

<p>MINNESOTA DEPARTMENT OF TRANSPORTATION</p> <p>DEVELOPED BY: Design Standards</p> <p>ISSUED BY: Office of Project Management and Technical Support, Design Support Section</p>	<p>TRANSMITTAL LETTER NO. (19-01)</p> <p>MANUAL: Standard Plates</p> <p>DATED: January 28, 2019</p>
<p>SUBJECT: Standard Plates 3000, 3020, 8352, 8400, 8401</p>	

The following Standard Plates have been modified:

- 3000 - Reinforced Concrete Pipe
- 3020 - Precast Concrete Cattle Pass
- 8352 – Thrie Beam Wedge Plate for Single Slope Barrier
- 8400 – Pipe Railing

The following Standard Plate is being removed:

- 8401 – At Grade Pipe Railing (Adjacent to Sidewalk)

See attached Summary of Changes for specifics.

INSTRUCTIONS:

- Record the transmittal letter number, date, and subject on the transmittal record sheet located in the front of the manual. The previous Transmittal Letter No. issued for this manual was 18-01, dated October 24, 2018.
- Remove from the Standard Plates manual:
 - Standard Plate Index, Sheets 1-4 of 4, Numerical Index of Standard Plates
 - Standard Plate 3000L, Sheets 3 and 4
 - Standard Plate 3020G
 - Standard Plate 8352A, Sheets 1 and 2
 - Standard Plate 8400E, (8401C back side)
- Insert into the Standard Plates manual:
 - Standard Plate Index, Sheets 1-4 of 4, Numerical Index of Standard Plates (January 9, 2019)
 - Standard Plate 3000L, Sheets 3 and 4, Pipe Railing (Revised January 9, 2019)
 - Standard Plate 3020H, Precast Concrete Cattle Pass (January 9, 2019)
 - Standard Plate 8352B, Thrie Beam Wedge Plate for Single Slope Barrier (January 18, 2019)
 - Standard Plate 8400F, Pipe Railing (January 9, 2019)
- Current Standard Plates including Transmittal Letters are available on the web at:
 - <https://standardplates.dot.state.mn.us/stdplate.aspx>
- Direct any technical questions regarding this transmittal to Ron Reemer, Design Standards Unit at (651) 366-4707.

Michael Elle

Michael Elle, P.E.
Design Standards Engineer

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Summary of Changes
Standard Plate 3000L (4 of 5) – Reinforced Concrete Pipe
Reinforcement Information Special Design Pipes
Transmittal Letter No. (19-01)

General:

1. Revision date added to sheet 4 of 5.

Details

2. At the Cross Section for Special Design Pipes, adjusted the leader line for A3 to point to the correct location (sheet 4 of 5).

Summary of Changes
Standard Plate 3020H–Precast Concrete Cattle Pass
(60 IN. & 72 IN.)
Transmittal Letter No. (19-01)

General:

1. Plate number incremented from 3020G to 3020H
2. Added underline to detail titles.
3. Changed note in lower right corner from “Estimated Weight:” to “Estimated Weight of Flared End Sections:”
4. Changed note in lower right corner from “Approx. Wt. of Section” to “Approx. Wt. of Intermediate Sections:”

Details

5. Added “Tongue and Groove Joint Detail”
6. Added the longitudinal steel designation (A_L) to both Section A-A and Steel Area Table and added note “ A_L = Longitudinal, Each Face”

Basis of Design

7. Updated the specification reference from 2014 AASHTO 7th edition to 2017 8th edition.

Construction Notes

8. At the Construction Notes, 6th note, changed the word “barrel” to “intermediate”.
9. At the Construction Notes, added numbered note ②: “Longitudinal end wire may be extended to the end surface of the joint in lieu of using a bar chair.”
10. At the Construction Notes, added numbered note ③: “Refer to spec. 2412 for sealant requirements.”

Summary of Changes
Standard Plate 8352B – Thrie Beam Wedge Plate for Single Slope Barrier
Transmittal Letter No. (19-01)
(Corrected 3/27/19)

General:

1. Plate reference updated from 8352A to 8352B.
2. Wedge plate has been extended/lengthened 10-1/4".
3. Notes clarified.

Sheet 1 of 2

1. Plate P1 dimension change to 30-1/4" x 20".
2. Plate P2 dimension change to 19-11/16" x 20" x 28-1/16".
3. Plate P3 dimension change to 49-15/16 x 3-5/8" x 30-1/4" x 16-31/32" x 1/2".
4. Plate S1 quantity change to 5.

Sheet 2 of 2

1. Spacing of Plates S1 and S7, S8, and S9 have been modified.
2. Welding symbols modified/added.

Summary of Changes
Standard Plate 8400F – Pipe Railing
Pedestrian Railing for Stairs and Ramps (at Grade)
Transmittal Letter No. (19-01)

General:

1. Plate number incremented from 8400E to 8400F

Details

1. The Base Plate has been modified from a trapezoidal (three hole) to a rectangular (four hole) shape with a thickness of ½”.
2. Minimum distance from base plate to the edge of the ramp or stairs has been added.
3. Base plate pipe and embedded pipe sleeve have changed to a 1 ½” solid round bar.
4. Vertical height of the pipe railing has changed to 3’-0” with the bottom pipe located 1’-6” from the top rail.
5. Pipe railing cantilevered end is 2’-0” maximum and has a 4” maximum spacing between cantilevers.

Specification Reference

1. Added 3385.

Notes

1. Notes have been updated to active voice.
2. Note regarding adhesive anchorage was added.
3. Note regarding railing is not suitable for OSHA fall protection was added.

Users of this detail should be sure to include the Special Provision associated with pay item 2402.503 Pipe Railing (LF).

Summary of Changes
Standard Plate 8401C – At Grade Pipe Railing
(Adjacent to Sidewalk)
Transmittal Letter No. (19-01)

General:

1. The mechanical connections shown on Standard Plate 8401C do not comply with ADA requirements, hence the plate has been archived.

Standard Plate 8401C is being **Removed**.

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STANDARD PLATES

BLANK	0000 SERIES
PAVEMENT	1000 SERIES
BLANK	2000 SERIES
CULVERTS AND APPURTENANCES	3000 SERIES
SEWER APPURTENANCES	4000 SERIES
EROSION CONTROL STRUCTURES.....	5000 SERIES
BLANK	6000 SERIES
CURB, CURB AND GUTTER, SIDEWALK.....	7000 SERIES
BARRICADES, SIGNALS, MARKERS, ETC.	8000 SERIES
MISCELLANEOUS.....	9000 SERIES

PLATE NO.

0000 SERIES—BLANK

1000 SERIES—PAVEMENT

- 1070M Supplemental Pavement Reinforcement
- 1103K Typical Dowel Bar Assembly (2 Sheets)
- 1150R Concrete Header Joints (2 Sheets)
- 1210G Concrete Pavement Adjacent to Railway Crossing

2000 SERIES—BLANK

3000 SERIES—CULVERTS AND APPURTENANCES

- 3000L Reinforced Concrete Pipe (5 Sheets)
- 3001B Reinforced Concrete Reducer Pipe
- 3002B Reinforced Concrete Increaser Pipe
- 3006G Gasket Joint for R.C. Pipe (2 Sheets)
- 3007E Shear Reinforcement for Precast Drainage Structures
- 3014J Reinforced Concrete Pipe Arch (2 Sheets)
- 3020H Reinforced Precast Concrete Cattle Pass (60" & 72")
- 3022C Precast Concrete Safety Apron (3 Sheets)
- 3040F Corrugated Metal Pipe Culvert (Standard 2-2/3" x 1/2" Corrugation)
- 3041D Corrugated Metal Pipe (3" x 1" Corrugation)
- 3050B Design Data Structural Plate Structures (18" Corner Radius)
- 3051B Design Data Structural Plate Structures (31" Corner Radius)
- 3065C Connection between Existing Culv. & New "C" Culv. Barrel (2 Sheets)
- 3066A C.M. Extension for Box Culvert
- 3100G Concrete Apron for Reinforced Concrete Pipe
- 3110G Concrete Apron for Reinforced Concrete Pipe-Arch
- 3114H Sectional Concrete Apron for Reinforced Concrete Pipe-Arch
- 3122K Metal Apron for C.M. Pipe-Arch Culvert
- 3123J Metal Apron for C.S. Pipe
- 3124B Metal Apron Connection
- 3125A Inlet Protection for Metal Culverts (90" dia. to 96" dia.)
- 3126B Inlet Protection for Structural Plate Pipe (60" thru 96" dia. or span)
- 3127A Inlet Protection for Structural Plate Pipe (102" thru 180" dia. or span)

PLATE NO.

3128H	Metal Safety Apron & Grate (2 Sheets)
3129A	Metal Apron for Corrugated Polyethylene Pipe (Use at Entrances and Driveways)
3131C	Precast Concrete Headwall for Subsurface Drains
3132A	Grate for 1:4 Precast Concrete Aprons
3133D	Riprap at RCP Outlets
3134D	Riprap at CSP Outlets
3135A	Hand-Placed Riprap at Precast Concrete Cattle Pass
3136B	Slotted Vane Drain for P.V.C. Pipe
3137B	Slotted Drain for 12" thru 30" Dia. C.M. Pipe (Stackable)
3138B	Slotted Drain for 12" thru 30" Dia. C.M. Pipe (Not Stackable)
3139B	Riprap at Precast Concrete End Sections
3142A	Outlet Screen for C.M. & S.C. Pipes
3143C	Inspection Tees
3145G	Concrete Pipe or Precast Culvert Ties
3146C	Anti-Seepage Diaphragm (For CMP and CMP-A)
3148A	Safety Slope Metal End Section for Circular & Arched Pipes (2 Sheets)
3221C	Corrugated Steel Pipe Coupling Band (3 Sheets)

4000 SERIES--SEWER APPURTENANCES

Drainage Structure and Castings (4 Sheets)

- Structure and Casting Combinations
- Standard Casting Assemblies
- List of Castings
- List of Drainage Structures

4000J	Manhole or Catch Basin (Masonry, Field Constructed) - Design A
4002F	Manhole or Catch Basin (Masonry, Field Construction) - Design C
4003B	30" Precast Catch Basin – Design N
4005M	Manhole or Catch Basin Type A & B Cone Sections Precast - Design F
4006L	Manhole or Catch Basin Precast - Designs G and H
4007C	Precast Mechanical Joint Sewer Manhole
4008E	Catch Basin (Sectional Concrete Pipe) - Design I
4009H	Manhole or Catch Basin (Sectional Concrete Pipe) - Design J
4010H	Concrete Short Cone & Adjusting Ring (Sectional Concrete)
4011E	Precast Concrete Base
4017C	Catch Basin (Concrete Pipe and Metal Pipe) - Designs PC and PM
4018B	Manhole or Catch Basin (Reducer Cone Section Precast) Design D
4020J	Manhole or Catch Basin (For Use With or Without Traffic Loads) (2 sheets)
4021F	Precast Curb Opening Catch Basin
4022A	Manhole or Catch Basin Cover (3 ft. X 2 ft. Opening)
4024A	48" Dia. Precast Shallow Depth Catch Basin - Design SD
4025B	Drop Inlets or Catch Basins - Design DI (Concrete & Metal)
4026A	Concrete Encased Concrete Adjusting Rings
4101D	Ring Casting For Manhole or Catch Basin
4108F	Adjusting Rings for Catch Basins and Manholes
4110F	Cover Casting for Manhole (For Use in all Traffic Areas) – Casting No. 715 and 716
4125D	Catch Basin Frame Casting (For Square Grate) – Casting No. 806
4126F	Catch Basin Frame Casting – Casting No. 801
4129G	Catch Basin Frame Casting (For Square Grate) - Casting No. 802A
4132G	Catch Basin Frame Casting (For Square Grate) – Casting No. 805
4133A	Curb Box Casting for Catch Basin - Casting No. 824
4134A	Curb Box Casting for Catch Basin (For Design B Curbs) - Casting No. 825
4140D	Special Grate Castings for Catch Basin (Convex and Concave) - Casting No. 720 and 721
4143E	Stool Grate & Concrete Frame (Median Drains) - Casting No. 731
4149C	Grate Casting for Catch Basin - Casting No. 810

PLATE NO.

- 4150C Grate Casting for All Pipe Drainage Structures
- 4151B Grate Casting for Catch Basin (Square Type) - Casting No. 811
- 4152C Catch Basin Grate Casting - Casting No. 814A
- 4153A Catch Basin Grate Casting - Casting No. 815
- 4154B Catch Basin Grate Casting - Casting No. 816
- 4155A ADA Grate Inlet Casting – Casting No. 817
- 4160D Curb Box Casting for Catch Basin - Casting No. 823A and 833A
- 4161F Curb Box Casting for Catch Basin - Casting No. 821B, 822 and 831A
- 4180J Manhole or Catch Basin Step

5000 SERIES--EROSION CONTROL STRUCTURES

- 5010A Reinforced Concrete Pipe Energy Dissipater

6000 SERIES -- Blank

7000 SERIES--CURB, CURB AND GUTTER, SIDEWALK

- 7000E Integrant Curbs (Design B, Design V and Design D)
- 7020K Concrete Curb (Design B, Design V, Design S, Design DR and Design BR) (2 Sheets)
- 7038A Detectable Warning Surface Truncated Domes
- 7065C Bituminous Curb
- 7100H Concrete Curb and Gutter (Design B and Design V)
- 7102K Concrete Curb and Gutter (Design D, Design S, and Design R)
- 7105C Concrete Median (Mountable Type)
- 7107I Entrance Nose (Urban Design)
- 7108G Exit Nose (Urban Design)
- 7109C Median Nose and Island (Undivided to Divided Roadway)
- 7111J Installation of Catch Basin Castings (Concrete Curb and Gutter)
- 7112C Installation & Reinforcement of Catch Basin & Manhole Castings (Concrete Integrant Curbs)
- 7113A Concrete Approach Nose Detail

8000 SERIES -- BARRICADES, SIGNALS, MARKERS, ETC.

- 8000J Channelizers
- 8002G Permanent Barricade
- 8106D Equipment Pad B
- 8107A RLF Equipment Pad Foundation Layout
- 8110E Traffic Signal Bracketing (Pole Mounted)
- 8111E Traffic Signal Bracketing (Pedestal Mounted) (3 Sheets)
- 8112I Pedestal Foundation (Traffic Control Signals)
- 8117G Precast Concrete HandHole With Vehicle Load
- 8118D Service Equipment & Pole Traffic Control Signals
- 8119C Ground Mounted Cabinet Foundation
- 8120Q Pole Foundation (PA85)
- 8121H Transformer Base and Pole Base Plate (PA85, PA90 and PA100) (2 Sheets)
- 8122F Pedestal and Pedestal Base (For Traffic Control Signals Support) (2 Sheets)
- 8123G Pole and Mast Arm Luminaires and Traffic Lights Assembly (For All Pole Types) (2 Sheets)
- 8126L Pole Foundation (PA90 and PA100)
- 8127E Light Foundation - Design E, Precast/Cast-In-Place, 40 ft. Pole or Less (2 Sheets)
- 8128E Light Foundation - Design H, Precast/Cast-In-Place, 49 ft. Pole (2 Sheets)

PLATE NO.

8129A	Shim and Washer (Traffic Control Signals and Roadway Lighting)
8130E	Saw Cut Loop Detectors (3 Sheets)
8132B	Preformed Rigid PVC Conduit Loop Detector (3 Sheets)
8133A	Pole and Mast Arm - Type BA (9 Sheets)
8134C	Pole Foundation - Type BA (4 Sheets)
8150C	Installation of Culvert Markers
8307S	W-Beam Guardrail & End Anchorages (Installation with Wood Posts) (4 Sheets)
8308B	Reinforced Concrete Median Barrier Type F (Non-Glare Screen Type) Design 8308 (3 Sheets)
8309B	Reinforced Concrete Median Barrier Type F & Glare Screen Design 8309 (3 Sheets)
8316C	Post Seat for Anchorage on Footing or Box Culverts
8318C	Guardrail Anchorage Plate for Bridges and BCT'S
8326D	Flexible Plastic Glare Screen
8329I	Eccentric Loader Breakaway Cable Terminal (ELT) (4 Sheets)
8330G	3-Cable Guardrail (With Wood Posts) (Assembly Details) (2 Sheets)
8331B	3-Cable Guardrail (With Steel Posts) (3 Sheets)
8332D	Anchor Bolt Cluster and Base Plate for Light Poles
8333B	3-Cable Guardrail Anchor (Anchor Details) (4 Sheets)
8337C	Temporary Portable Precast Concrete Barrier (Type "F") (3 Sheets)
8338D	W-Beam Guardrail & End Anchorages (Installation with Steel Posts) (4 Sheets)
8339A	3-Cable (Steel Posts) to W Beam (Wood Posts) Guardrail Transition
8340A	3-Cable (Steel Posts) to W Beam (Steel Posts) Guardrail Transition
8342B	High-Tension Cable Barrier Line Post Foundation (Concrete Design)
8343A	High-Tension Cable Barrier Line Post Foundation (Steel Design)
8347A	Portable Precast Concrete Barrier Anchors
8350A	Thrie Beam Anchorage Plate
8352B	Thrie Beam Wedge Plate for Single Slope Barrier
8360A	Guardrail Post Length Marking
8400F	Pipe Railing

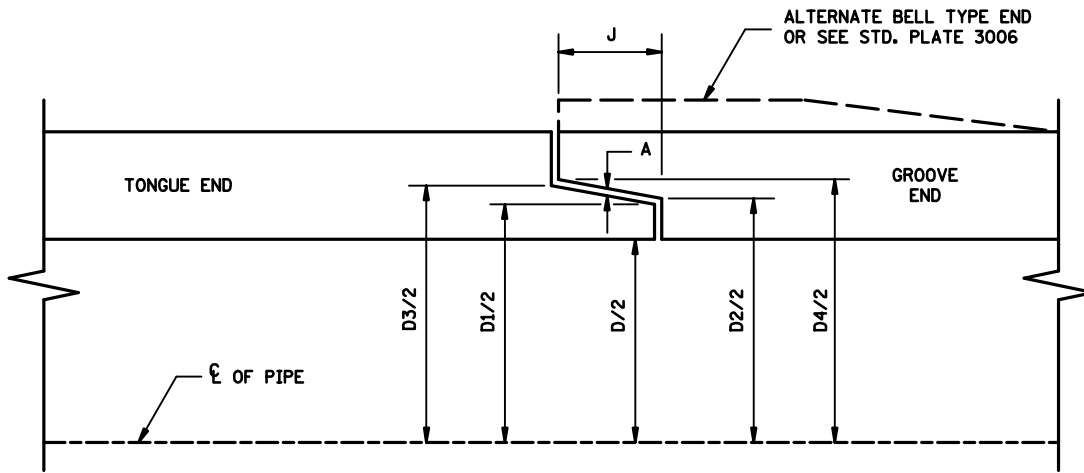
9000 SERIES--MISCELLANEOUS

9000E	Approaches and Entrances - Recommended Standards
9101B	Shaping and Sodding of Slopes at Box Culvert Ends
9303B	Geodetic Survey Disks (Aluminum) (2 Sheets)
9304A	Geodetic Survey Disks (Removable Type Disk)
9308A	Survey Monument Cap (2 Sheets)
9309G	PLS (Public Land Survey) Monument (2 Sheets)
9320G	Woven Wire Fence (Wood Post)
9321E	Woven Wire Fence (Steel Post)
9322K	Chain Link Fence (2 Sheets)
9323D	Barbed Wire Fence (Wood Post)
9324C	Barbed Wire Fence (Steel Post)
9350A	Mailbox Support (Swing-Away Type)

INTERNAL DIAMETER OF PIPE IN INCHES	CROSS SECTION WATER AREA	LENGTH OF JOINT	NOMINAL - A	D1	D2	D3	D4	TOLERANCES IN DIMENSIONS:				
								INTERNAL DIAMETER	D1, D2, D3, & D4	WALL THICKNESS		J
D	SQ. FT.	J							B WALL	C WALL	J	
INCHES												
12	0.79	1-3/4	3/16	13-1/4	13-5/8	13-7/8	14-1/4	1/4	3/16	3/16	3/16	1/4
15	1.23	2	3/16	16-1/2	16-7/8	17-1/4	17-5/8	1/4	3/16	3/16	3/16	1/4
18	1.77	2-1/4	3/16	19-5/8	20	20-3/8	20-3/4	5/16	3/16	3/16	3/16	1/4
21	2.40	2-1/2	3/16	22-7/8	23-1/4	23-3/4	24-1/8	5/16	3/16	3/16	3/16	1/4
24	3.14	2-3/4	3/16	26	26-3/8	27	27-3/8	3/8	3/16	3/16	3/16	1/4
27	3.98	3	3/16	29-1/4	29-5/8	30-1/4	30-5/8	3/8	3/16	3/16	3/16	1/4
30	4.91	3-1/4	3/16	32-3/8	32-3/4	33-1/2	33-7/8	3/8	3/16	3/16	3/16	1/4
33	5.94	3-1/2	1/4	35-1/2	36	36-3/4	37-1/4	3/8	1/4	3/16	1/4	1/4
36	7.07	3-3/4	1/4	38-3/4	39-1/4	40	40-1/2	3/8	1/4	3/16	1/4	1/4
42	9.62	4	1/4	45-1/8	45-5/8	46-1/2	47	7/16	1/4	1/4	1/4	1/4
48	12.57	4-1/4	1/4	51-1/2	52	53	53-1/2	1/2	1/4	1/4	5/16	1/4
54	15.90	4-1/2	1/4	57-7/8	58-3/8	59-3/8	59-7/8	9/16	1/4	1/4	5/16	1/4
60	19.63	5	1/4	64-1/4	64-3/4	66	66-1/2	5/8	1/4	5/16	5/16	1/4
66	23.76	5-1/2	1/4	70-5/8	71-1/8	72-1/2	73	11/16	1/4	5/16	3/8	1/4
72	28.27	6	1/4	77	77-1/2	79	79-1/2	3/4	1/4	3/8	3/8	1/4
78	33.18	6-1/2	1/4	83-3/8	83-7/8	85-5/8	86-1/8	3/4	1/4	3/8	7/16	1/4
84	38.48	7	1/4	89-3/4	90-1/4	92-1/8	92-5/8	13/16	1/4	3/8	7/16	1/4
90	44.18	7	1/4	95-3/4	96-1/4	98-1/8	98-5/8	7/8	1/4	7/16	7/16	1/4
96	50.27	7	1/4	102-1/8	102-5/8	104-1/2	105	15/16	1/4	7/16	1/2	1/4
108	63.62	7-1/2	1/4	115-1/2	116	118	118-1/2	1-1/16	1/4	1/2	9/16	1/4

NOTES:

LAYING LENGTH: SHALL NOT UNDERRUN BY MORE THAN 1/2".



SECTION AT PIPE JOINT

APPROVED Aug. 31, 1989

R.H. Sullivan
Director

Materials, Research and Standards

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

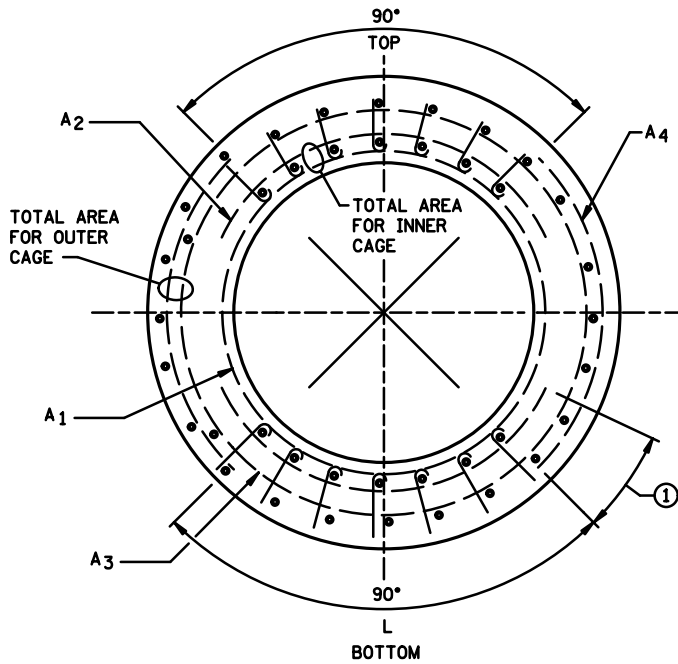
**REINFORCED CONCRETE PIPE
JOINT DIMENSIONS FOR B-WALL AND C-WALL**

SPECIFICATION
REFERENCE

2501
2502
2503

STANDARD
PLATE
NO.

3000L
3 OF 5



CROSS SECTION FOR SPECIAL DESIGN PIPES

NOTES:

SEE SHEET 1 FOR INNER AND OUTER CAGE REINFORCEMENT.

$A_1 + A_2 =$ TOTAL INNER CAGE REINFORCEMENT.

$A_3 + A_4 =$ TOTAL OUTER CAGE REINFORCEMENT.

POINT OR INDENT LEGIBLE MARKS AT ONE END OF EACH SECTION ON THE INSIDE AND OUTSIDE OF OPPOSITE WALLS DESIGNATING THE CENTER OF STIRRUP REINFORCEMENT.

THE TOP OF THE PIPE SHALL BE APPROPRIATELY MARKED OR STENCILED BOTH ON THE INSIDE AND OUTSIDE SURFACES.

① THE CAGES MUST BE ASSEMBLED WITH THE OUTER MAT OVERLAPPING THE INNER MAT BY A DISTANCE EQUAL TO ONE PIPE WALL THICKNESS OR GREATER.

A₁ = REINFORCING OF FULL CIRCULAR INNER CAGE.

A₂ = REINFORCING OF INNER LAP SECTION, 90° MINIMUM ARC.

A₃ = REINFORCING OF FULL CIRCULAR OUTER CAGE.

A₄ = REINFORCING OF OUTER LAP SECTION, 90° MINIMUM ARC.

A_r = MINIMUM RADIAL REINFORCING REQUIRED IN SQUARE INCHES PER SQUARE FOOT OF PIPE OVER A MINIMUM 90° ARC AT TOP AND BOTTOM OF PIPE. HOOK DESIGN MUST BE APPROVED BY MATERIALS SECTION.

THE FULL CIRCULAR CAGES MUST HAVE AN AREA EQUAL TO AT LEAST 40% OF THE REQUIRED TOTAL AREA.

L = LENGTH OF 90° ARC MEASURED AT INNER CAGE.

N = MINIMUM NUMBER OF ROWS OF RADIAL REINFORCING AT TOP AND BOTTOM OF PIPE.

S = MAXIMUM CIRCUMFERENTIAL SPACING OF ROWS OR RADIAL REINFORCING AT OUTER CAGE.

INTERNAL DIA. OF PIPE	LENGTH OF 90° ARC	WALL THICKNESS	SHEAR STEEL					
			CLASS IV			CLASS V		
D	L	T	N	S	A _r	N	S	A _r
54"	44"	5-1/2"	—	—	—	12	4"	0.22
60"	49"	6"	—	—	—	10	6"	0.22
66"	54"	6-1/2"	—	—	—	10	6"	0.22
72"	59"	7"	—	—	—	11	6"	0.23
78"	63"	7-1/2"	12	6"	0.25	12	6"	0.25
84"	68"	8"	13	6"	0.28	13	6"	0.28
90"	73"	8-1/2"	13	6"	0.31	13	6"	0.31
96"	77"	9"	14	6"	0.34	14	6"	0.34
102"	82"	9-1/2"	15	6"	0.37	15	6"	0.37
108"	87"	10"	16	6"	0.40	16	6"	0.40

APPROVED Aug. 31, 1989

R.H. Sullivan

Director

Materials, Research and Standards

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION
REINFORCED CONCRETE PIPE
REINFORCEMENT INFORMATION
SPECIAL DESIGN PIPES

SPECIFICATION REFERENCE

2501 2502 2503

REVISED
1-9-2019 M.J.E.

STANDARD PLATE NO.

3000L

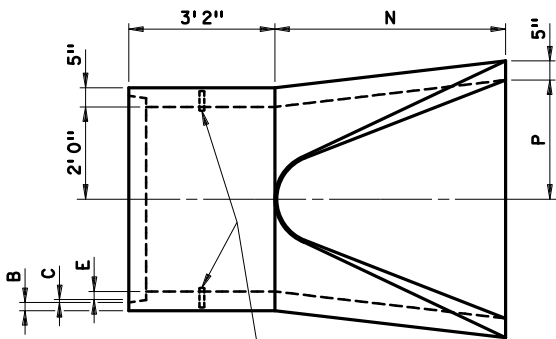
4 OF 5

PLOTTED/REVISED: 10-JAN-2019

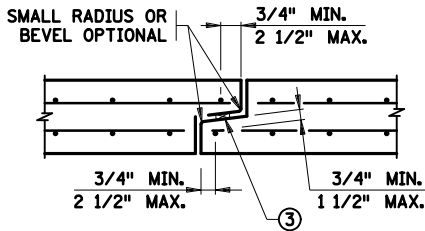
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PLOT NAME: s3020_spt

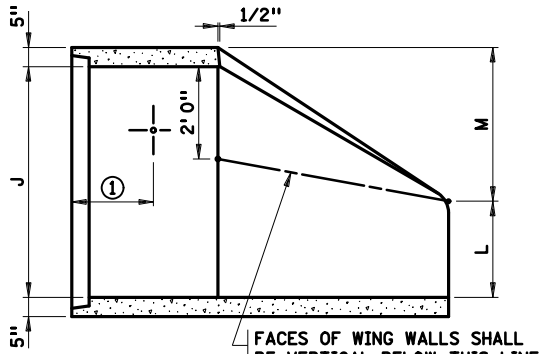
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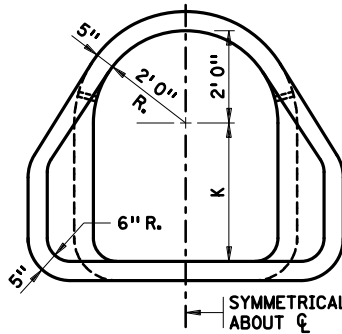
TOP VIEW



TONGUE AND GROOVE JOINT DETAIL ②



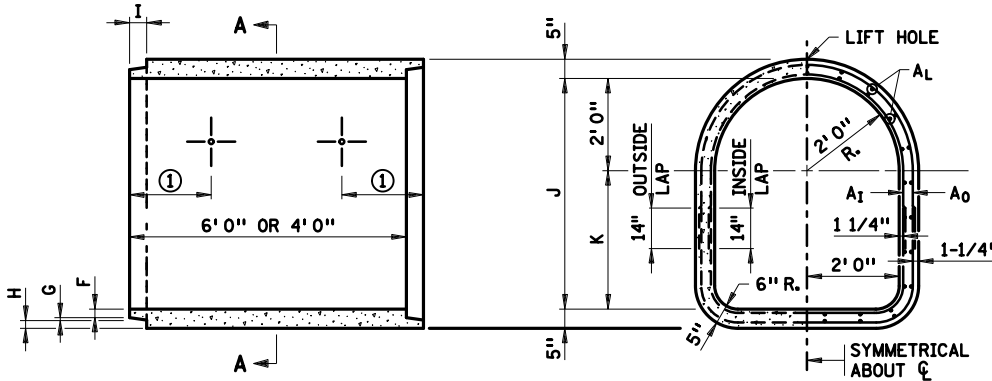
SECTION ON CL



END VIEW

DETAILS OF FLARED END SECTION

(REINFORCEMENT NOT SHOWN)



SECTION ON CL

SECTION A-A

DETAILS OF INTERMEDIATE SECTION

BASIS OF DESIGN:

DESIGNED IN ACCORDANCE WITH 2017 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION AND MnDOT LRFD BRIDGE DESIGN MANUAL.

WELDED WIRE REINFORCEMENT MINIMUM SPECIFIED YIELD STRESS = 65 KSI

MINIMUM SPECIFIED CONCRETE STRENGTH = 4 KSI

CONSTRUCTION NOTES:

USE 4 FT. SECTIONS ONLY AS NEEDED TO MATCH REQUIRED PLAN LENGTH, BUT NOT MORE THAN TWO 4 FT. SECTIONS PERMITTED IN ANY CATTLE PASS. PLACE SHORT SECTIONS NEAR ENDS OF CATTLE PASS.

FILL OVER TOP OF CATTLE PASS; 1 FT. MINIMUM, 15 FT. MAXIMUM.

CONFORM DESIGN OF FLARED END SECTION TO MATCH INTERMEDIATE SECTION.

ROUNDED EDGE PERMITTED ON SLOPED END.

PLACE GROOVED END UP GRADE AND TONGUE END DOWNGRADE.

CAST NO MORE THAN ONE LIFT HOLE IN EACH INTERMEDIATE SECTION OF PIPE. FURNISH TAPERED CONCRETE PLUGS FOR CLOSING LIFT HOLES.

PLACE U-BOLT, SINGLE, OR DOUBLE CONNECTION TIE AS SHOWN ON STANDARD PLATE 3145, INSERTED FROM THE INSIDE WITH THE NUTS ON THE OUTSIDE.

① REFER TO STANDARD PLATE 3145.

② LONGITUDINAL END WIRE MAY BE EXTENDED TO THE END SURFACE OF THE JOINT IN LIEU OF USING A BAR CHAIR.

③ REFER TO SPEC, 2412 FOR SEALANT REQUIREMENTS.

DIMENSIONS

CATTLE PASS SIZE	CATTLE PASS SIZE	
	60"	72"
B	2-1/8"	2"
C	5/8"	3/4"
E	2-1/4"	2-1/4"
F	2-1/16"	2"
G	5/8"	3/4"
H	2-5/16"	2-1/4"
I	4-1/2"	5"
J	5' 0"	6' 0"
K	3' 0"	4' 0"
L	2' 6"	2' 11"
M	2' 11"	3' 6"
N	5' 0"	7' 0"
P	3' 0"	3' 6"

ESTIMATED WEIGHT OF FLARED END SECTIONS:
7,320 LBS. (60")
10,650 LBS. (72")

CONCRETE 4000 PSI

STEEL AREA SQ. IN. PER LIN. FT.		
A _I	A _O	A _L
0.35	0.35	0.05 EF

A_L = LONGITUDINAL, EACH FACE
A_I = INSIDE, A_O = OUTSIDE
APPROX. WEIGHT OF INTERMEDIATE SECTIONS:
(60") 1110 LBS. PER FT.
(72") 1240 LBS. PER FT.

APPROVED JANUARY 9, 2019

Rom Sja
STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

PRECAST CONCRETE CATTLE
PASS (60 IN. & 72 IN.)

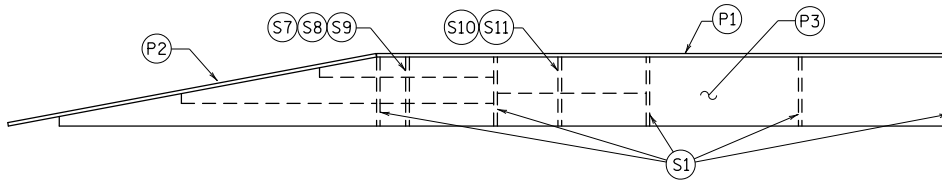
SPECIFICATION
REFERENCE

3236
2412
2501

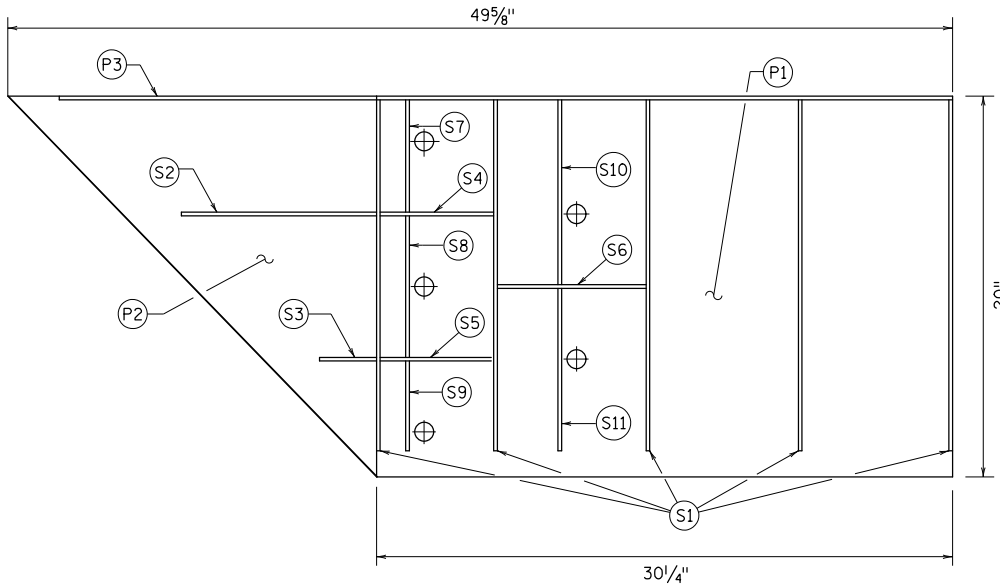
STANDARD
PLATE
NO.

3020H

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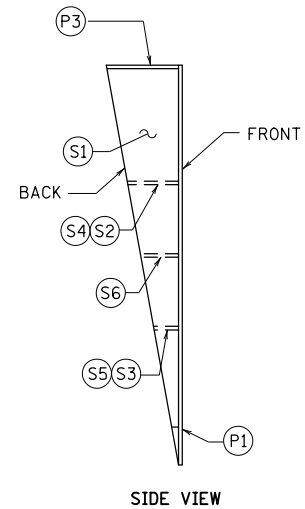
TOP VIEW



BACK VIEW

WEDGE PLATE DETAILS

THRIE BEAM WEDGE PLATE DIMENSIONS (PER ASSEMBLY)				
PLATE	QUANTITY	SHAPE	SIZE (A x B x C x D x E)	THICKNESS
P1	1	B	30 1/4" x 20"	3/16"
P2	1	B	19 1/16" x 20" x 28 1/16"	3/16"
P3	1	B	46 15/16" x 3 5/8" x 30 1/4" x 16 31/32" x 1/2"	3/16"
S1	5	B	18 7/16" x 3 5/8" x 18 3/4"	1/4"
S2	1	B	10 1/4" x 2 7/16" x 10 3/8" x 1/2"	1/4"
S3	1	B	3" x 1 1/16" x 3 1/8" x 1/2"	1/4"
S4	1	B	6 1/8" x 2 7/16"	1/4"
S5	1	B	6 1/8" x 1 1/16"	1/4"
S6	1	B	7 3/4" x 1 3/4"	1/4"
S7	1	A	2 9/16" x 6" x 3 5/8" x 5 7/8"	1/4"
S8	1	A	1 5/32" x 7 1/2" x 2 1/2" x 7 3/8"	1/4"
S9	1	C	6 1/16" x 6 3/16" x 1 3/32"	1/4"
S10	1	A	1 7/8" x 9 7/8" x 3 5/8" x 9 1/16"	1/4"
S11	1	C	8 1/2" x 8 3/4" x 1 13/16"	1/4"



NOTES:

CONNECTOR PLATE SHALL BE FABRICATED FROM ASTM GRADE A36 STEEL AND GALVANIZED PER SPEC. 3392 AND 3394.

HOLE DIAMETERS ARE 1".

MIRROR DETAILS FOR OPPOSITE TRAFFIC DIRECTION APPLICATION.

APPROVED JANUARY 18, 2019

STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

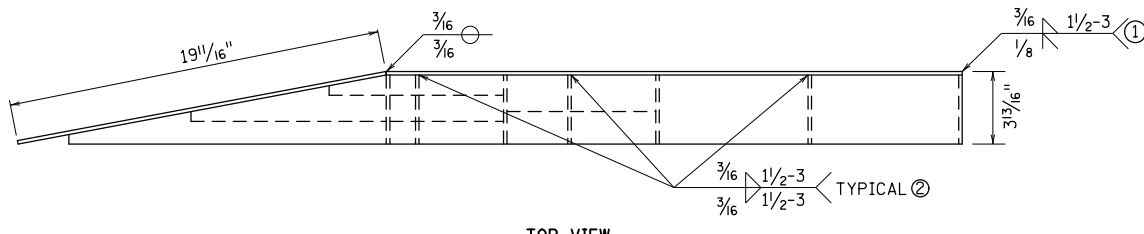
THRIE BEAM WEDGE PLATE
FOR SINGLE SLOPE BARRIER

SPECIFICATION
REFERENCE

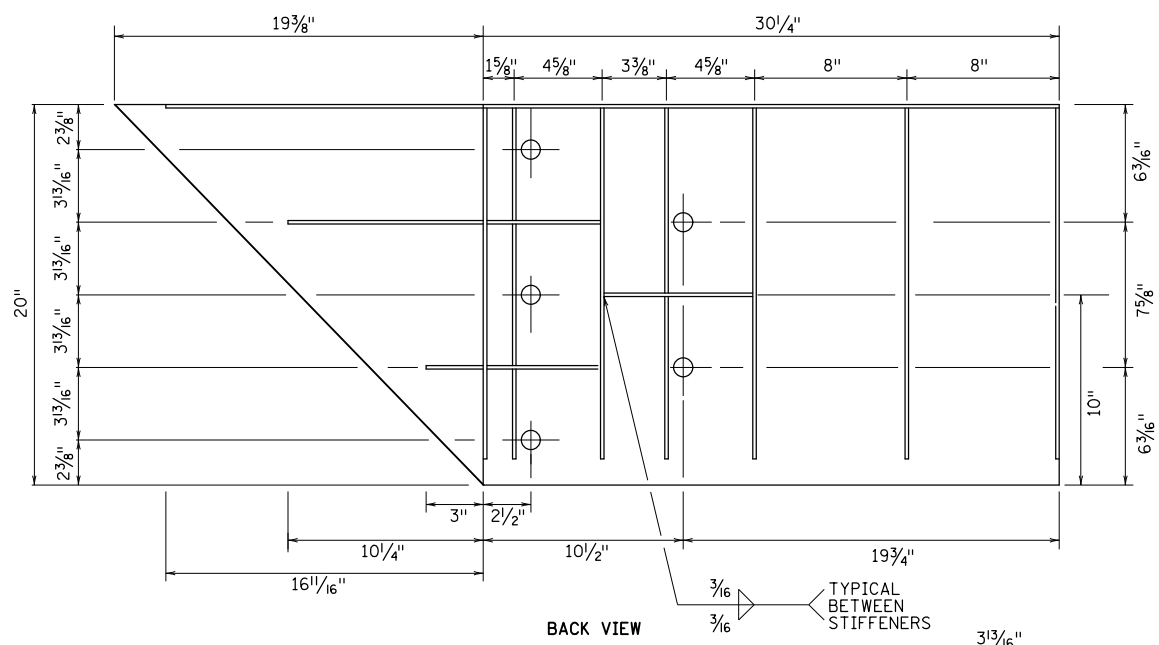
STANDARD
PLATE
NO.

8352B

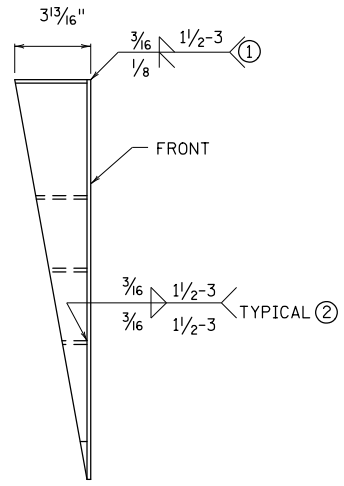
1 OF 2



TOP VIEW



BACK VIEW

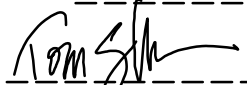


SIDE VIEW

WEDGE PLATE WELD DETAILS

NOTES:

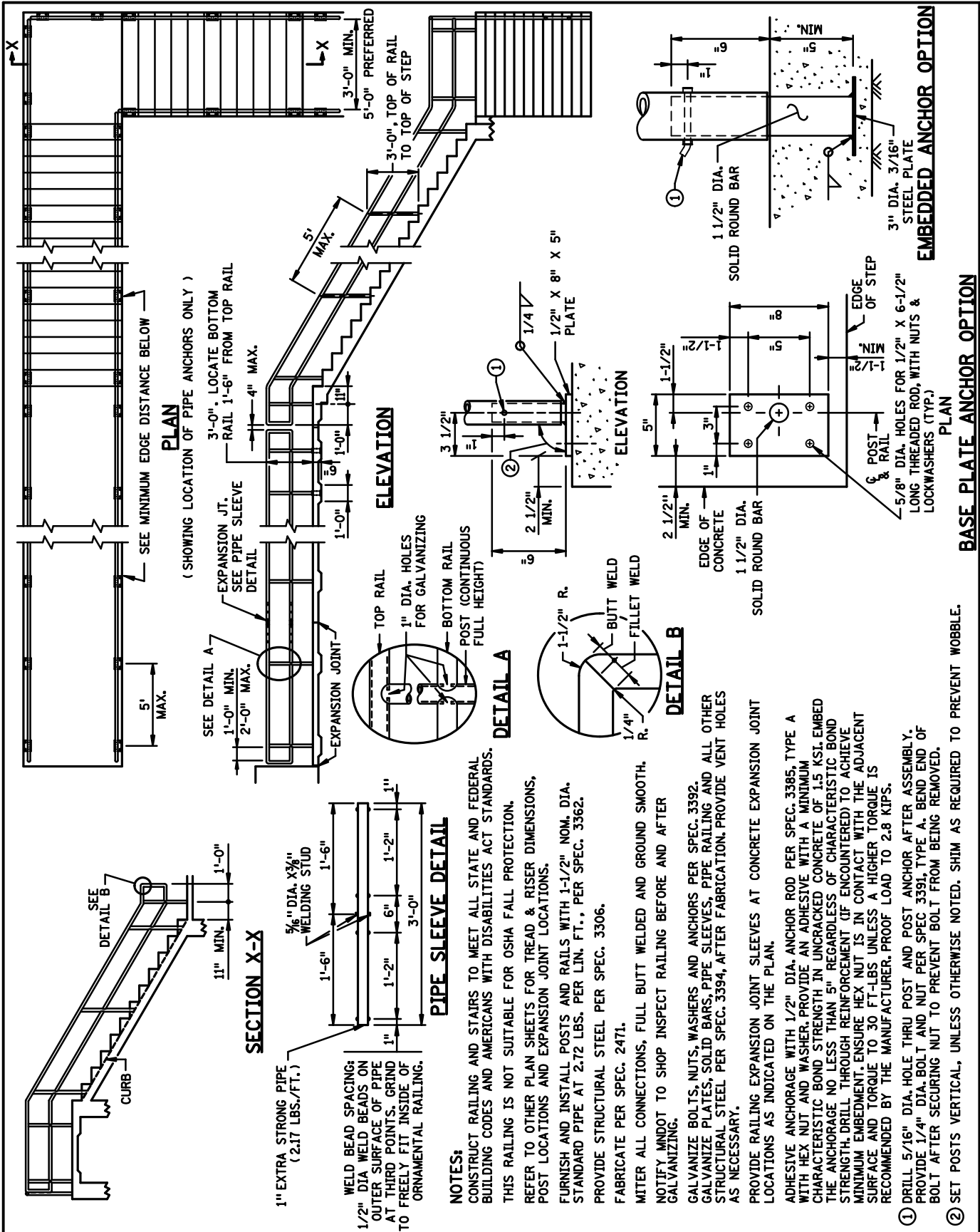
- ① STIFFENER PLATES LOCATED AT THE OUTSIDE EDGES OF THE COVER PLATES SHALL BE WELDED AS FOLLOWS:
SINGLE BEVEL GROOVE WELD ON EXTERNAL SIDES AND 3/16" FILLET WELD BY 1/2" LONG SPACED AT 3" ON INTERNAL SIDES.
- ② STIFFENER PLATES LOCATED ON THE INSIDE OF THE COVER PLATE SHALL BE WELDED AS FOLLOWS:
3/16" FILLET WELD BY 1/2" LONG SPACED AT 3".

APPROVED JANUARY 18, 2019

 STATE DESIGN ENGINEER

STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION
**THREE BEAM WEDGE PLATE
 FOR SINGLE SLOPE BARRIER**

SPECIFICATION
 REFERENCE

STANDARD
 PLATE
 NO.
8352B
 2 OF 2



EMBEDDED ANCHOR OPTION

BASE PLATE ANCHOR OPTION

NOTES:
 CONSTRUCT RAILING AND STAIRS TO MEET ALL STATE AND FEDERAL BUILDING CODES AND AMERICANS WITH DISABILITIES ACT STANDARDS. THIS RAILING IS NOT SUITABLE FOR OSHA FALL PROTECTION. REFER TO OTHER PLAN SHEETS FOR TREAD & RISER DIMENSIONS, POST LOCATIONS AND EXPANSION JOINT LOCATIONS. FURNISH AND INSTALL POSTS AND RAILS WITH 1-1/2" NOM. DIA. STANDARD PIPE AT 2.72 LBS. PER LIN. FT., PER SPEC. 3362. PROVIDE STRUCTURAL STEEL PER SPEC. 3306. FABRICATE PER SPEC. 2471. MITER ALL CONNECTIONS, FULL BUTT WELDED AND GROUND SMOOTH. NOTIFY MNDOT TO SHOP INSPECT RAILING BEFORE AND AFTER GALVANIZING. GALVANIZE BOLTS, NUTS, WASHERS AND ANCHORS PER SPEC. 3392. GALVANIZE PLATES, SOLID BARS, PIPE SLEEVES, PIPE RAILING AND ALL OTHER STRUCTURAL STEEL PER SPEC. 3394, AFTER FABRICATION. PROVIDE VENT HOLES AS NECESSARY. PROVIDE RAILING EXPANSION JOINT SLEEVES AT CONCRETE EXPANSION JOINT LOCATIONS AS INDICATED ON THE PLAN. ADHESIVE ANCHORAGE WITH 1/2" DIA. ANCHOR ROD PER SPEC. 3385, TYPE A WITH HEX NUT AND WASHER. PROVIDE AN ADHESIVE WITH A MINIMUM CHARACTERISTIC BOND STRENGTH IN UNGRADED CONCRETE OF 1.5 KSI. EMBED THE ANCHORAGE NO LESS THAN 5" REGARDLESS OF CHARACTERISTIC BOND STRENGTH. DRILL THROUGH REINFORCEMENT (IF ENCOUNTERED) TO ACHIEVE MINIMUM EMBEDMENT. ENSURE HEX NUT IS IN CONTACT WITH THE ADJACENT SURFACE AND TORQUE TO 30 FT-LBS UNLESS A HIGHER TORQUE IS RECOMMENDED BY THE MANUFACTURER. PROOF LOAD TO 2.8 KIPS. ① DRILL 5/16" DIA. HOLE THRU POST AND POST ANCHOR AFTER ASSEMBLY. PROVIDE 1/4" DIA. BOLT AND NUT PER SPEC 3391. TYPE A. BEND END OF BOLT AFTER SECURING NUT TO PREVENT BOLT FROM BEING REMOVED. ② SET POSTS VERTICAL, UNLESS OTHERWISE NOTED. SHIM AS REQUIRED TO PREVENT WOBBLE.

APPROVED **JANUARY 9, 2019**

 STATE DESIGN ENGINEER

STATE OF MINNESOTA
 DEPARTMENT OF TRANSPORTATION
PIPE RAILING
 PEDESTRIAN RAILING FOR STAIRS AND RAMPS
 (AT GRADE)

SPECIFICATION REFERENCE
 2471
 3385

STANDARD PLATE NO.
8400F

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