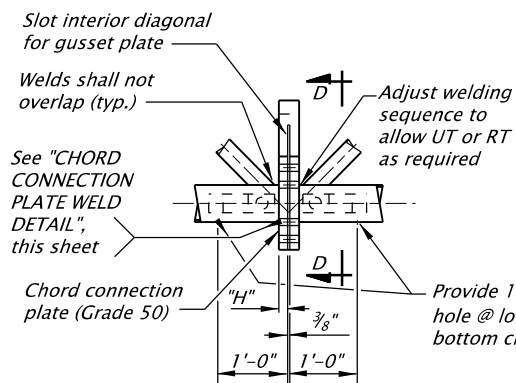


**SADDLE - ELEVATION**  
No Scale

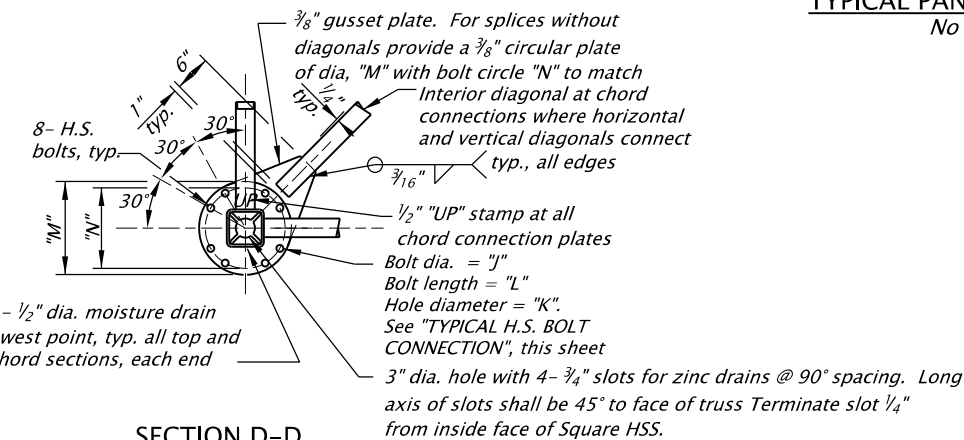
**SECTION B-B**  
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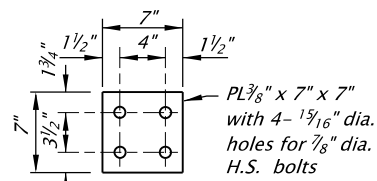
**ASSEMBLED CONNECTION - ELEVATION**  
No Scale



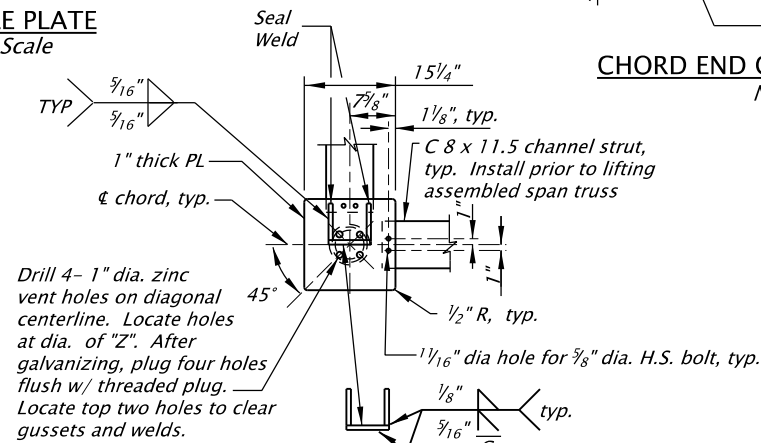
**TRUSS FIELD SPLICE**  
No Scale



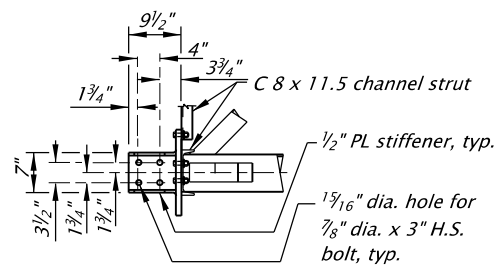
**SECTION D-D**  
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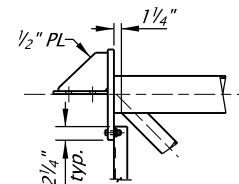
**SADDLE PLATE**  
No Scale



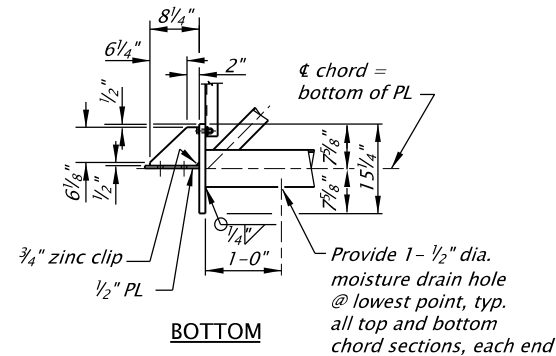
**CHORD END CONNECTION - END VIEW**  
No Scale



**CHORD END CONNECTION - PLAN**  
No Scale

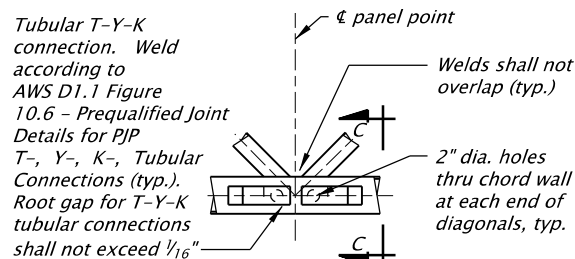


**TOP**

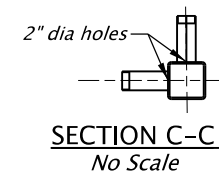


**BOTTOM**

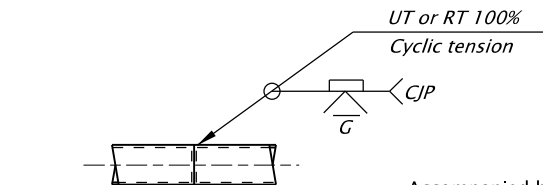
**CHORD END CONNECTION - ELEVATION**  
No Scale



**TYPICAL PANEL POINT DETAIL**  
No Scale



**SECTION C-C**  
No Scale



**POST/CHORD SPLICE DETAIL**  
No Scale

**Note:**  
Bottom chord end connection details are typically shown.  
Top chord end connection details are similar.

**PERMISSIBLE WELDED  
SPLICE LOCATIONS:**

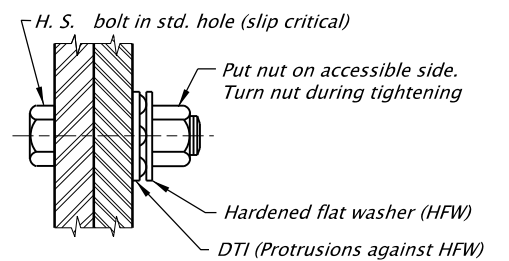
Chords - 0.5 "P" ± 0.15 "P"  
from panel point &  
Post - Top half of post

Bridge Truss Length Temperature Adjustment Table			
Span	Temperature Change from 50° Fahrenheit		
"S"	18° F	36° F	54° F
(ft.)	Length Change from 50° Fahrenheit		
50' - 69'	1/16"	3/32"	1/4"
> 69' - 89'	3/32"	1/4"	3/8"
> 89' - 108'	1/8"	3/16"	7/16"
> 108' - 128'	3/16"	1/2"	3/4"
> 128' - 148'	1/2"	3/4"	1"
> 148' - 167'	3/4"	1"	1 1/4"

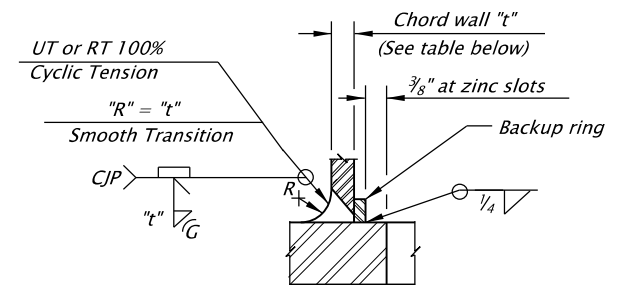
**Temperature Adjustment Notes:**

**Instructions to Fabricator:**

- 1) Adjust the Span "S" truss length at the fabrication temperature so that the truss will be the nominal length at the 50° F given on the Project Plans. For example, if the nominal span is 164 ft. and if the fabrication temperature is 86° F (which is 36° F higher than the reference temperature) the fabrication length would be 164' + 1/2".
- 2) The bridge must be made longer when the fabrication temperature is higher than the reference temperature. The bridge must be made shorter than the nominal length when the fabrication temperature is lower than the reference temperature.



**TYPICAL H. S. BOLT CONNECTION**  
No Scale

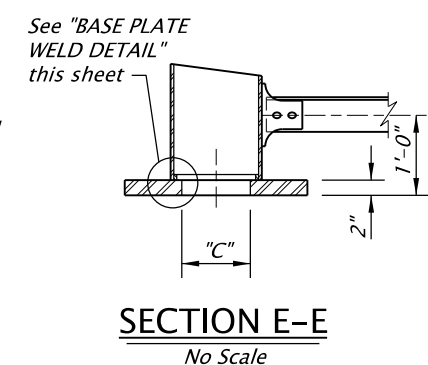
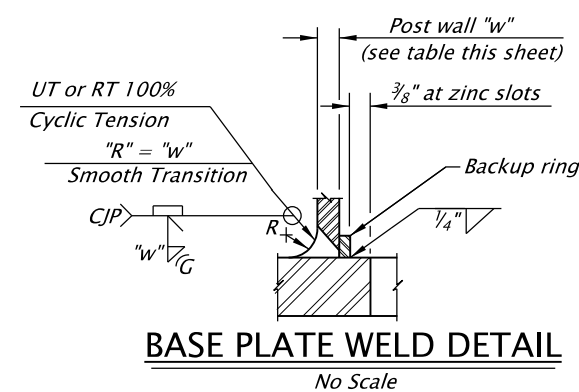
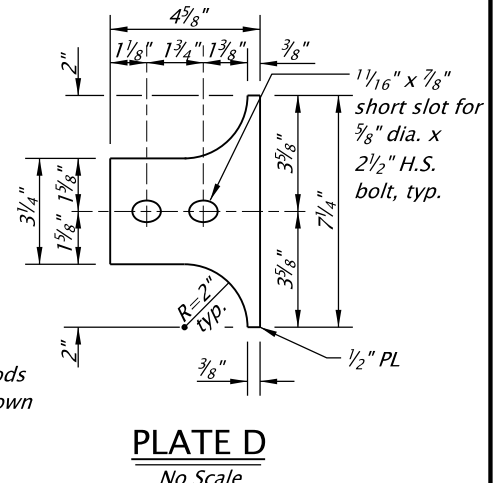
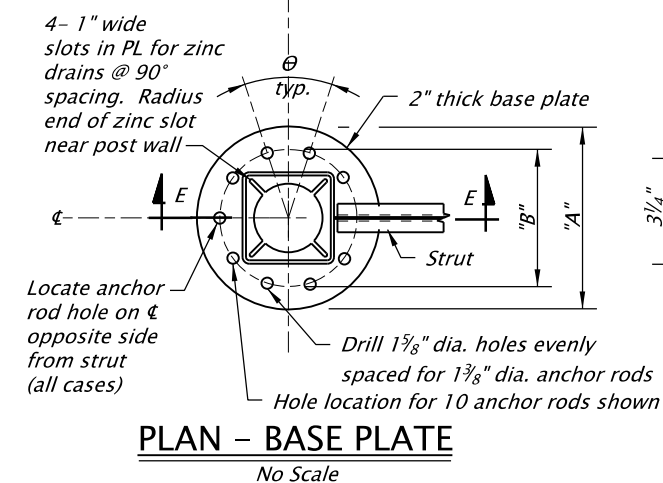
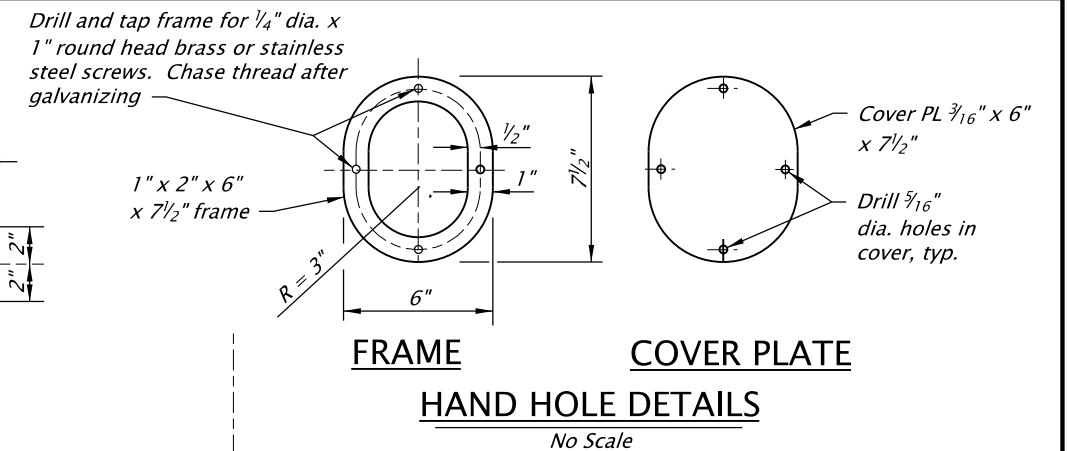
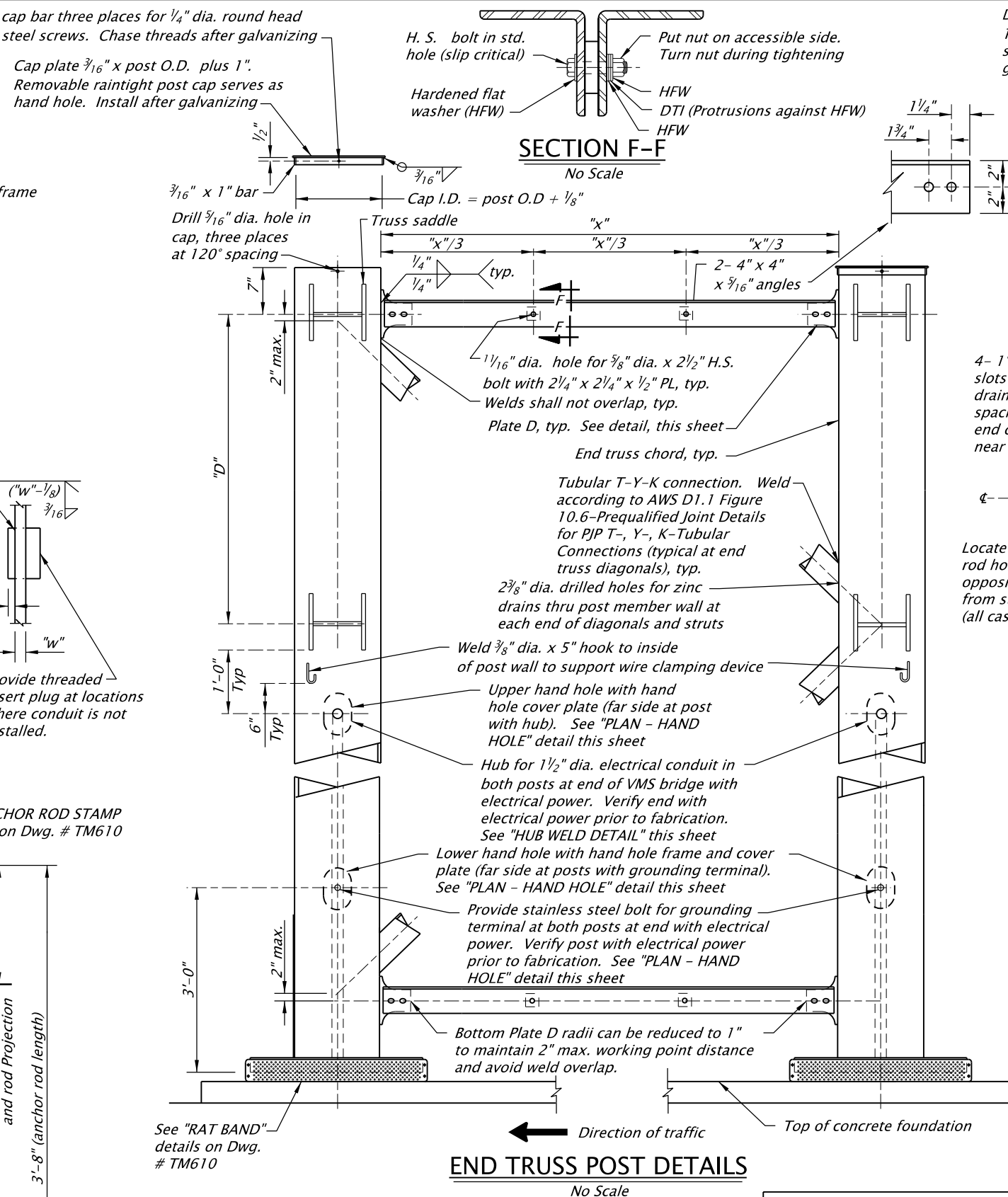
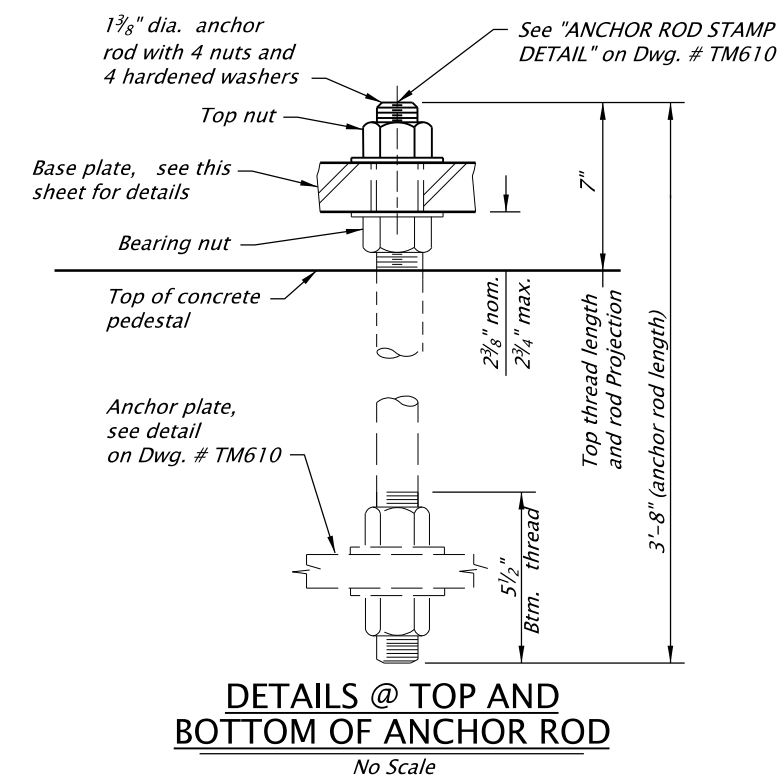
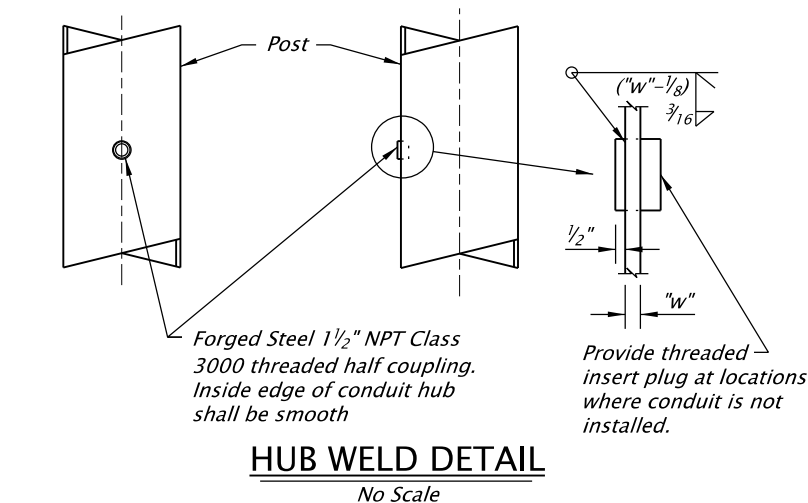
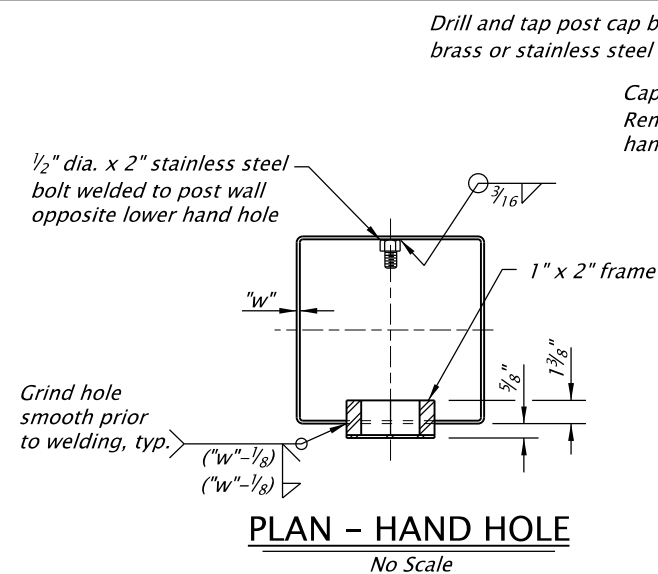


**CHORD CONNECTION PLATE WELD DETAIL**  
No Scale

Accompanied by dwgs. TM606, TM607, TM609, TM610, TM611, TM612

CALC. BOOK NO. <b>5014/6133</b>		SRD DATE <b>07-JAN-2022</b>	
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		<b>OREGON STANDARD DRAWINGS</b>	
		<b>STANDARD TRUSS TYPE VMS BRIDGE 50' TO 167' SPAN RANGE BRIDGE TRUSS DETAIL</b>	
		2021	
DATE		REVISION DESCRIPTION	
01/22		Updated AWS D1.1 Figure 3.5 to 10.6.	





<i>END TRUSS POST SIZE (in.)</i>	<i>"A"</i>	<i>"B"</i>	<i>"C"</i>	<i>NUMBER OF ANCHOR RODS</i>	<i>θ (degree)</i>	<i>"W"</i>
<i>Sq. HSS 12 x 12 x 3/8</i>	<i>27"</i>	<i>21"</i>	<i>9"</i>	<i>8</i>	<i>45</i>	<i>3/8"</i>
<i>Sq. HSS 12 x 12 x 1/2</i>	<i>27"</i>	<i>21"</i>	<i>9"</i>	<i>10</i>	<i>36</i>	<i>1/2"</i>
<i>Sq. HSS 14 x 14 x 1/2</i>	<i>30"</i>	<i>24"</i>	<i>11"</i>	<i>10</i>	<i>36</i>	<i>1/2"</i>

Accompanied by dwqs. TM606, TM607, TM608, TM 610, TM611, TM612

CALC. BOOK NO. 5014/6133

SDR DATE 07-JAN-2022

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

STANDARD TRUSS TYPE VMS  
BRIDGE 50' TO 167' SPAN RANGE  
END TRUSS DETAIL

2021

DATE	REVISION DESCRIPTION
01/22	Updated AWS D1.1 Figure 3.5 to 10.6.

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*

tm615.dgn 07-JAN-2022

TM615

GENERAL NOTES:

Standard Truss Type Sign Bridges are designed in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals 4th edition, 2001 and 2002 interim revisions.

Basic wind speed (3 second gust) used for sign bridge design is 110 mph.  $G = 1.14$ ,  $I_r = 1.0$  (50 year recurrence interval) and Exposure C were used for design.

Material for square HSS members shall be ASTM A500 Grade B, or ASTM A500 Grade C. 18"x18"x5/8" square tubes shall be fabricated from  $\frac{3}{8}$ " thick ASTM A572 Gr. 50 plate according to the detail shown on TM620.

The maximum design sign area for Standard Sign Bridge Trusses (based on 9'-0" primary sign height plus 2'-6" exit secondary sign heights, above and below primary sign for a maximum total sign height of 14'-0") is shown on Dwg.# TM614. The maximum design length extends over the full width of the possible travel lanes and shoulders.

The signs are to be positioned horizontally in coordination with Traffic Plans and vertically as shown on Dwg.# TM614.

Chord end connection plates and truss field splice plates shall conform to ASTM A709, Grade 50 or ASTM A572, Grade 50.

Notch toughness of all structural steel members and plates greater than  $\frac{1}{2}$ " thick shall conform to Zone 2 non-fracture critical requirements of ASTM A709.

All other structural steel shall conform to ASTM A36, or A992.

High strength bolts shall conform to ASTM A325, Type 1.

Nuts for high strength bolts shall be heavy hex and conform to ASTM A563 Grade DH, with supplementary requirements "S1" and "S2".

Hardened steel washers shall conform to ASTM F436, Type 1. Use washers under turning element in tightening unless otherwise specified.

Final elevations shall be field verified prior to the fabrication of the end truss members and footing reinforcement.

All fasteners, except mechanically galvanized direct tension indicator (DTI) washers, shall be hot-dip galvanized (except stainless steel and non-ferrous fasteners).

All structural steel shall be hot-dip galvanized after fabrication, unless noted otherwise.

The silicon content of the base metal shall be in the ranges of 0.0% to 0.06% or 0.13% to 0.25% for all hot-dip galvanized steel, unless noted otherwise. The maximum carbon equivalent (CE) is 0.40% for the base metal. Use the AWS D1.1 CE formula. Preheat according to AWS D1.5 Annex F using the hydrogen control method and high degree of restraint when the carbon equivalent (CE) of the steel exceeds 0.40%.

All H.S. bolts shall be considered slip critical and tightened according to 00930.40(d)(2)a, unless noted otherwise. Design slip resistance for bolts shall conform to the Bolt Specifications for Class C slip coefficient = 0.33.

Selection of the End Truss Posts shall be based on the larger "HP" in the case of unequal post heights. All End Truss Posts shall be the same cross section. This Standard Truss Type Sign Bridge has been designed for both equal and unequal post heights. This Standard Truss Type Sign Bridge has been designed for the stated loading only. No additional signs or additional loadings are permitted. Other uses and loadings shall be considered non-standard, and are outside the scope of this design.

Welded splices in posts or chords and welds connecting posts or chords to base connection plates shall be full penetration welds as shown on Dwgs.# TM616 and TM617.

Root gap for T-Y-K tubular connections welds shall not exceed  $\frac{1}{16}$ ".

Fabrication drawings shall show the weight of all parts.

Where ever possible truss member centerlines shall intersect at a common work point, unless shown otherwise on these Standards. Where it is not possible to line up member centerlines at a common work point, the maximum allowable centerline eccentricity is 2 inches.

Verify that tops of pedestals are level and at correct elevations, prior to vertical end truss installation.

A preconstruction meeting is recommended to make sure the contractor understands ODOT requirements and that ODOT understands the contractor's plan.

If a 20 minute rolling traffic stop is used to install the overhead sign support truss bridge, the rolling stop shall meet the following requirements:

- a) Verify (prior to span truss lift) adequate crane capacity and boom length to perform complete installation from side of road.
- b) Set crane(s) on side of road and do not re-set crane during lift.
- c) Verify (prior to span truss lift) that lifting equipment and lifting points meet requirements of plans.
- d) Verify (prior to span truss lift) that vertical end trusses are at the correct elevations, plumb, and that the (hole to hole) distance between the two end trusses matches the span truss (hole to hole) length.
- e) Pre-assemble span truss within reach of crane(s).
- f) Rig lift before beginning rolling stop.
- g) Make sure all required tools and hardware are on site.
- h) Do not resume traffic until span truss to saddle bolts are at least snug tight.
- i) Rolling stops shall be at night and shall conform to the Special Provisions.
- j) Follow all required safety procedures.

If required, installation of temporary guard rail or temporary barrier should preceed any other work involving the construction of the footing.

Use single self locking nuts or double nuts on non-high strength (H.S.) bolts, unless otherwise shown or specified.

See Dwg.# TM616 for typical high strength bolt connection.

At ends of square HSS, welding shall be carried continuously around corners, with corners fully built up and all weld starts and stops within flat faces. Perform magnetic particle testing of areas within 2 inches of welds prior to pickling, and report findings to ODOT. If cracks are found, do not galvanize until directed to do so. Perform a detailed 100% visual inspection of the entire structure after galvanizing.

Prior to galvanizing, the fabricator shall assemble the span truss and measure the camber and measure the horizontal span distance between the four centers of the outside slotted holes in the presence of the ODOT inspector. With the span truss resting on its side and the camber in the horizontal direction, a string line shall be used to check the camber. The allowable variation from required camber at shop assembly is -0% to +25%. The length between saddle holes shall be measured using a steel tape, or other approved measuring method, and shall have an allowable variation of -1/8" to +1/8".

**FOUNDATION NOTES:**

Provide shoring for each footing if required.

Top surface of concrete pedestal (including area under base plate and around anchor bolts) shall be floated and troweled to a flat and level surface. This surface shall not vary more than  $\frac{1}{8}$ " from a horizontal plane. Provide a  $\frac{3}{4}$ " chamfer on all exposed edges of the pedestal.

All concrete shall be Class 3600 -  $\frac{3}{4}$ " Commercial Grade Concrete as a structural item. Place bars 2 inches clear of the nearest face of concrete, unless shown otherwise.

Concrete shall be placed using a tremie when free fall exceeds 4'-0". Cold joints shall be cause for rejection of the foundation, except between footing and pedestal.

All reinforcing steel shall conform to ASTM A706 or A615 Gr. 60.

Anchor rod washers shall conform to ASTM F436.

Anchor rods shall conform to ASTM F1554, Gr. 55, with supplementary requirements "S2" that includes grade and manufacturer's identification and "S4".

Anchor rod nuts shall conform to ASTM A563 Grade DH with supplementary requirements "S1" and "S2".

Anchor rod template, temporary support members, and anchor plate shall conform to ASTM A36.

Anchor rods shall be hot-dip galvanized full length.

The elevation and location of anchor rods is critical. Use survey techniques to verify the elevation, location, and orientation of anchor bolt groups prior to placement of foundation concrete.

Provide 1 -2 inch dia. rigid electrical conduit at each end of bridge as shown on Dwg. # TM617 and as directed. Extend sign support end of conduit to the center of the lower hand hole. If luminaries are not required, extend the other end of the conduit into the nearest illumination circuit junction box and identify conduit by attaching a tag which says "future sign lighting". Install "pull string" in conduit for future use. Install conduit cap on each end. When luminaries are required, extend the other end of conduit per Project Plans.

Where the footing of a Std. Truss Type Sign Bridge interferes with guard rail posts the depth of footing may be increased to the maximum shown on Dwg.# TM619, or concrete barrier may be used instead of guard rail, or guard rail posts may be attached to footing in accordance with Dwg.# BR266. All buried steel shall be coated for immersion exposure with an approved product from the qualified products for structural coatings. Prepare and coat surfaces according to Section 00594 of Oregon Standard Specifications.

CONSTRUCTION PROCEDURE AND SEQUENCE:

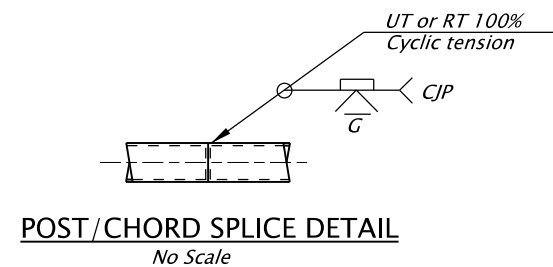
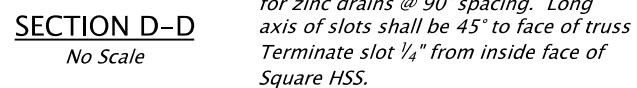
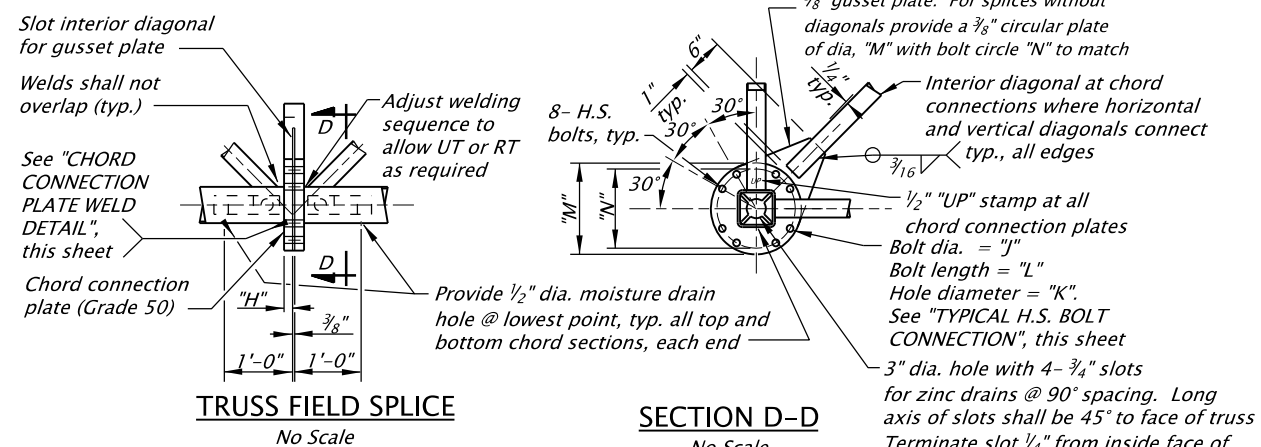
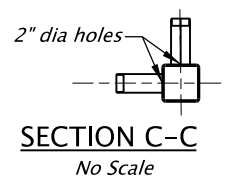
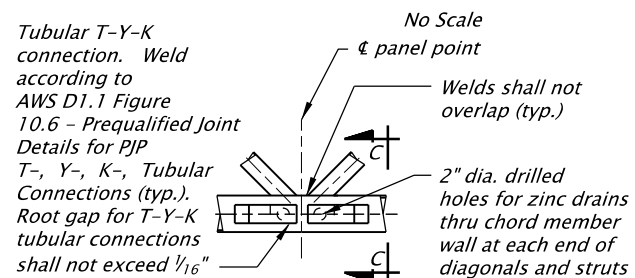
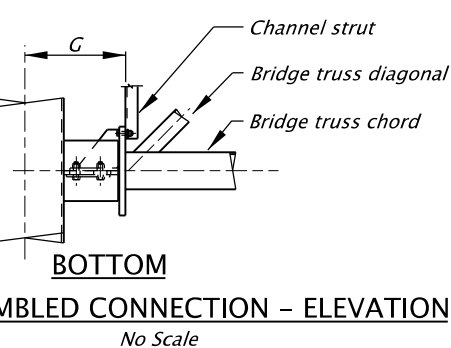
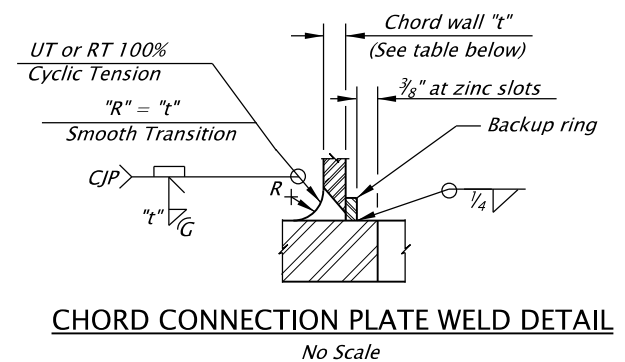
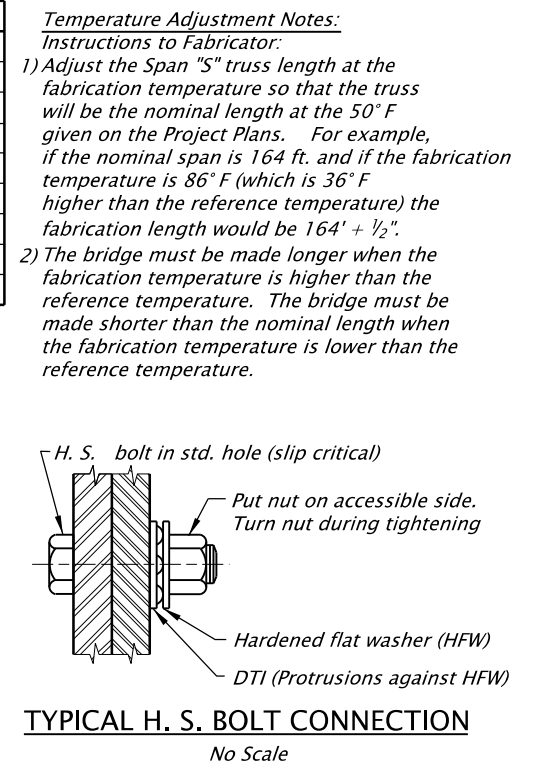
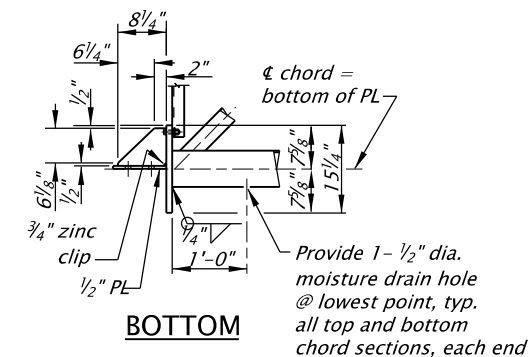
1. Construct foundation according to plans. Verify elevation, location and orientation of anchor bolts. Steel templates shall be used to accurately locate and hold the anchor rods plumb and in proper alignment. Hole diameter in template shall be the nominal bolt diameter plus  $\frac{1}{16}$ ". This template shall be in place during concrete placement and shall remain in place for a minimum of 24 hours after the concrete placement has been complete. Out of position anchor rods and anchor rods greater than 1:40 out of plumb are cause for rejection of the foundation. Bending of anchor rods to straighten or move them into position, or alterations of the base plate shall not be permitted and are cause for rejection of the foundation and/or post weldment. See Template Detail on Dwg.# TM620.
2. After 7 days min. of spread footing concrete cure time (excluding days when the surrounding temperature is below 40° Fahrenheit for over 4 hours) and when tests indicate that the concrete has reached full design strength (100%), the pedestal pour may begin. The post erection may begin after 7 days of concrete cure time of the pedestal and when test indicate that the concrete pedestal has reached full design strength (100%).
3. Use crane to lift end truss onto anchor rods. Maintain crane connection as a safety measure until post installation is 100% complete. No grout shall be used under the base plate. Install hardened flat washers above base plate.
4. Install bearing nuts on anchor rods. Level the bearing nuts. Install hardened flat washers above bearing nuts.
5. Generously apply approved bolting lubricant (Castrol Stick Wax or approved equal) to the top nut bearing surface and internal threads, and install nut on anchor rods to snug tight condition. Snug tight is defined as the condition when all plies are in firm contact and can usually be obtained by the full effort of a worker on a 12" long wrench or a few impacts of an impact wrench. Several passes may be required to obtain uniform tightness.
6. Tighten bearing nuts upward against base plate in a similar manner, to assure a uniform snug tight condition. Assure that the hole to hole span distance between saddles at opposite ends of the sign bridge matches the hole to hole span distance between opposite ends of the span truss. The end trusses may be up to  $\frac{1}{2}$ " out of plumb to help accommodate construction tolerances and temperature effects. Adjust bearing nut as required and repeat snug tightening.
7. Mark position of each anchor rod and top nut with a felt tip pen so subsequent nut rotation can be verified. Rotate all top nuts an additional 1/6 turn in two passes (1/12 turn per pass).
8. Assemble sign bridge span truss and fully tighten high strength connection bolts according to Section 00930.40(d)(2)(a) of the Standard Specifications and Special Provisions.
9. Verify positions of end truss saddles relative to sign bridge chord end connections.
10. Assemble vertical sign mounts, signs, and span together. Provide adequate time for engineer to inspect the bolt tightening on the assembly in accordance with 00930.40(e) and tighten or replace bolts as required prior to lifting assembly.
11. Verify signs, sign mounts, and span truss total weight before lifting. Lift the signs and span truss using one or two cranes as required to meet the following conditions. A qualified person shall be in charge of the lifting operation. Signs and span truss shall be lifted at four equally loaded lift points, see TM606. Extreme care must be used when lifting the assembly the first time to make sure that it does not rotate from the eccentric sign loads.
12. Lift the signs and span truss assembly into position on the saddles.
13. Install H.S. saddle bolts and tighten according to Section 00930.40(d)(2)(a).

LUMINAIRE NOTES:

1. Hubs, hand holes, grounding terminals, hook and foundation conduit shall always be installed for possible future use. Luminaires, luminaire support arms and luminaire support channels noted on Dwg.# TM618 should only be provided when luminaires are required (see Project Plans).
2. Conduit diameters shown on plans are nominal or trade sizes.

Accompanied by dwgs. TM614, TM616, TM617, TM618, TM619, TM620

CALC. BOOK NO. <u>5071/6134</u>		SDR DATE <u>07-JAN-2022</u>	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>STANDARD TRUSS TYPE SIGN BRIDGE 50' TO 167' SPAN RANGE NOTES</b>	
		2021	
		DATE	REVISION DESCRIPTION
		01/22	Updated sillcon content ranges and AWS D1.5 Annex G to Annex F.



Note:  
Bottom chord end connection details are typically shown.  
Top chord end connection details are similar.

[illegible]

**PERMISSIBLE WELDED  
SPICE LOCATIONS:**

---

Chords -  $0.5 "P" \pm 0.15 "P"$   
from panel point &  
Post - Top half of post

Accompanied by dwgs. TM614, TM615, TM617, TM618, TM619, TM620

CALC. BOOK NO. <u>5071/6134</u>		SDR DATE <u>07-JAN-2022</u>	
<p><i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i></p>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<h2>OREGON STANDARD DRAWINGS</h2> <h3>STANDARD TRUSS TYPE SIGN BRIDGE 50' TO 167' SPAN RANGE BRIDGE TRUSS DETAIL</h3> <p>2021</p>	
		DATE	REVISION DESCRIPTION
		01/22	Updated AWS D1.1 Figure 3.5 to 10.6.

*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

**OREGON STANDARD DRAWINGS**

**STANDARD TRUSS TYPE SIGN  
BRIDGE 50' TO 167' SPAN RANGE  
BRIDGE TRUSS DETAIL**

2021

DATE	REVISION DESCRIPTION
01/22	Updated AWS D1.1 Figure 3.5 to 10.6.



END TRUSS POST SIZE (HSS) (in.)	"A"	"B"	"C"	NUMBER OF ANCHOR RODS	θ (degree)	"W"
Sq. HSS 12 x 12 x 1/2	27"	21"	9"	10	36	1/2"
Sq. HSS 14 x 14 x 1/2	30"	24"	11"	12	30	1/2"
Sq. HSS 16 x 16 x 1/2	32 1/2"	26 1/2"	12 1/2"	14	25.714	1/2"
Sq. HSS 16 x 16 x 5/8	32 1/2"	26 1/2"	12 1/2"	18	20	5/8"
Sq. HSS 18 x 18 x 5/8	35 1/2"	29 1/2"	15"	20	18	5/8"

Note: See notes on Dwg. TM615

CALC. BOOK NO. 5037/6134

SDR DATE	07-JAN-2022
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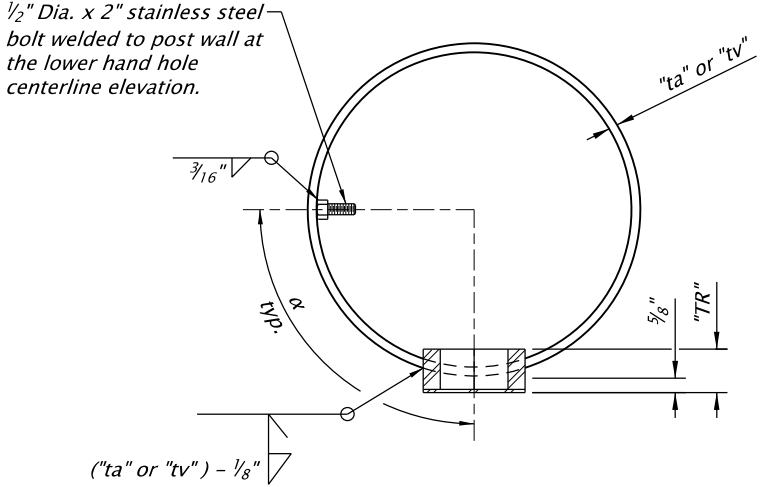
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

**OREGON STANDARD DRAWINGS**  
**STANDARD TRUSS TYPE SIGN**  
**BRIDGE 50' TO 167' SPAN RANGE**  
**END TRUSS DETAILS**

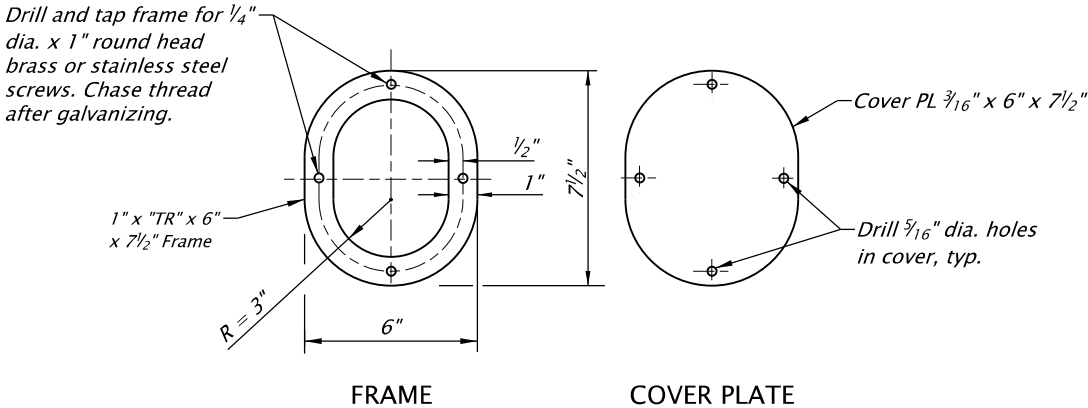
2021

DATE	REVISION DESCRIPTION
01/22	Updated AWS D1.1 Figure 3.5 to 10.6.

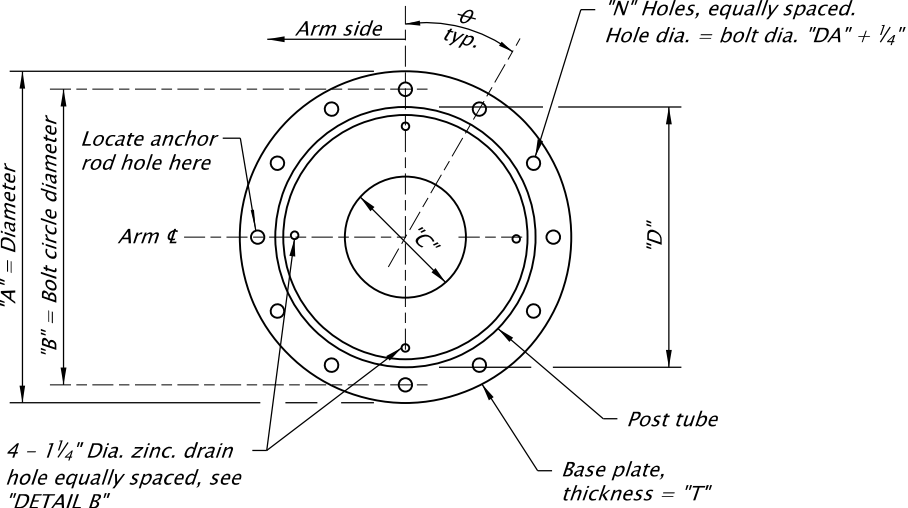
*The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.*



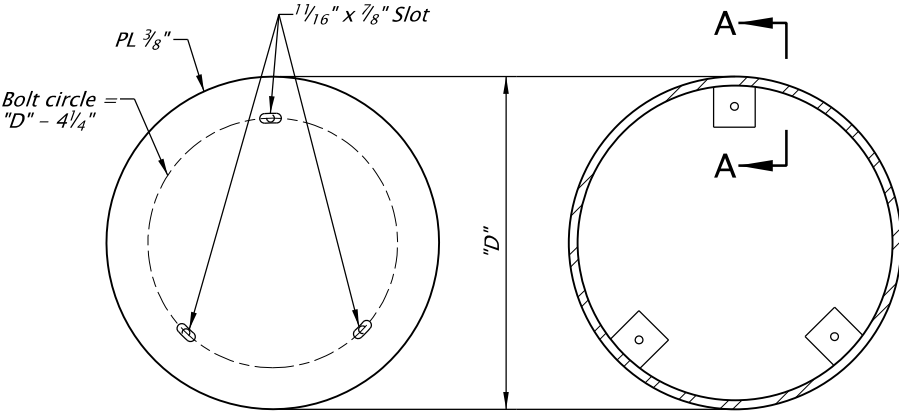
PLAN - HAND HOLE  
No Scale



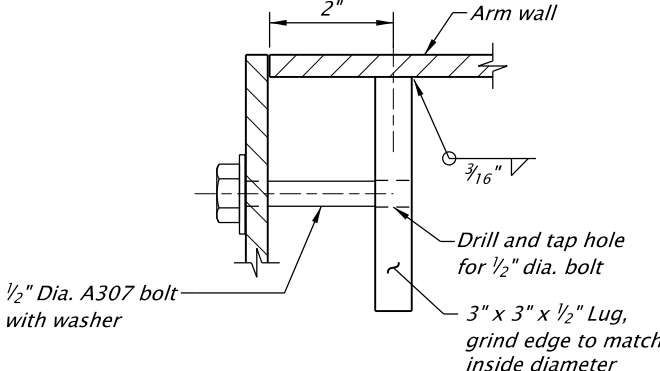
HAND HOLE DETAIL  
No Scale



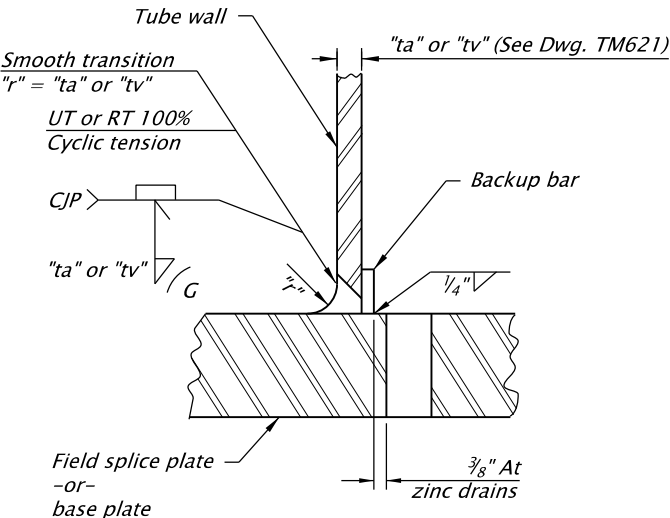
BASE PLATE  
No Scale



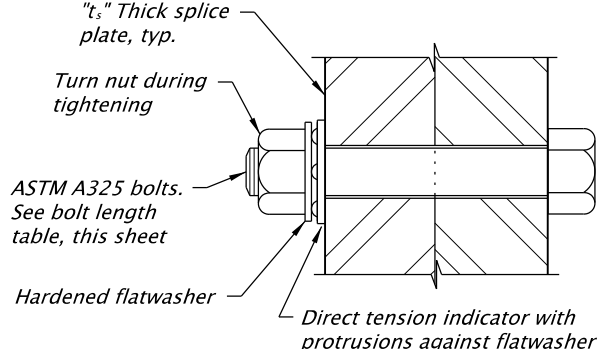
DETAIL "C"  
(CAP AND ATTACHMENT)  
No Scale



SECTION A-A  
No Scale

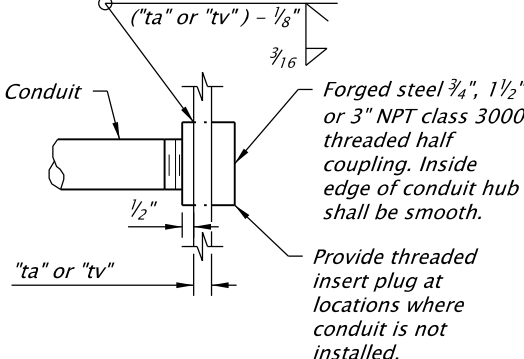


DETAIL "B"  
No Scale

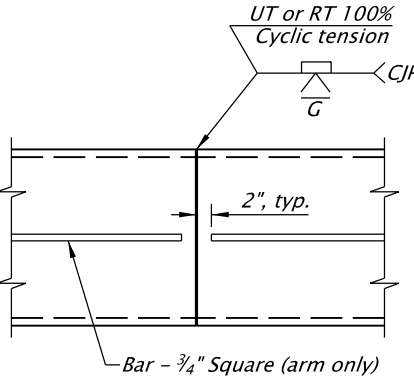


H.S. THRU - BOLTS  
No Scale

"t_s"	Bolt Length
3"	7 3/4"
2 3/4"	7"
2 1/2"	6 1/2"
2"	5 1/2"



HUB WELD DETAIL  
No Scale

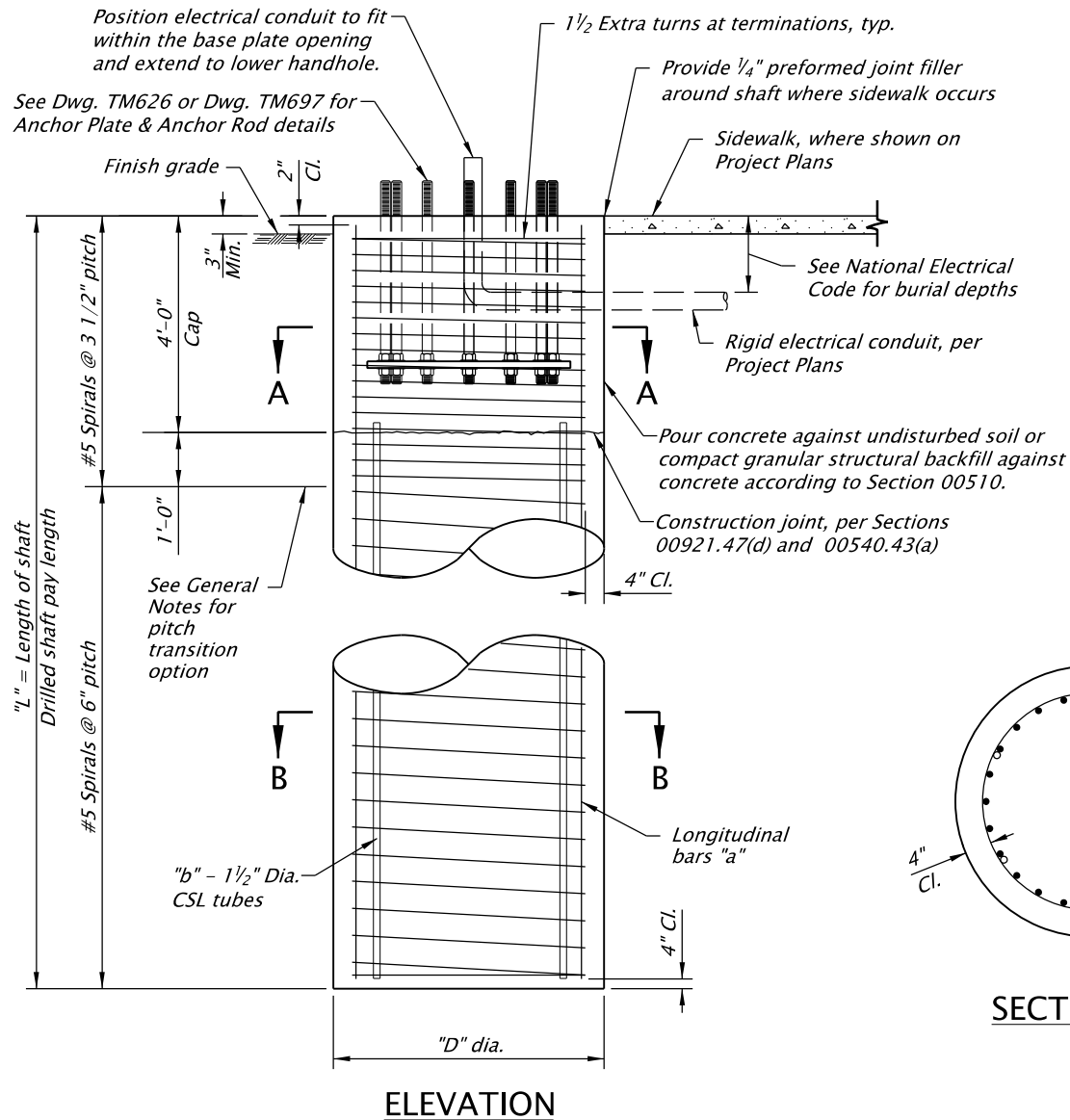


WELDED SPICE DETAIL  
No Scale

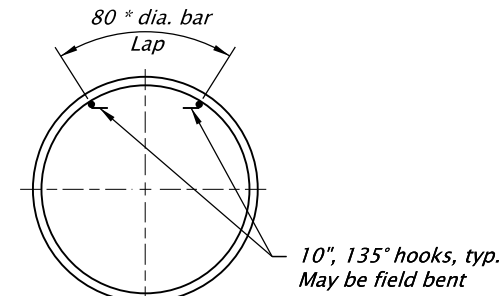
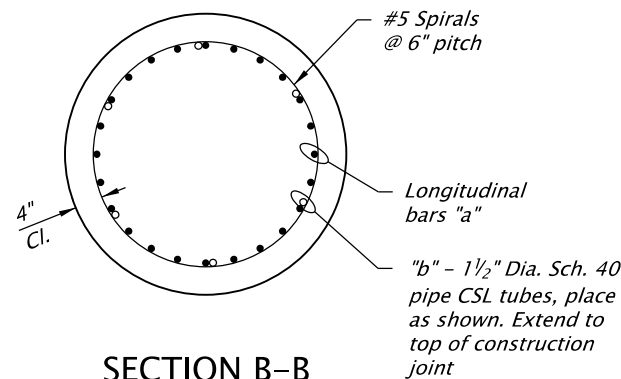
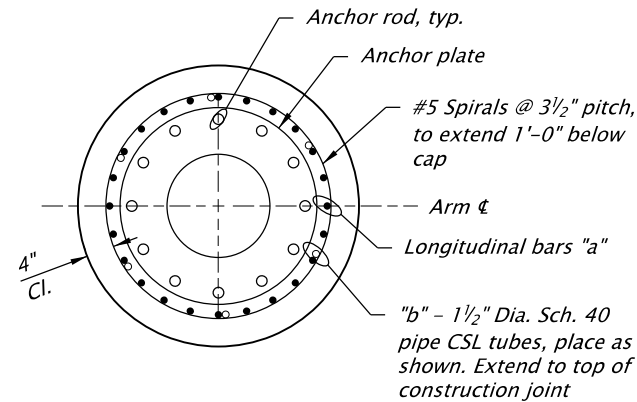
Structure Design No.	"TR"	Base Plate				Anchor Rods				$\alpha$ (deg.)
		"A"	"B"	"C"	"T"	"DA"	"N"	$\Theta$ (deg.)	"PR"	
1	2 1/4"	3'-8"	3'-2"	9"	3 1/2"	2"	18	20	10"	90
2	2 1/4"	3'-8"	3'-2"	9"	3 1/2"	2"	18	20	10"	90
3	1 3/4"	3'-8"	3'-2"	9"	3 1/2"	2"	18	20	10"	90
4	1 3/4"	3'-8"	3'-2"	9"	3 1/2"	1 3/4"	18	20	10"	90
5	1 1/2"	3'-8"	3'-2"	9"	3 1/2"	1 3/4"	18	20	10"	90
6	1 3/4"	3'-2"	2'-8"	9"	3"	1 3/4"	12	30	9"	90
7	1 1/2"	3'-2"	2'-8"	9"	3"	1 3/4"	12	30	9"	90
8	1 1/2"	2'-8"	2'-2"	9"	2 1/2"	1 1/2"	8	45	8"	180
9	2 1/4"	3'-8"	3'-2"	9"	3 1/2"	2"	18	20	10"	90

Accompanied by dwgs. TM621, TM622, TM624, TM625, TM626, TM627, TM628

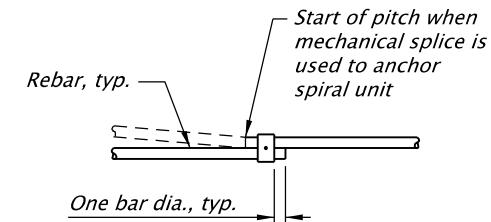
CALC. BOOK NO. 6921-6930, 6974		SDR DATE 07-JAN-2022	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>STD. MONOTUBE SIGN/VMS CANTILEVER MISC. DETAILS</b>	
		2021	
		DATE 01/22	REVISION DESCRIPTION Structure Design No. 9 "TR" was 1 3/4" and grounding lug was at 180 degrees.



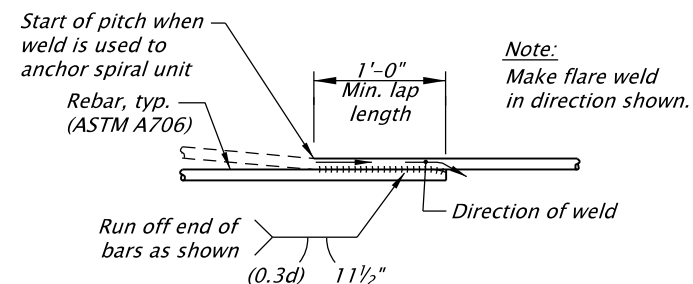
DRILLED SHAFT DETAILS  
No Scale



LAPPED SPLICE



MECHANICAL SPLICE  
(Not allowed for ASTM A82 spirals)



WELDED SPLICE

SPIRAL SPLICE DETAIL  
No Scale

## GENERAL NOTES:

Use ASTM A706 for all welded splices, except ASTM A615 Grade 60, ASTM A82 or ASTM A496 may be used if copies of the chemical composition analysis are submitted and approved as weldable by the Engineer.

Anchor spirals at each end or discontinuity with one extra turn and a splice to itself as shown. Where permitted on plans, provide closed hoops conforming to the requirements of this detail.

Securely tie CSL tubes to reinforcement.

Use temporary casing as required. Permanent casing not permitted.

Cap concrete shall be Class 3600 - 3/4" commercial grade, classified as a structural item. Remainder of shaft shall be Class 4000 - 3/8" without air entrainment and with 8 1/2" ± 1 1/2" slump.

Contractor shall field verify elevations prior to installation.

The transition between the 3 1/2" to 6" pitches may use two separate spiral cages with 1 1/2" horizontal turns at the start and end of each cage and the lapped splice details between the cages.

### Note:

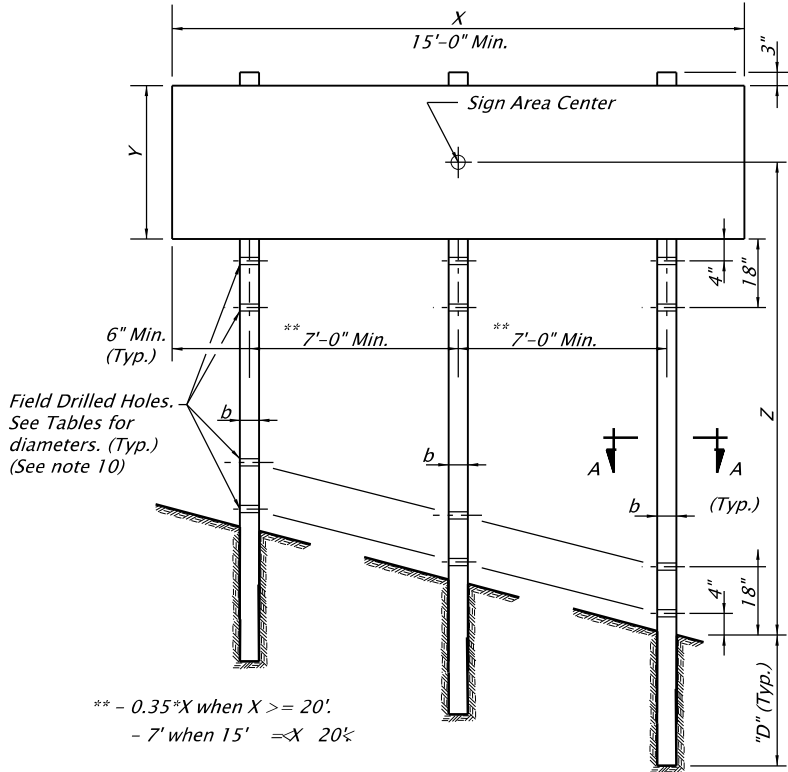
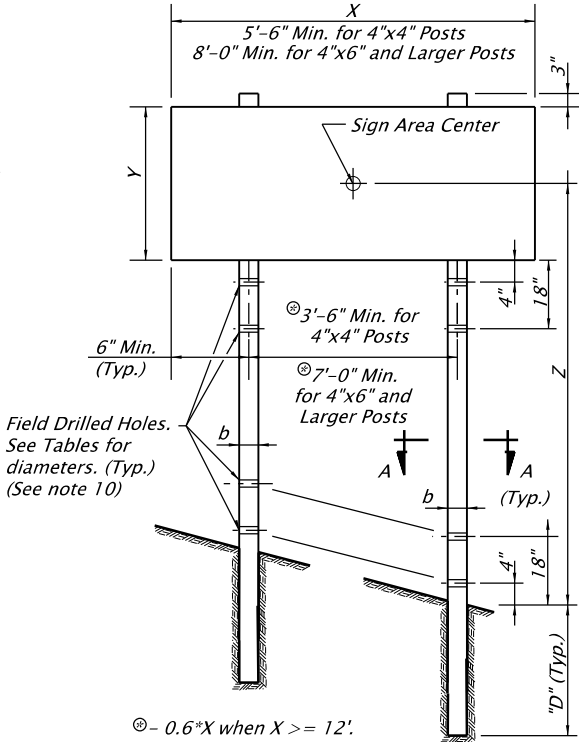
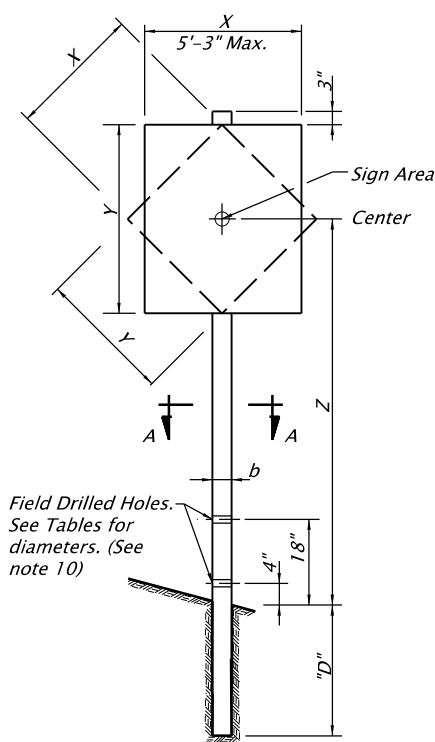
The base plate reactions shown in the table are worst case Extreme I and Service I loads. Engineer of Record to specify shaft depth and confirm shaft design for local soil conditions based on a site specific geotechnical study and loads shown in table. If shaft size or reinforcement shown in table are not adequate for local soil conditions, Engineer of Record must adjust the shaft design accordingly.

The shafts designs shown in table were based on an analysis to encompass worst case soil conditions by applying Extreme I loads to the top of shaft and analyzing below ground shaft forces using Brom's method for two different soil types. The assumed cohesive soil minimum undrained shear strength,  $c$ , is 600 psf. The assumed non-cohesive soil friction angle is 25 degrees and bulk weight is 100 pcf.

Accompanied by dwgs. TM621, TM622, TM623, TM624, TM625, TM626, TM627

CALC. BOOK NO. 6921-6930, 6969-6972 6974	SDR DATE 07-JAN-2022											
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>	NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications											
	OREGON STANDARD DRAWINGS											
	STD. MONOTUBE SIGN/VMS SUPPORT DRILLED SHAFT DETAILS											
	2021											
	<table><tr><th>DATE</th><th>REVISION DESCRIPTION</th></tr><tr><td>07/20</td><td>Added "Monotube" to the design number columns.</td></tr><tr><td>01/21</td><td>Changed conduit note.</td></tr><tr><td>01/22</td><td>Slump was 8" ± 1/2".</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>	DATE	REVISION DESCRIPTION	07/20	Added "Monotube" to the design number columns.	01/21	Changed conduit note.	01/22	Slump was 8" ± 1/2".			
DATE	REVISION DESCRIPTION											
07/20	Added "Monotube" to the design number columns.											
01/21	Changed conduit note.											
01/22	Slump was 8" ± 1/2".											





**ELEVATION**  
No scale

		$(X * Y * Z)$ in $ft^3$ – Maximum												Field Drilled Hole Diameters	Post Embedment Depth "D"
		3 Second Gust Wind Speed (TM671)													
		85 MPH				95 MPH				105 and 110 MPH					
		Number of Posts				Number of Posts				Number of Posts					
		1	2	3 * X=15'	3 * X≥20'	1	2	3 * X=15'	3 * X≥20'	1	2	3 * X=15'	3 * X≥20'		
POST SIZE b x d	4" x 4"	77	154	165	231	62	124	132	186	56	112	120	168	Not Req'd	4' – 0"
	4" x 6"	162	324	347	486	130	260	278	390	117	234	250	351	1½"	5' – 0"
	6" x 6"	270	540	578	810	216	432	462	648	195	390	417	585	2"	5' – 0"
	6" x 8"	494	988	1058	1482	395	790	846	1185	356	712	762	1068	3"	7' – 0"

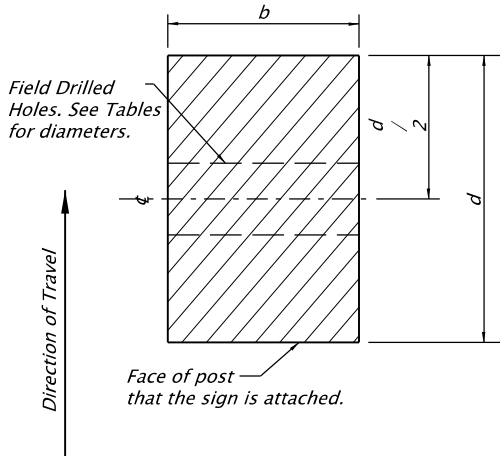
**PERMANENT WOOD POST TABLE**

\*\* – Linear Interpolate  $X*Y*Z$  3 post values for signs greater than 15' and less than 20'.  
\*\* – See note 8

		$(X * Y * Z)$ in ft <sup>3</sup> – Maximum												Field Drilled Hole Diameters	Post Embedment Depth "D"
		3 Second Gust Wind Speed (TM671)													
		85 MPH				95 MPH				105 and 110 MPH					
		Number of Posts				Number of Posts				Number of Posts					
		1	2	3 * X=15'	3 * X ≥20'	1	2	3 * X=15'	3 * X ≥20'	1	2	3 * X=15'	3 * X ≥20'		
POST SIZE b x d	4" x 4"	122	244	261	366	98	196	210	294	88	176	188	264	Not Req'd	4' – 0"
	4" x 6"	257	514	550	771	205	410	439	615	185	370	396	555	1½"	5' – 0"
	6" x 6"	426	852	912	1278	341	682	730	1023	308	616	660	924	2"	5' – 0"
	6" x 8"	779	1558	1669	2337	624	1248	1337	1872	563	1126	1206	1689	3"	7' – 0"

**TEMPORARY WOOD POST TABLE**

\* – Linear Interpolate  $X*Y*Z$  3 post values for signs greater than 15' and less than 20'.  
\*\* – See note 9



**SECTION A-A**  
No scale

**General Notes:**

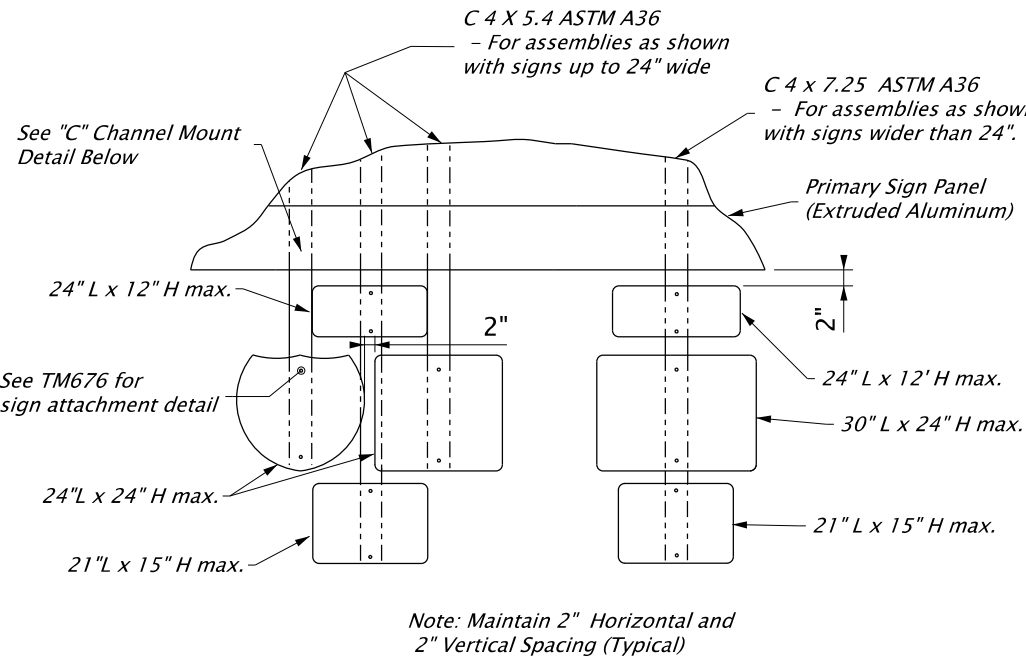
1. Wood posts are available in the following commercial lengths: 12', 14', 16', 18', 20', 22', 24', 26'.
2. Material shall be Douglas Fir No. 1 and according to Section 02110.40.
3. For horizontal and vertical clearances of permanent signs refer to TM200 and of temporary signs refer to TM822.
4. Wood post design in accordance with the 5th Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.
5. Use the 3 second gust wind speeds shown on TM671 for the site specific sign location.
6. General design parameters are  $K_z = 0.87$ ,  $SIF$  (duration factor) = 1.6,  $C_d$  (sign) = 1.20, and  $G = 1.14$ .
7. The sign width to sign height or sign height to sign width ratio shall not exceed 5.0.
8. Permanent signing uses an  $I_r = 0.71$  for a recurrence interval of 10 years.
9. Temporary signing uses an  $I_r = 0.45$  for a recurrence interval of 1.5 years.
10. Posts protected by barrier or guardrail do not require field drilled holes.
11. 4" x 4" posts should not be used in snow plow areas.

**Post Embedment Installation:**

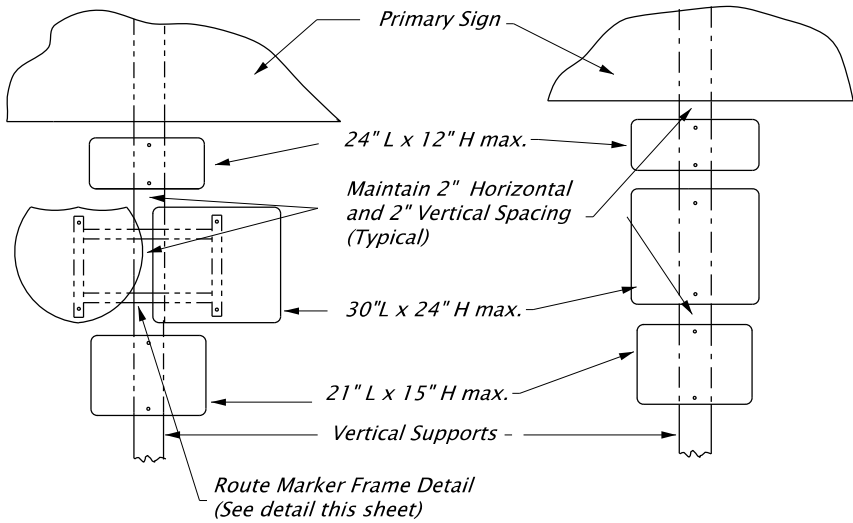
1. Excavate the hole at least 12" larger in diameter than the diagonal dimension of the post. Maintain at least 6" of space around the edges of the post to accommodate compaction equipment.
2. Align the post in the hole to a vertical position.
3. The space around the wood post shall be backfilled to finished ground surface.
4. Backfill with selected general backfill meeting the requirements of 00330.13.
5. Place in layers not greater than 6 inches.
6. Solidly ram and tamp the layers into the excavation area around the post.
7. Dampen during placement if too dry to compact properly.
8. Replace and finish the surface around the post to match the surrounding surface.

Accompanied by dwgs. TM200, TM671, TM822

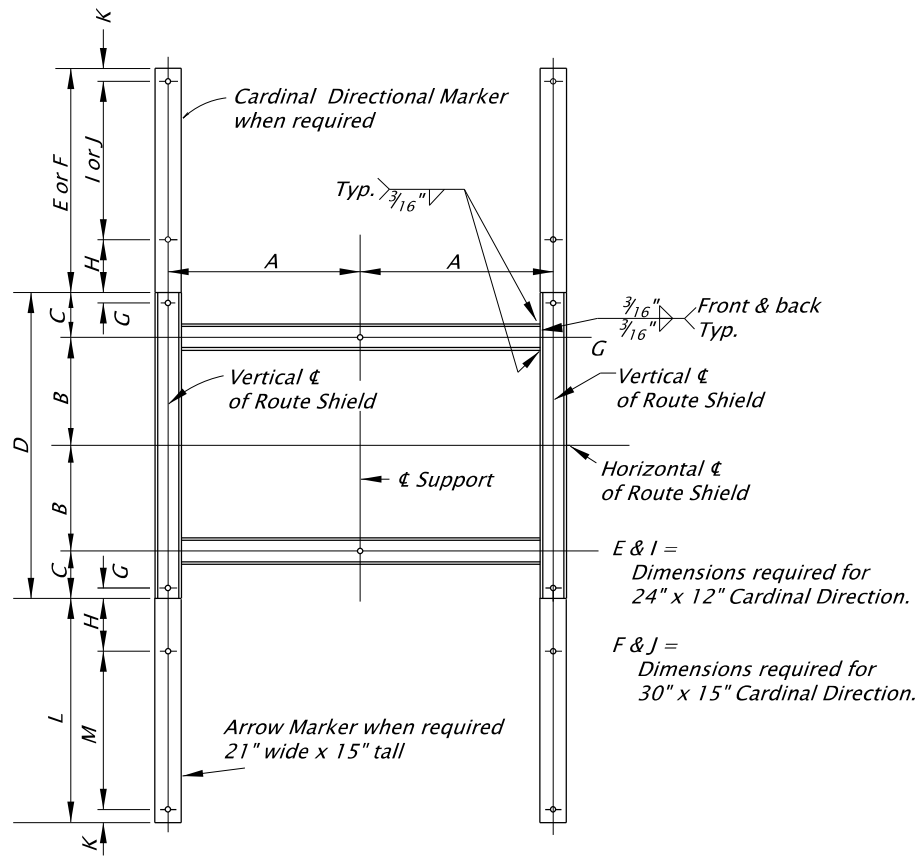
CALC. BOOK NO. 5850		SDR DATE 07-JAN-2022	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>WOOD POST SIGN SUPPORTS</b>	
		2021	
		DATE	REVISION DESCRIPTION
		01/22	Added 3'-6" Min. spacing for 4"x4" posts and 8'-0" Min. sign widths for 4"x6" and larger posts.



ROUTE MARKERS MOUNTED TO EXTRUDED PANELS  
No Scale



ROUTE MARKERS MOUNTED TO VERTICAL SUPPORTS  
No Scale



Shield Sizes (in inches)	A	B	C	D	E	F	G	H	I	J	K	L	M
2 - 24" x 24"	13	8	3 1/2	23	14	17	3/4	4	9	12	1	17	12
1 - 24" x 24" & 1-30" x 24"	14 1/2	8	3 1/2	23	14	17	3/4	4	9	12	1	17	12
2 - 30" x 24"	16	8	3 1/2	23	14	17	3/4	4	9	12	1	17	12
2 - 36" x 36"	19	12	5 1/2	35	14	17	1 3/8	4	9	12	1	17	12
1 - 36" x 36" & 1-45" x 36"	21 1/4	12	5 1/2	35	14	17	1 3/8	4	9	12	1	17	12
2 - 45" x 36"	23 1/2	12	5 1/2	35	14	17	1 3/8	4	9	12	1	17	12

Note: Route Marker frames shall be constructed from 2" x 2" x 3/16" ASTM A53 GR B tubing, galvanized after fabrication. Provide 7/16" holes, 3/8" galvanized steel bolts, washers, and lock-nuts for mounting route marker frame to post. For sign attachments see TM676.

ROUTE MARKER FRAME DETAIL  
No Scale

Accompanied by dwgs. TM675, TM676

CALC. BOOK NO. _____		SDR DATE 07-JAN-2022	
<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		OREGON STANDARD DRAWINGS	
		SECONDARY SIGN MOUNTING DETAILS	
		2021	
DATE		REVISION DESCRIPTION	
01/22		Revised "C" channel details and added 30" sign to custom hole spacing.	



TAPER TYPES & FORMULAS	
TAPER	FORMULA
Merging (Lane Closure)	"L"
Shifting	"L"/2 or ½"L"
Shoulder Closure	"L"/3 or ⅓"L"
Flagging (See Drg. TM850)	50' – 100'
Downstream (Termination)	Varies (See Drawings)

★ Use Pre-Construction Posted Speed to select the Speed from the Tables below:

TEMPORARY BARRIER FLARE RATE TABLE	
★ SPEED (mph)	MINIMUM FLARE RATE
≤ 30	8:1
35	9:1
40	10:1
45	12:1
50	14:1
55	16:1
60	18:1
65	19:1
70	20:1

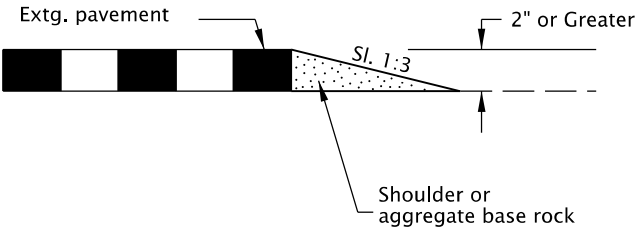
MINIMUM LENGTHS TABLE					
"L" VALUE FOR TAPERS (ft)					BUFFER "B" (ft)
★ SPEED (mph)	W = Lane or Shoulder Width being closed or shifted				
	W ≤ 10	W = 12	W = 14	W = 16	
25	105	125	145	165	75
30	150	180	210	240	100
35	205	245	285	325	125
40	265	320	375	430	150
45	450	540	630	720	180
50	500	600	700	800	210
55	550	660	770	880	250
60	600	720	840	960	285
65	650	780	910	1000	325
70	700	840	980	1000	365
FREEWAYS					
55	1000	1000	1000	1000	250
60	1000	1000	1000	1000	285
65	1000	1000	1000	1000	325
70	1000	1000	1000	1000	365

- NOTES:
- For Lane closures where W < 10', use "L" value for W = 10'.
  - For Shoulder closures where W < 10', use "L" value for W = 10' or calculate "L" using formula, for Speeds ≥ 45: L = WS, Speeds < 45: L = S<sup>2</sup>W/60, S = Speed, W=Width

TRAFFIC CONTROL DEVICES (TCD) SPACING TABLE				
★ SPEED (mph)	Sign Spacing (ft)			Max. Channelizing Device Spacing (ft)
	A	B	C	
20 – 30	100	100	100	20
35 – 40	350	350	350	20
45 – 55	500	500	500	40
60 – 70	700	700	700	40
Freeway	1000	1500	2640	40

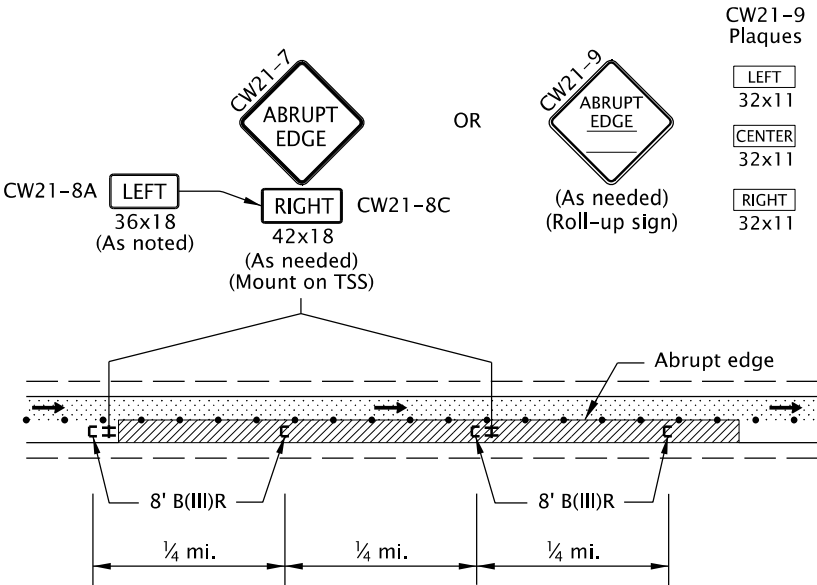
- NOTES:
- Place traffic control devices on 10 ft. spacing for intersection and access radii.
  - When necessary, sign spacing may be adjusted to fit site conditions. Limit spacing adjustments to 30% of the "A" dimension for all speeds.

- NOTES:
- When paved shoulders adjacent to excavations are less than four feet wide protect longitudinal abrupt edge as shown.
  - Use aggregate wedge when abrupt edge is 2 inches or greater.



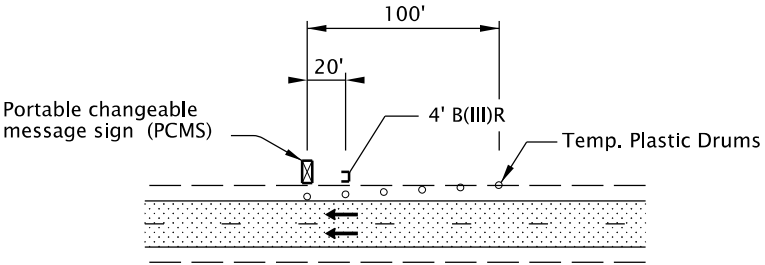
EXCAVATION ABRUPT EDGE

- NOTES:
- Abrupt edges may be created by paving, operations, excavations or other roadway work. Use abrupt edge signing for longitudinal abrupt edges of 1 inch or greater.
  - If the excavation is located on left side of traffic, replace the 8' B(III)R barricades with 8' B(III)L barricades and replace the "RIGHT" (CW21-8C) riders with "LEFT" (CW21-8A) riders.
  - Continue signing and other traffic control devices throughout excavation area at spacings shown.
  - If roll-up signs are used, attach the correct (CW21-9) plaques to the sign face using hook and loop fasteners. Place roll-up signs in advance of barricades.



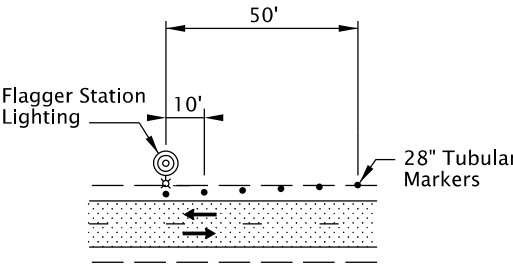
TYPICAL ABRUPT EDGE DELINEATION

- NOTES:
- Install PCMS beyond the outside shoulder, when possible.
  - Use the appropriate type of barricade panels for PCMS location. Right shoulder, use Type B(III)R Left shoulder, use Type B(III)L
  - Use six drums in shoulder taper on 20' spacing. The drums and barricade may be omitted when PCMS is placed behind a roadside barrier.
  - Detail as shown is used for trailered and non-crashworthy components of:
    - Portable Traffic Signals
    - Smart Work Zone Systems



PORTABLE CHANGEABLE MESSAGE SIGN (PCMS) INSTALLATION

- NOTES:
- Install Flagger Station Lighting beyond the outside shoulder, where practical.
  - Use six tubular markers in shoulder taper on 10' spacing.
  - Place cart / generator / power supply off of the shoulder, as far as practical.



FLAGGER STATION LIGHTING DELINEATION

- GENERAL NOTES FOR ALL TCP DRAWINGS:
- Signs and other Traffic Control Devices (TCD) shown are the minimum required.
  - Place a barricade approx. 20' ahead of all sequential arrow boards.
  - Arrows shown in roadway are directional arrows to indicate traffic movements.
  - All signs are 48" x 48" unless otherwise shown. Use fluorescent orange sheeting for the background of all temporary warning signs.
  - All diamond shaped warning signs mounted on barrier sign supports shall be 36" by 36". All other signs mounted on barrier sign supports shall not exceed 12 sq. ft. in total sign area.
  - Low speed highways have a pre-construction posted speed of 40 mph or less. High speed highways have a pre-construction posted speed of 45 mph or higher.
  - Do not locate sign supports in locations designated for bicycle or pedestrian traffic.
  - Combine drawing details to complete temporary traffic control for each work activity.
  - To be accompanied by Dwg. Nos. TM820 & TM821.

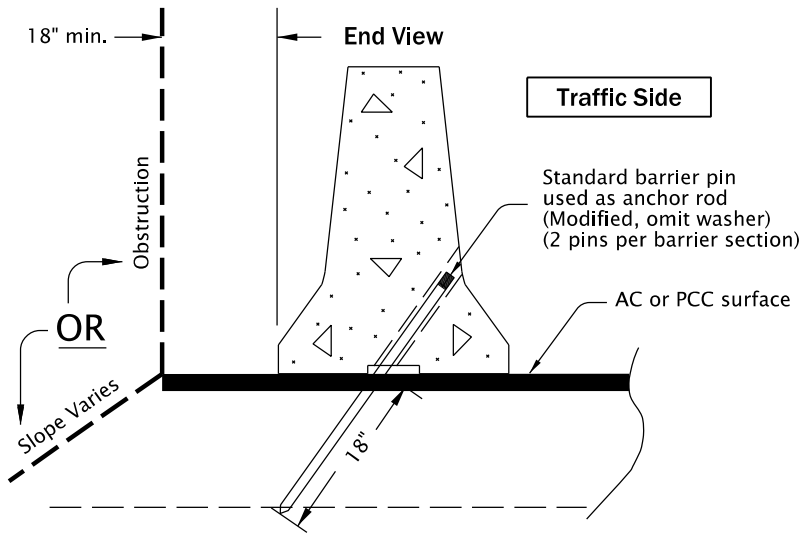
CALC. BOOK NO. \_\_\_\_ TM09-01 \_\_\_\_ SDR DATE \_\_\_\_ 04-JAN-2022 \_\_\_\_

<i>The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.</i>		NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications	
		<b>OREGON STANDARD DRAWINGS</b>	
		<b>TABLES, ABRUPT EDGE AND PCMS DETAILS</b>	
		2021	
		DATE	REVISION DESCRIPTION

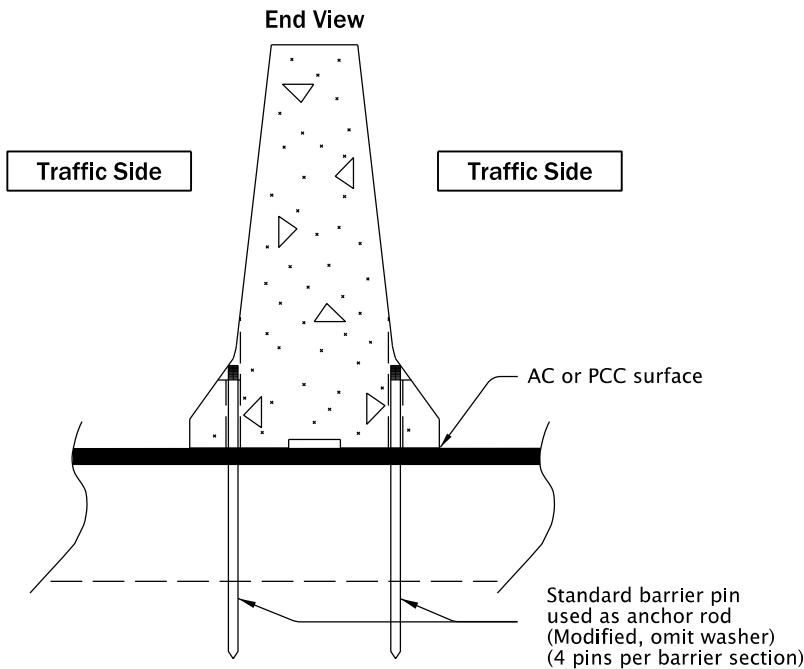
tm830.dgn 04-JAN-2022

TM830

- NOTES:
- DO NOT USE ON BRIDGE DECKS. Restrain barrier on bridge decks according to Bridge Design Manual. See Chapter 1.13.1.10
  - Predrill pin holes for PCC pavement placement.
  - Excavation height greater than 3 feet requires proper backslope based on angle of repose, or shoring as directed.
  - Place temporary barrier on smooth, solid surfacing. Maintain, smooth solid surfacing for clear area behind temporary barrier.



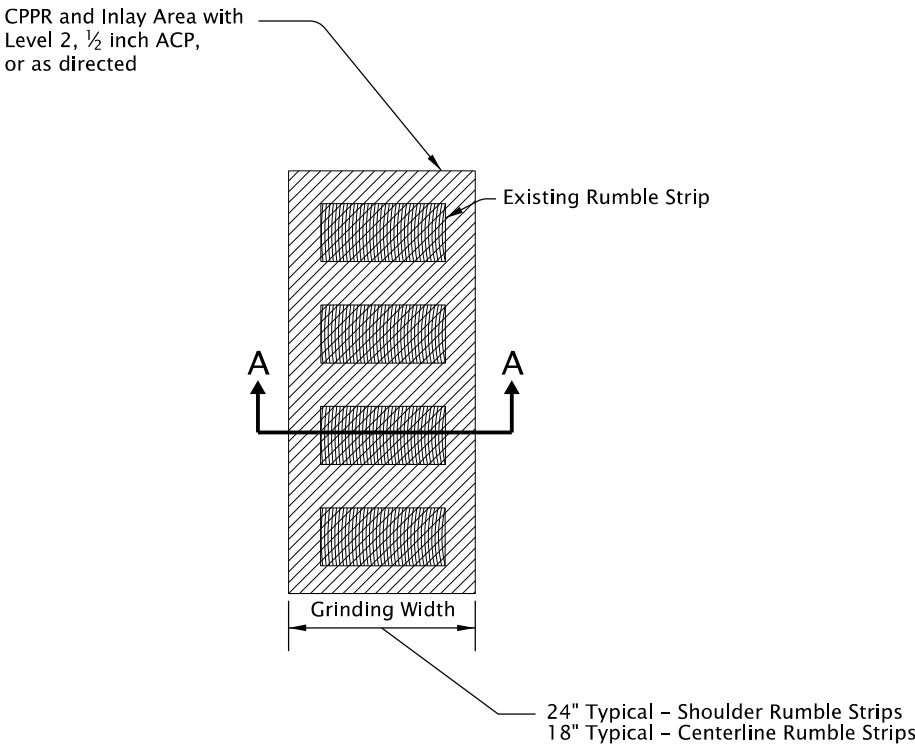
SECURING TEMPORARY CONCRETE BARRIER  
(Shoulder Installation)



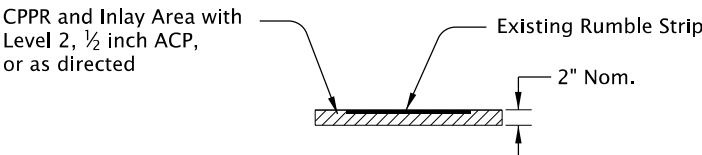
SECURING TEMPORARY TALL CONCRETE BARRIER  
(Median Installation)

- NOTES:
- CPPR and inlay existing rumble strips prior to staging traffic across the area. Common application is staging for freeway crossovers and lane shifts.
  - Remove and replace existing striping as required.

UNDER CONSTRUCTION

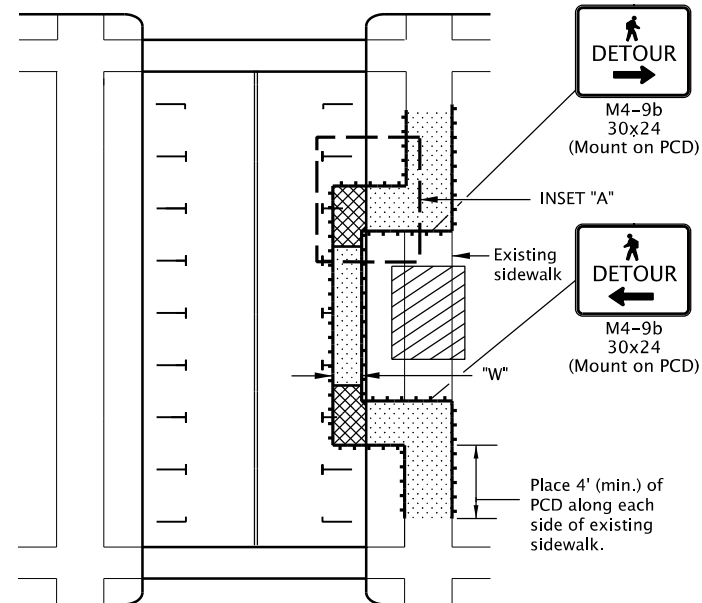


EXISTING RUMBLE STRIP REMOVAL



SECTION A-A

CALC. BOOK NO. _____ N/A _____	SDR DATE _____ 04-JAN-2022 _____												
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	<b>OREGON STANDARD DRAWINGS</b>												
	<b>TEMPORARY CONCRETE BARRIER AND RUMBLE STRIP DETAILS</b>												
	2021												
	<table><tr><th>DATE</th><th>REVISION DESCRIPTION</th></tr><tr><td>07/01/21</td><td>Revised clear space to obstruction.</td></tr><tr><td>01/01/22</td><td>Added note for surfacing behind barrier.</td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>	DATE	REVISION DESCRIPTION	07/01/21	Revised clear space to obstruction.	01/01/22	Added note for surfacing behind barrier.						
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07/01/21	Revised clear space to obstruction.												
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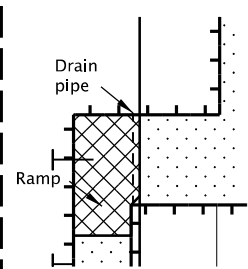
### Within Roadway SIDEWALK DIVERSION

#### NOTES:

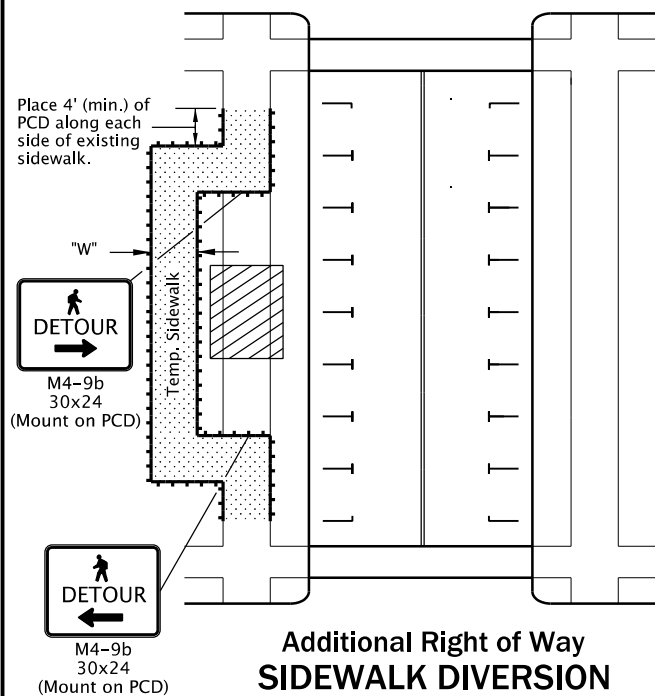
- Place or construct temp. sidewalk ramp, as needed.
- For roadways with a pre-construction posted speed of 40 mph or less.
- See inset "A" for Temp. Sidewalk Ramp details.
- "W" = 60", or, where 60" width cannot be maintained through the entire route, provide 48" min. width with 60" x 60" passing spaces every 200 ft.
- Use temporary ADA compliant surfaces to cross planter strips or other non-traversable surfaces.

#### NOTES:

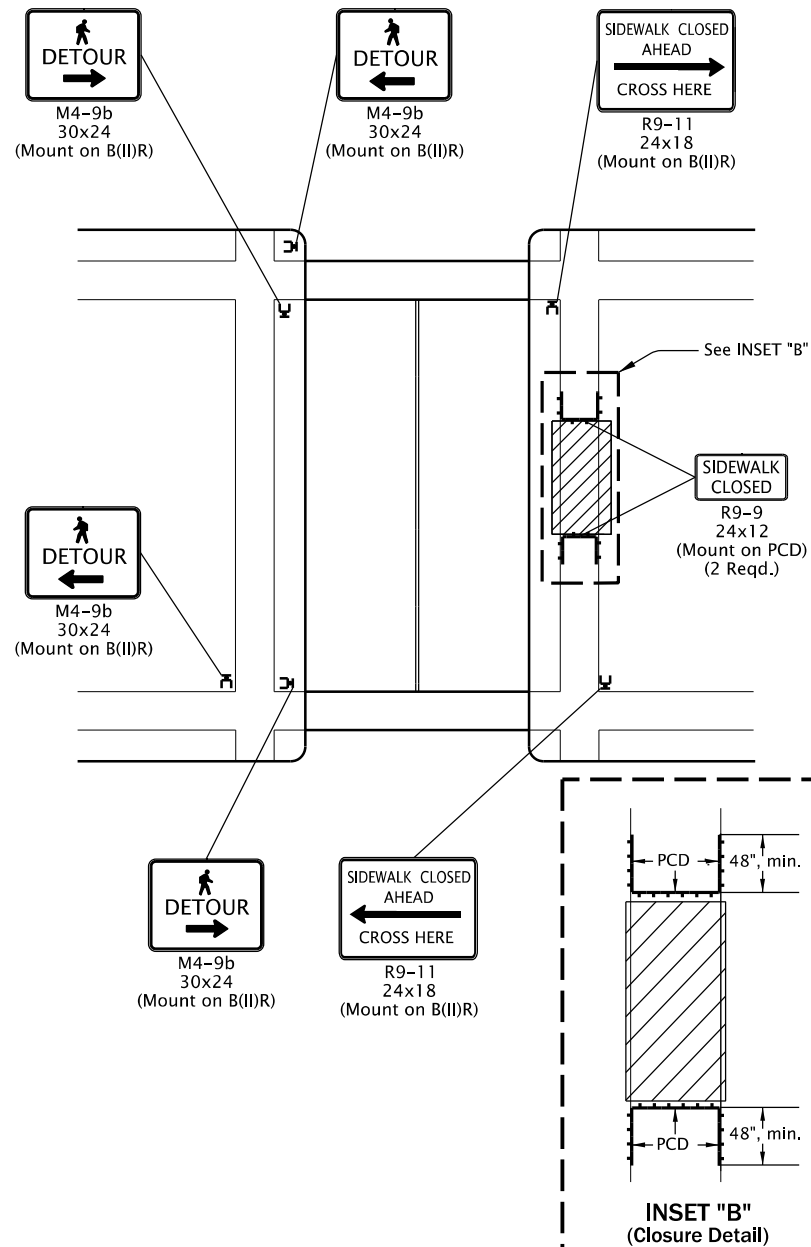
- Ramp size will vary. Ramp must meet ADA requirements incl. max. finished surf. slope of 8.3% and max. finished cross slope of 2.0%.



INSET "A"  
(Temp. Sidewalk Ramp)



### Additional Right of Way SIDEWALK DIVERSION

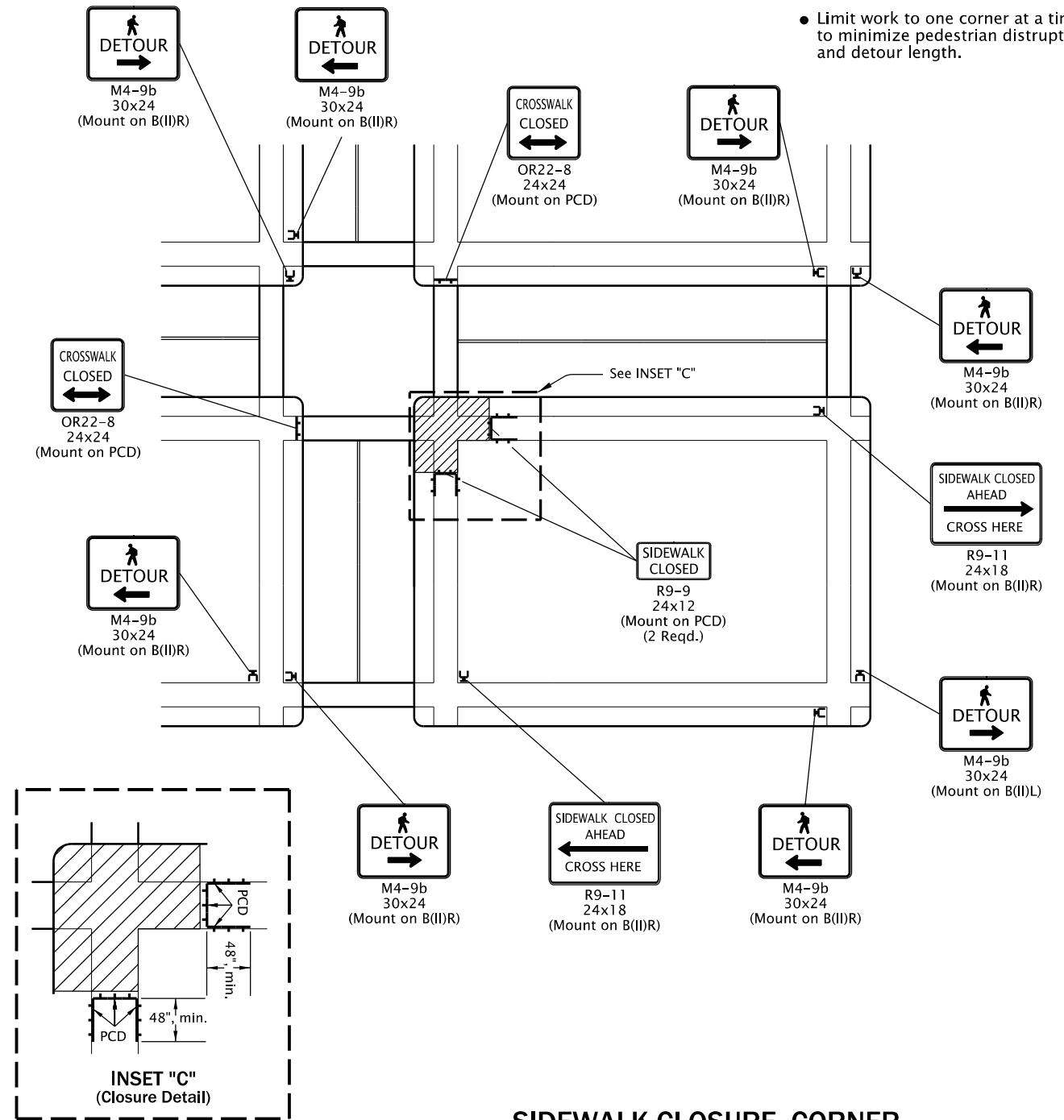


### SIDEWALK CLOSURE, MIDBLOCK

#### GENERAL NOTES FOR ALL DETAILS:

- When closing or relocating crosswalks or other pedestrian facilities provide ADA compliant facilities. Include accessibility features consistent with existing pedestrian facilities by providing adequate slope transitions and surfacing.
- Provide non-slip, 60 inch minimum wide surface through entire pedestrian route. If not possible, provide 48" min. width with 60" x 60" passing spaces every 200 feet along the route.
- Only TCD for pedestrians are shown. Other devices may be necessary to control vehicular traffic.
- Stage work, as necessary, to provide a temporary pedestrian access route at all times. For roadways with no available detours, maintain one open sidewalk at all times.
- Minimize pedestrian out-of-direction travel.
- To be accompanied by Dwg. Nos. TM820 & TM821.

- UNDER PEDESTRIAN TRAFFIC
- UNDER CONSTRUCTION
- PEDESTRIAN CHANNELIZING DEVICE (PCD)



### SIDEWALK CLOSURE, CORNER

#### NOTE:

- Limit work to one corner at a time to minimize pedestrian disruption and detour length.

CALC. BOOK NO. \_\_\_\_\_ N/A \_\_\_\_\_

SDR DATE \_\_\_\_\_ 04-JAN-2022 \_\_\_\_\_

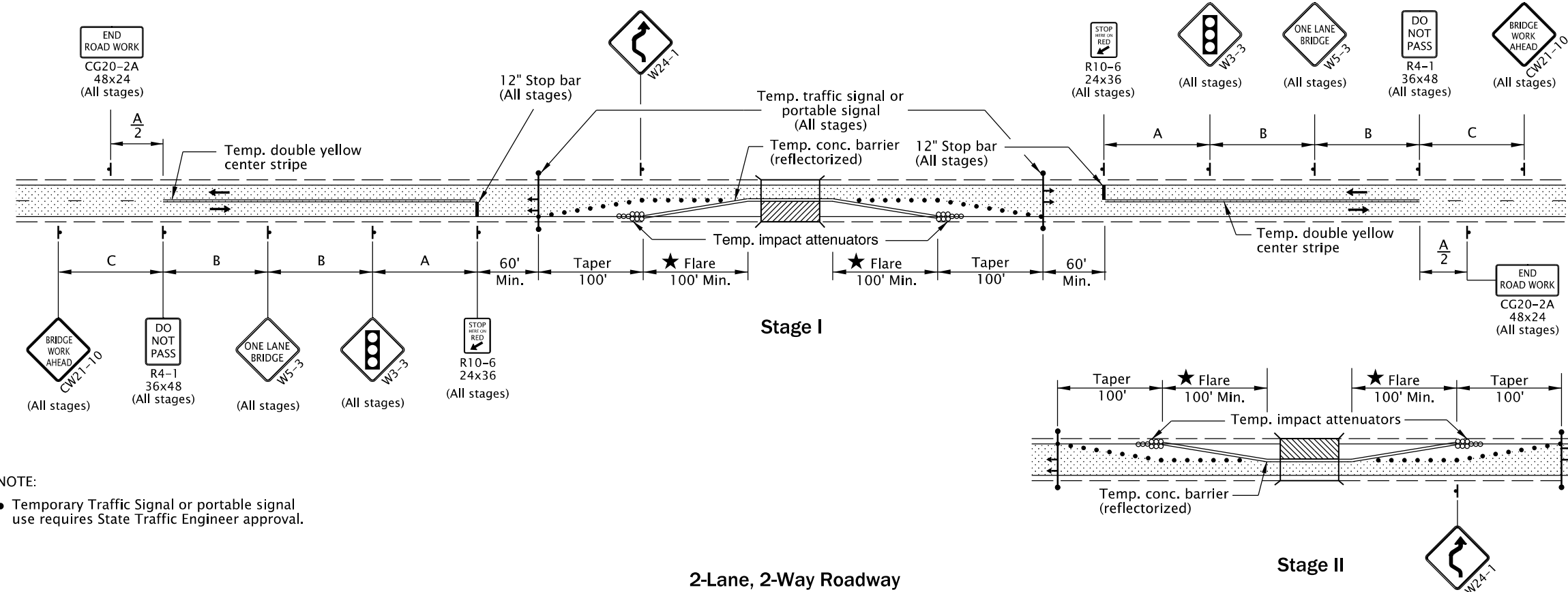
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

### OREGON STANDARD DRAWINGS TEMPORARY PEDESTRIAN ACCESSIBLE ROUTES

2021

DATE	REVISION	DESCRIPTION
01/01/22	Revised note for temporary sidewalk ramp.	

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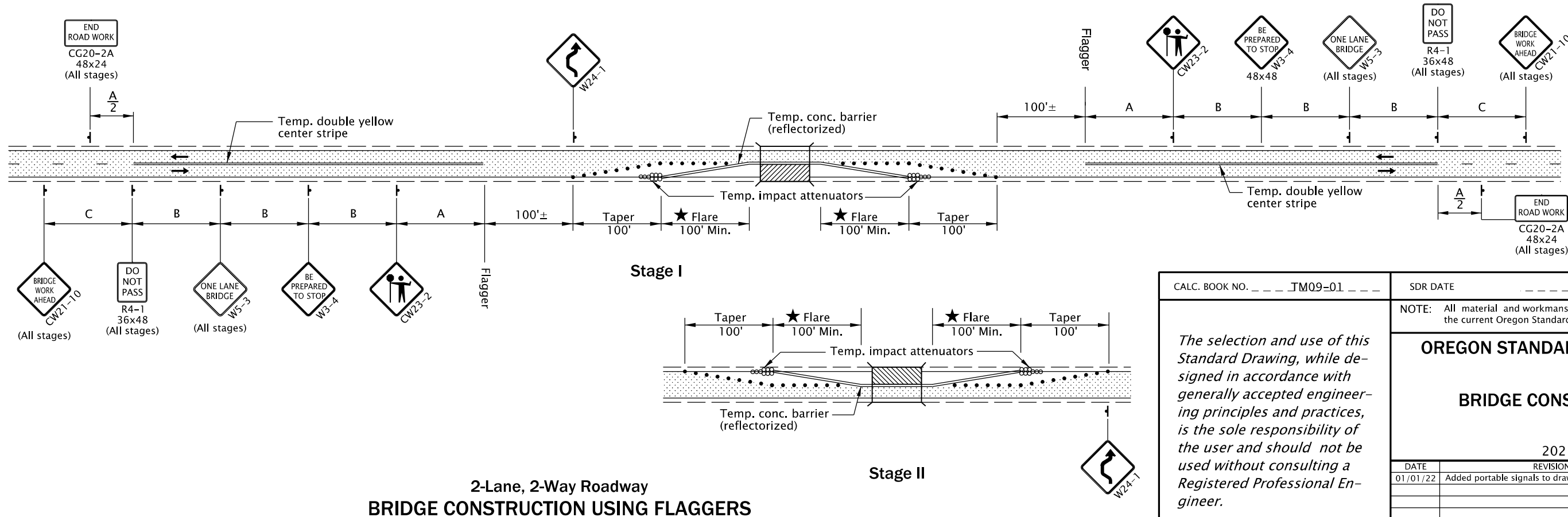


NOTE:

- Temporary Traffic Signal or portable signal use requires State Traffic Engineer approval.

- GENERAL NOTES FOR ALL DETAILS:
- For single lane operations, maintain 19' minimum horizontal clearance between positive barriers, or as directed. If overwidth loads are diverted, the roadway width may be adjusted, as directed.
  - Bridge replacement requires use of positive protection (i.e. temp. barrier) for the work area.
  - To determine sign spacing A, B, and C, use "TRAFFIC CONTROL DEVICES (TCD) SPACING TABLE" on Dwg. No. TM800.
  - DOUBLE REVERSING CURVE (W24-1) symbol sign may be used for work areas up to 600'. For longer work areas, use "REVERSING CURVE" (W1-4) [L and R] signs.
  - Install a "BICYCLES ON ROADWAY" (CW11-10) sign in advance of the closure when a bike lane is closed, or when the shoulder is closed and bikes are expected.
  - ★ See "TEMPORARY BARRIER FLARE RATE TABLE" on Dwg. No. TM800.
  - To be accompanied by Dwg. Nos. RD500, TM820, TM821, TM830, & TM831.

- ..... 28" Tubular Markers on 20' max. spacing
- ..... UNDER TRAFFIC
- ..... UNDER CONSTRUCTION



CALC. BOOK NO. \_\_\_\_ TM09-01 \_\_\_\_

SDR DATE \_\_\_\_ 04-JAN-2022 \_\_\_\_

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

**OREGON STANDARD DRAWINGS**

**BRIDGE CONSTRUCTION**

2021

DATE	REVISION	DESCRIPTION
01/01/22	Added portable signals to drawing	

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