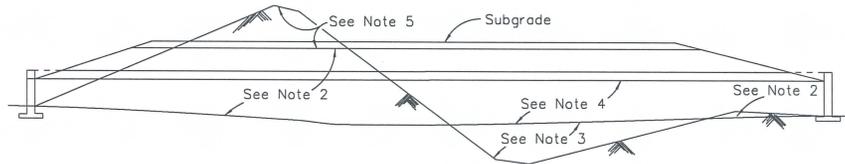


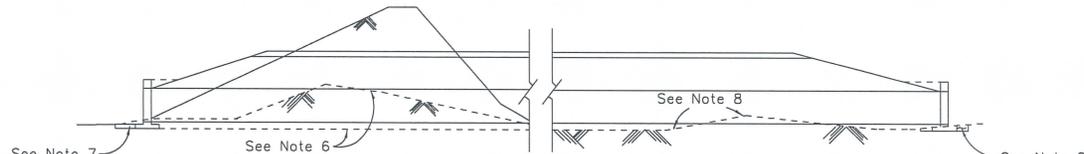
Proposed Standard Plan Changes.

July2, 2015

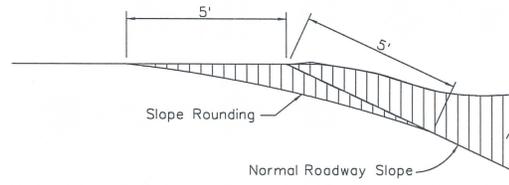
PART I



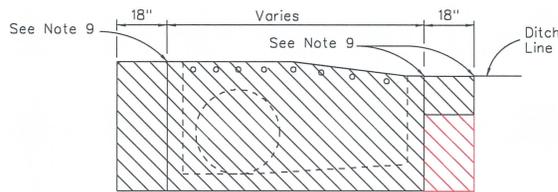
CULVERT INSTALLATION IN ROUGH TERRAIN



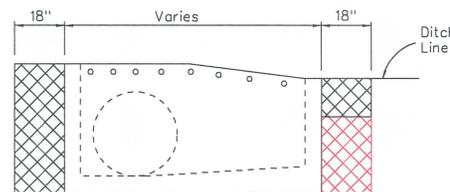
CULVERT INSTALLATION WITH UNSUITABLE FOUNDATIONS



Cut Slopes Steeper than 5:1 will be Rounded, Except in Rock
ROUNDED OR TRANSITION SLOPES



TYPE 7 DROP INLET



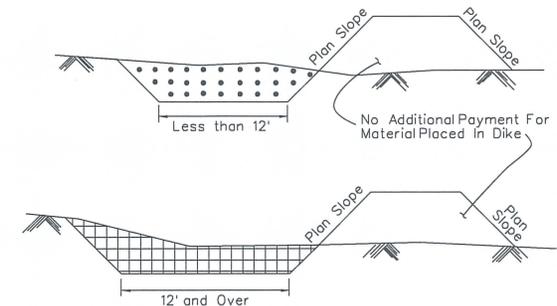
TYPE 8 DROP INLET

NOTES:

- Excavations for multiple pipe installations 12' and over in width will be paid as channel or roadway excavation.
- Structure excavation and backfill in excavation to be paid below subgrade and within designated limits.
- Embankment to be constructed to flowline prior to installation.
- Backfill in embankment to be paid from flowline to the designated maximum limits.
- Roadway excavation to be paid to subgrade.
- CMP, HDPE or RCP - when the pipe is laid in a trench in rock, hard clay, shale or other hard material, the unsuitable material shall be removed to a depth of not less than 6" for RCP and 12" for CMP, HDPE below the bottom of the pipe grade and the trench backfilled with a suitable material. In no place shall the pipe be laid directly on unsuitable material.
- No additional excavation is necessary under headwalls when rock or other hard material is encountered.
- When a firm foundation is not encountered all soft, spongy or other unsuitable material under the culvert shall be removed, and the space filled with foundation fill. (depth of foundation fill as indicated on the plans or ordered by the engineer, but not less than 1'-6").
- Grade to this elevation prior to installation.

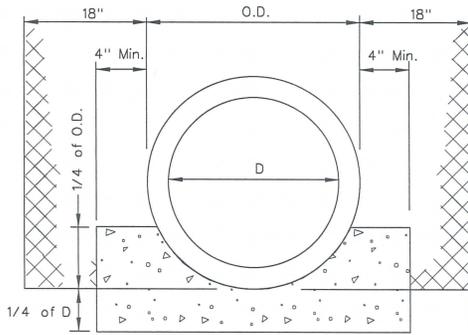
LEGEND:

- STRUCTURE EXCAVATION
- CHANNEL EXCAVATION
- GRANULAR BACKFILL
- DRAINAGE EXCAVATION
- ROADWAY EXCAVATION

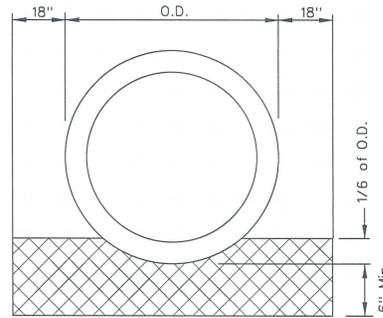


FLAT BOTTOM DITCH EXCAVATION

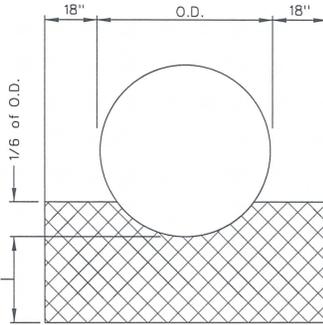
STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
STRUCTURE EXCAVATION AND BACKFILL METHOD OF MEASUREMENT		
R-1.1.1	(206,207)	Signed Original On File
ADOPTED 8/69	REVISED 5/09	CHIEF ROAD DESIGN ENGR.



CLASS A BEDDING (RCP)

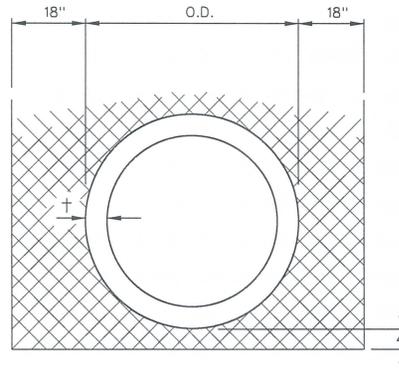


CLASS B BEDDING (RCP)

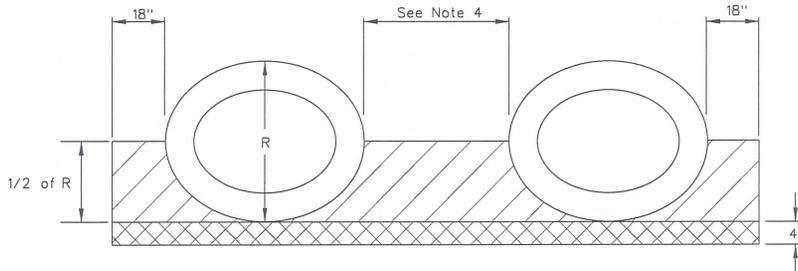


CLASS B BEDDING (CMP)

1/2" Per Ft. of Average
Fill Over Pipe
(12" Min. - 3/4 of O.D. Max.)



CLASS C BEDDING
(RCP AND CMP)
STANDARD HDPE BEDDING



BEDDING FOR MULTIPLE OVAL RCP CULVERTS

NOTES:

1. Minimum depths as specified on sheet R-1.1.1, Notes 7 and 9 will prevail when these conditions are encountered.
2. Concrete shall be class A or AA, additional excavation for class A bedding to be included in the unit bid price per cubic yard of concrete.
3. Class B bedding shall be carefully shaped to fit pipe prior to installation.
4. See sheet R-2.1.1 or headwall details for appropriate pipe separation.

LEGEND:

- GRANULAR BACKFILL
- CLASS A SLURRY BACKFILL

ALLOWABLE FILL HEIGHT
FOR REINFORCED CONCRETE PIPE

Pipe Size I.D.	FILL HEIGHT IN FEET						Pipe Class	Bedding Class
	III		IV		V			
	A	B	A	B	A	B		
24"	22	14	30	18	46	29		
30"	22	14	32	20	47	30		
36"	22	14	32	20	47	31		
42"	22	14	32	21	47	31		
48"	22	14	32	21	48	31		
54"	22	14	32	21	49	31		
60"	22	14	33	21	49	31		
66"	22	14	33	22	49	31		
72"	22	15	33	22	49	32		
84"	22	15	33	22	50	32		

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CULVERT BEDDING AND
ALLOWABLE FILL HEIGHT
FOR RCP

R-1.1.6	(603,604)	Signed Original On File
ADOPTED 8/96	REVISED 5/09	CHIEF HYDRAULICS ENGR.



2014 Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R.1.1.C Page No.: R-7 Note: A separate form is required for each change.

Description of requested modification or correction: Delete CLASS B Bedding, Change
CLASS C TO CLASS B, UPDATE FILL HEIGHT TABLE, ADD
New TABLE, ADD RCP / CMP NOTES, ADD x=4" min.
.....
.....
.....
.....
..... (Please attach supporting information).

Reason for request:
.....
.....
.....
.....
.....
.....
.....

Requestor Information: Name: BRIAN MATTHEWS HTD Phone: 7621

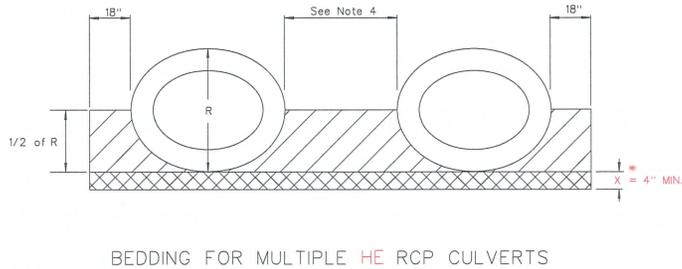
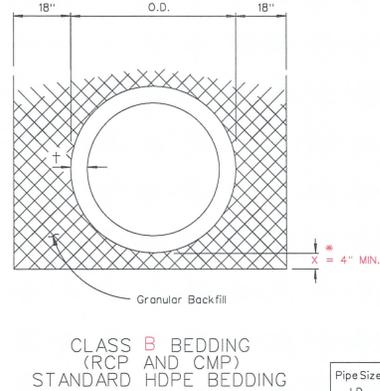
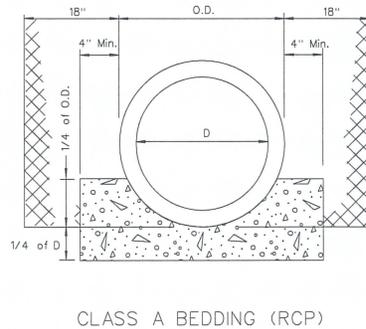
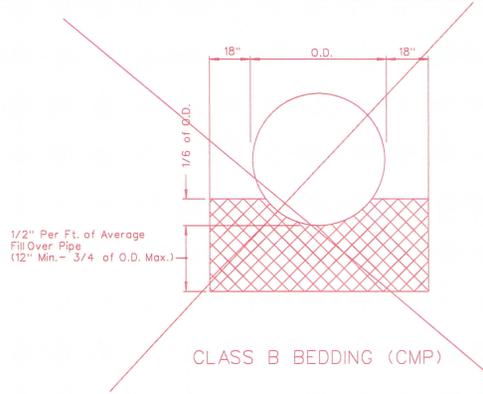
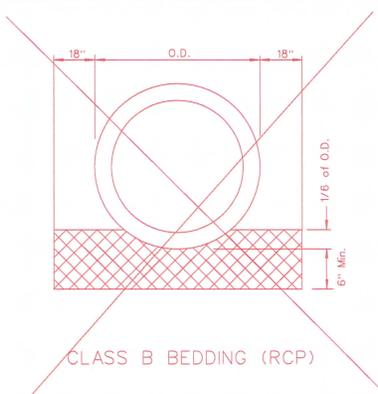
For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes:
.....
.....
.....



NOTES:

1. MINIMUM DEPTHS AS SPECIFIED IN "CULVERT INSTALLATION WITH UNSUITABLE FOUNDATIONS" ON SHEET R-1.1.1, NOTES NO. 6 & B WILL PREVAIL WHEN THESE CONDITIONS ARE ENCOUNTERED.
2. CONCRETE SHALL BE CLASS A OR AA. ADDITIONAL EXCAVATION FOR CLASS A BEDDING TO BE INCLUDED IN THE UNIT BID PRICE PER CUBIC YARD OF CONCRETE.
3. CLASS B BEDDING SHALL BE CAREFULLY SHAPED TO FIT PIPE PRIOR TO INSTALLATION.
4. SEE SHEET R-2.1.1 OR HEADWALL DETAILS FOR APPROPRIATE PIPE SEPARATION.

RCP

- * NORMAL FOUNDATIONS $\frac{O.D.}{24}$ MIN. (NOT LESS THAN 4" MIN). IF ROCK FOUNDATION USE $\frac{O.D.}{12}$ MIN. (NOT LESS THAN 6" MIN).

CMP

- * $X = \frac{1}{2}$ PER FT. OF AVERAGE FILL OVER PIPE, WHEN D = 24" OR SMALLER, $X = \frac{3}{4}$ OF O.D. MAXIMUM. WHEN D = 30" OR LARGER, X = 24" MAXIMUM.

ALLOWABLE FILL HEIGHT FOR REINFORCED CONCRETE PIPE

Pipe Size I.D.	FILL HEIGHT IN FEET						Pipe Class Bedding Class
	III		IV		V		
	A	B	A	B	A	B	
24"	23	17	35	26	53	40	
30"	23	17	35	26	53	40	
36"	23	17	35	26	52	40	
42"	23	17	34	26	52	40	
48"	23	17	34	26	52	40	
54"	22	17	34	26	52	40	
60"	22	17	34	26	51	40	
66"	22	17	33	26	51	39	
72"	22	17	33	25	51	39	
84"	21	16	33	25	50	39	

Pipe Size HE RCP	FILL HEIGHT IN FEET			
	III		IV	
	B	B	B	B
19" x 30"	14	22		
24" x 38"	14	22		
29" x 45"	14	22		
34" x 53"	14	22		
38" x 60"	14	22		
43" x 68"	14	22		
48" x 76"	14	22		
53" x 83"	14	22		
58" x 91"	14	22		
68" x 106"	14	22		

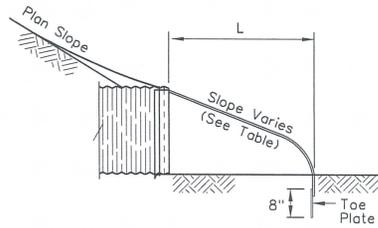
LEGEND:

- GRANULAR BACKFILL
- CLASS A SLURRY BACKFILL

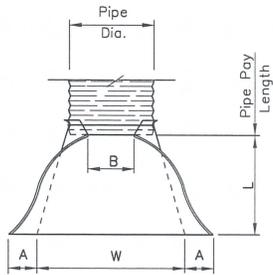
NEVADA DEPARTMENT OF TRANSPORTATION

CULVERT BEDDING & ALLOWABLE FILL HEIGHT FOR RCP AND HE RCP

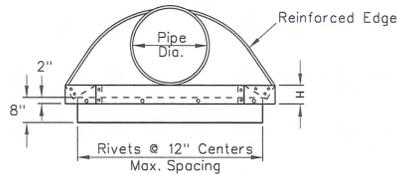
Signed Original On File R-1.1.6 (603.604)
 CHIEF HYDRAULICS ENGR. ADOPTED X/XX REVISION X/XX



SECTION



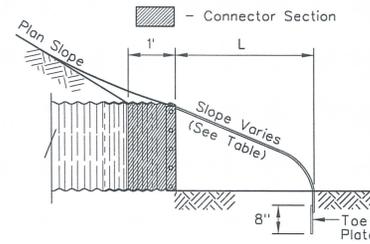
PLAN



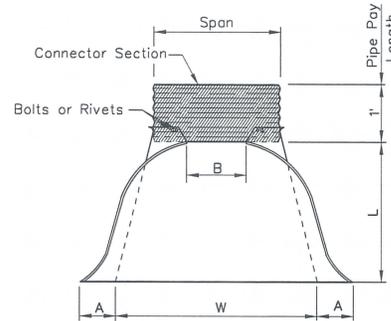
ELEVATION

Length of Toe Plate To Be $W + 10''$ Min. For 12" to 30" Dia. Pipe Inclusive and $W + 22''$ Min. For 36" Diameter Pipes and Larger.

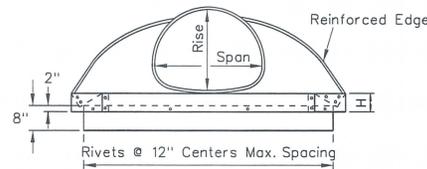
TYPE 1 OR 2 CONNECTION



SECTION



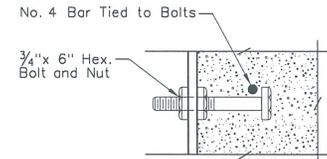
PLAN



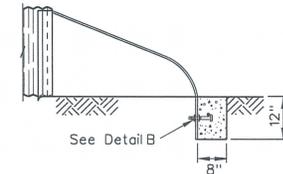
ELEVATION

Length of Toe Plate To Be $W + 10''$ Min. For Pipe Arches With Rise of 13" to 29" Inclusive and $W + 18''$ Min. For Pipe Arches With Rise of 33" and Larger.

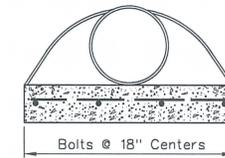
TYPE 3 CONNECTION



DETAIL B

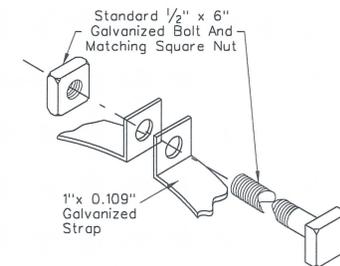


SECTION

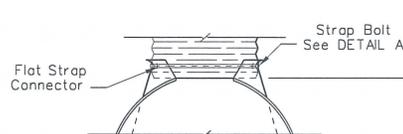


ELEVATION

See Notes 6 Thru 9
ANCHOR BLOCK DETAIL

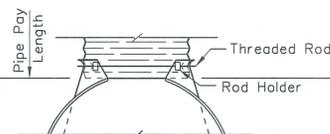


DETAIL A



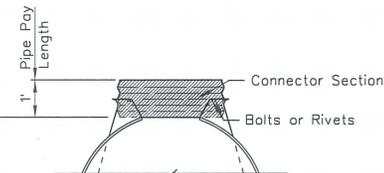
TYPE 1

For 12" Thru 24" CMP Only



TYPE 2

For 30" Thru 84" CMP,
17" x 13" Thru 57" x 38" CMAP, and
12" Thru 60" HDPE



TYPE 3

For 64" x 43" Thru 83" x 57" CMAP or
42" Thru 84" CMP (Optional)

STANDARD CONNECTIONS

SHEET 1 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

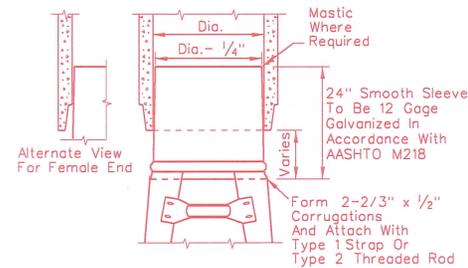
METAL END SECTIONS
12" TO 84" CMP,
12" TO 60" HDPE AND
17" x 13" TO 83" x 57" CMAP

R-2.2.1	(604)	Signed Original On File
ADOPTED	REVISED	CHIEF HYDRAULICS ENGR.
8/75	5/09	

TYPE CONNECTION	PIPE ARCH DIMENSIONS		GAGE	DIMENSIONS					APPROX. SLOPE	*CONCRETE CU. YD.
	SPAN	RISE		A 1" TOL.	B MAX	H 1" TOL.	L 1/2" TOL.	W 2" TOL.		
TYPE 2	17"	13"	16	7"	9"	6"	19"	30"	2 1/2 : 1	
	21"	15"	16	7"	10"	6"	23"	36"	2 1/2 : 1	
	24"	18"	16	8"	12"	6"	28"	42"	2 1/2 : 1	
	28"	20"	16	9"	14"	6"	32"	48"	2 1/2 : 1	
	35"	24"	14	10"	16"	6"	39"	60"	2 1/2 : 1	
	42"	29"	14	12"	18"	8"	46"	75"	2 1/2 : 1	
	49"	33"	12	13"	21"	9"	53"	85"	2 1/2 : 1	
57"	38"	12	18"	26"	12"	63"	90"	2 1/2 : 1	0.26	
TYPE 3	64"	43"	12	18"	30"	12"	70"	102"	2 1/4 : 1	0.29
	71"	47"	12	18"	33"	12"	77"	114"	2 1/4 : 1	0.31
	77"	52"	12	18"	36"	12"	77"	126"	2 : 1	0.34
	49"	33"	12	13"	21"	9"	53"	85"	2 1/2 : 1	0.26
	83"	57"	12	18"	39"	12"	77"	138"	2 : 1	0.36

TYPE CONNECTION	CMP/HDPE PIPE DIAM.	GAGE	DIMENSIONS					APPROX. SLOPE	*CONCRETE CU. YD.
			A 1" TOL.	B MAX	H 1" TOL.	L 1/2" TOL.	W 2" TOL.		
TYPE 1 CMP/ TYPE 2 HDPE	12"	16	6"	6"	6"	21"	24"	2 1/2 : 1	
	15"	16	7"	8"	6"	26"	30"	2 1/2 : 1	
	18"	16	8"	10"	6"	31"	36"	2 1/2 : 1	
	21"	16	9"	12"	6"	36"	42"	2 1/2 : 1	
TYPE 2	30"	14	12"	16"	8"	51"	60"	2 1/2 : 1	
	36"	14	14"	19"	9"	60"	72"	2 1/2 : 1	
TYPE 2 OR TYPE 3	42"	12	16"	22"	11"	69"	84"	2 1/2 : 1	0.26
	48"	12	18"	27"	12"	78"	90"	2 1/4 : 1	
	54"	12	18"	30"	12"	84"	102"	2 : 1	
	60"	12	18"	33"	12"	87"	114"	3/4 : 1	
	66"	12	18"	36"	12"	87"	120"	1 1/2 : 1	
	72"	12	18"	39"	12"	87"	126"	1 1/3 : 1	
	78"	12	18"	42"	12"	87"	132"	1 1/4 : 1	
	84"	12	18"	45"	12"	87"	138"	1 1/6 : 1	

* FOR INFORMATION ONLY



For All Concrete Pipes

TAPERED SLEEVE FOR ATTACHING STEEL END SECTIONS TO RCP AND HDPE

SHEET 2 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

METAL END SECTIONS
12" TO 84" CMP,
12" TO 60" HDPE AND
17"x 13" TO 83"x 57" CMAP

R-2.2.1.1	(604)	Signed Original On File
ADOPTED 8/75	REVISED 5/09	CHIEF HYDRAULICS ENGR.

NOTES:

- The culvert lengths shown on the plans and structure list shall be the pay length as indicated on the standard sheet including connector section lengths when used.
- Pipe on skew shall be mitered. Sufficient additional length of pipe shall be allowed to provide clearance for end sections.
- Toe plates required on round pipe 24" and over in diameter and on arch pipe 28"x 20" and over unless otherwise specified on the plans or in the special provisions.
- Toe plates shall be punched with 3/16" holes to match holes in lip of end section and bolted with 3/8" galvanized bolts.
- Reinforced edges to be supplemented with galvanized stiffener angles for the 60" thru 84" round, 77"x 52" and 83"x 57" pipe-arch sizes. The angles will be 2"x 2"x 1/4" for the 60" thru 72" round, 77"x 52" and 83"x 57" pipe arch sizes and 2 1/2" x 2 1/2" x 1/4" for 78" thru 84" round. The angles to be attached by 3/8" galvanized nuts and bolts.
- Anchor block shall be used on inlet end only for 48" CMP and over and for 57"x 38" CMAP and over unless otherwise specified (see anchor block details).
- Concrete shall be class A or AA.
- Toe plate to be eliminated when anchor block is used.
- Reinforcing steel bar to clear 2" on ends of concrete anchor block.
- Actual dimensions of end section may vary by manufacturer. Provide appropriate metal end sections to specifically fit either HDPE or CMP as recommended by the manufacturer.
- Metal end sections installed on HDPE pipe shall engage 2 corrugations.

SAFETY SLOPE END SECTIONS FOR ROUNDPIPES													
Pipe Dia. in.	Min. Thick in.	Ga.	Dimensions +/- 2"				L Dimensions +/- 2"						
			A	H	W	Overall Width	Slope	Length in.	Slope	Length in.			
15	.064	16	8	6	21	37	4:1	20	6:1	30	10:1	50	
18	.064	16	8	6	24	40	4:1	32	6:1	48	10:1	80	
21	.064	16	8	6	27	43	4:1	44	6:1	66	10:1	110	
24	.064	16	8	6	30	46	4:1	56	6:1	84	10:1	140	
30	.109	12	12	9	36	60	4:1	80	6:1	120	10:1	200	
36	.109	12	12	9	42	66	4:1	104	6:1	156	10:1	260	
42	.109	12	16	12	48	80	4:1	128	6:1	192	—	—	
48	.109	12	16	12	54	86	4:1	152	6:1	228	—	—	
54	.109	12	16	12	60	92	4:1	176	6:1	264	—	—	
60	.109	12	16	12	66	98	4:1	200	6:1	300	—	—	

NOTES:

- Galvanized steel shall meet AASHTO specifications.
- Connector sizes thru 24" diameter attach to pipe with Type 1 straps. All other sizes attach with Type 2 rods and lugs.
- When required, toe plate extensions are to be 8" high by overall width less 6". Do not include unless specified.
- Fabricate transverse bars and longitudinal bars from steel pipe conforming to ASTM A53 Grade B Schedule 40 Specifications, hot dip galvanize bars after fabrication. Slotted holes for transverse bar attachment shall be provided for all end sections.
- Longitudinal bars shown are for cross drainage structures for pipes larger than 30". Longitudinal bar required where open span (as measured perpendicular to the flow line) is greater than 30". Use additional longitudinal bars if after placement of one longitudinal bar the open spacing still exceeds 30" on larger end sections. Where the open span of any cross drainage structure is 30" or smaller, no bars are required. Weld longitudinal bars to transverse bars.
- All references made to pipe diameter apply to round pipe diameters and their arched equivalents.

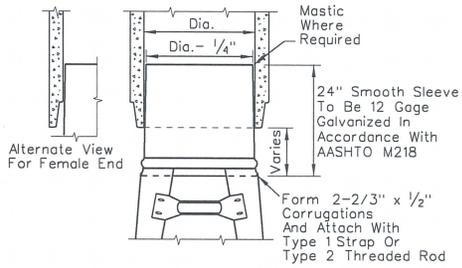
SAFETY SLOPE END SECTIONS FOR ARCHED PIPES														
Equiv. Dia. in.	Span in.	Rise in.	Min. Thick in.	Ga.	Dimensions +/- 2"				L Dimensions +/- 2"					
					A	H	W	Overall Width	Slope	Length in.	Slope	Length in.		
18	21	15	.064	16	8	6	27	43	4:1	20	6:1	30	10:1	50
21	24	18	.064	16	8	6	30	46	4:1	32	6:1	48	10:1	80
24	28	20	.064	16	8	6	34	50	4:1	40	6:1	60	10:1	100
30	35	24	.079	14	12	9	41	65	4:1	56	6:1	84	10:1	140
36	42	29	.109	12	12	9	48	72	4:1	76	6:1	114	10:1	190
42	49	33	.109	12	16	12	55	87	4:1	92	6:1	138	—	—
48	57	38	.109	12	16	12	63	95	4:1	112	6:1	168	—	—
54	64	43	.109	12	16	12	70	102	4:1	132	6:1	198	—	—
60	71	47	.109	12	16	12	77	109	4:1	148	6:1	222	—	—
72	83	57	.109	12	16	12	89	121	4:1	188	6:1	282	—	—

SHEET 2 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

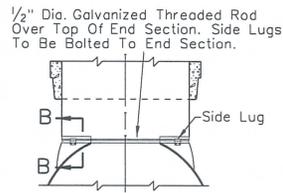
METAL END SECTION
SAFETY TYPE
FOR METAL PIPES

R-2.2.2.1	(604)	Signed Original On File
ADOPTED 9/00	REVISED 5/09	CHIEF HYDRAULICS ENGR.



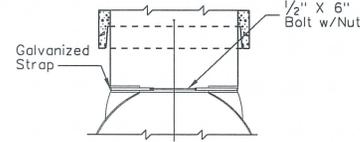
For All Concrete Pipes

TAPERED SLEEVE FOR ATTACHING STEEL END SECTIONS TO RCP AND HDPE



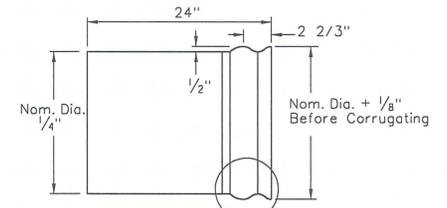
For 30\" and Larger Round and All Elliptical RCP/HDPE

TYPE 2 CONNECTOR DETAIL



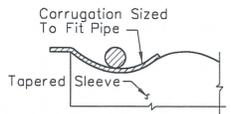
Through 24\" Round RCP/HDPE

TYPE 1 CONNECTOR DETAIL

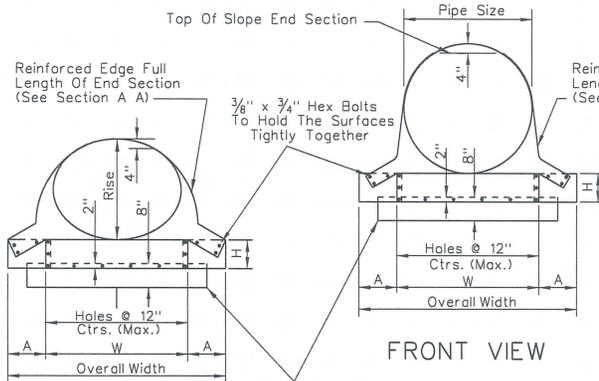


SMOOTH TAPERED SLEEVE DETAIL

Form 1/2\" x 2 2/3\" Corrugations. Maintain Inside Diameter Of Sleeve. Finished End To Be The Same Diameter As Corrugated Steel Pipe Diameter.



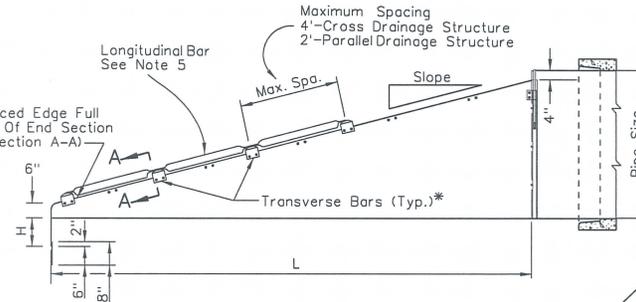
SECTION B-B



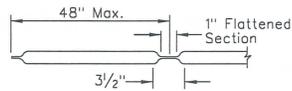
FRONT VIEW

FRONT VIEW

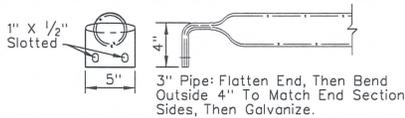
Optional Toe Plate Extension (Same Gage As End Section)



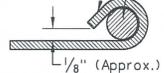
ELEVATION



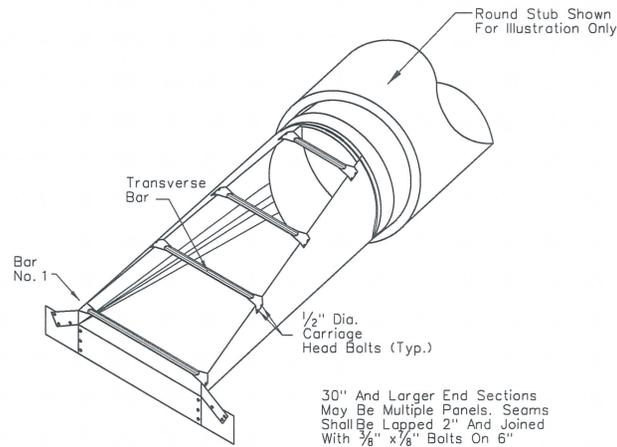
TRANSVERSE BAR DETAIL



Edge Of Sidewall Sheet Rolled Snugly Against Steel Rod. Min. 7/8\" Dia. Galvanized Steel Rod Or No. 4 Galvanized Reinforcing Bar Steel Rod.

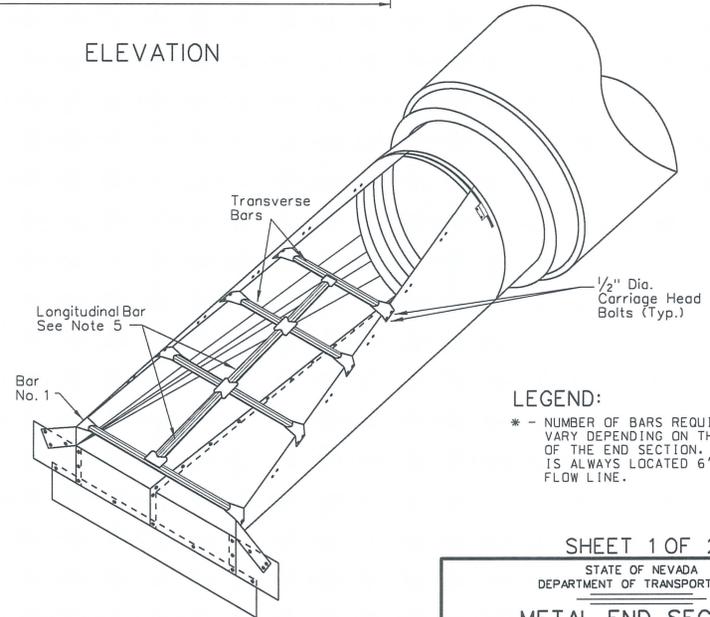


SECTION A-A



PARALLEL DRAINAGE STRUCTURE

30\" and Larger End Sections May Be Multiple Panels. Seams Shall Be Lapped 2\" And Joined With 3/8\" x 7/8\" Bolts On 6\" Centers Max.



CROSS DRAINAGE STRUCTURE

LEGEND:

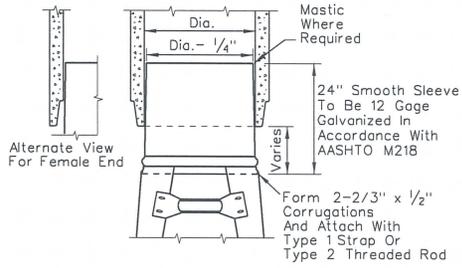
* - NUMBER OF BARS REQUIRED WILL VARY DEPENDING ON THE LENGTH OF THE END SECTION. BAR NO. 1 IS ALWAYS LOCATED 6\" ABOVE FLOW LINE.

SHEET 1 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

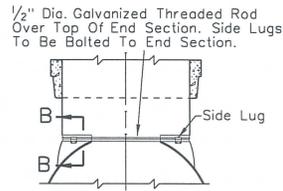
METAL END SECTION SAFETY TYPE FOR CONCRETE AND HDPE PIPES

R-2.2.3	(604)	Signed Original On File
ADOPTED	REVISED	CHIEF HYDRAULICS ENGR.
	1/05	5/09



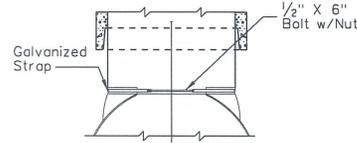
For All Concrete Pipes

TAPERED SLEEVE FOR ATTACHING STEEL END SECTIONS TO RCP AND HDPE

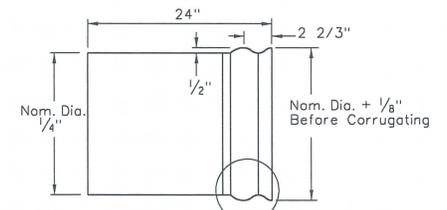


For 30" and Larger Round and All Elliptical RCP/HDPE

TYPE 2 CONNECTOR DETAIL

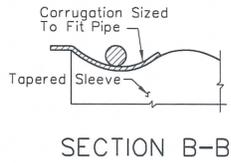


TYPE 1 CONNECTOR DETAIL

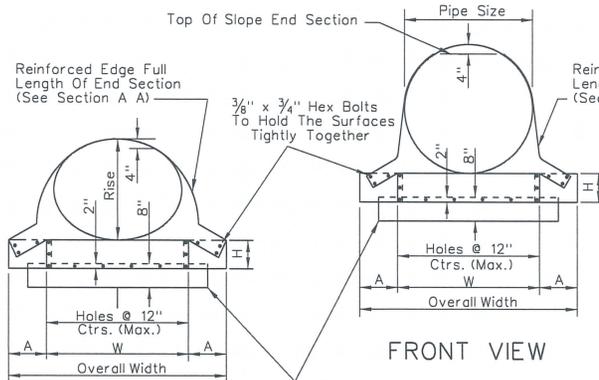


SMOOTH TAPERED SLEEVE DETAIL

Form 1/2" x 2 2/3" Corrugations. Maintain Inside Diameter Of Sleeve. Finished End To Be The Same Diameter As Corrugated Steel Pipe Diameter.



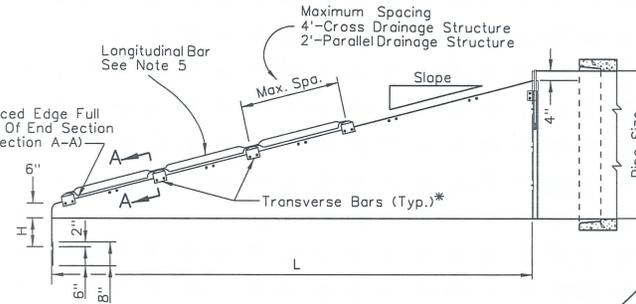
SECTION B-B



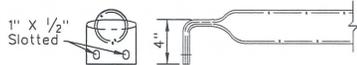
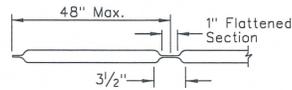
FRONT VIEW

FRONT VIEW

Optional Toe Plate Extension (Same Gage As End Section)



ELEVATION

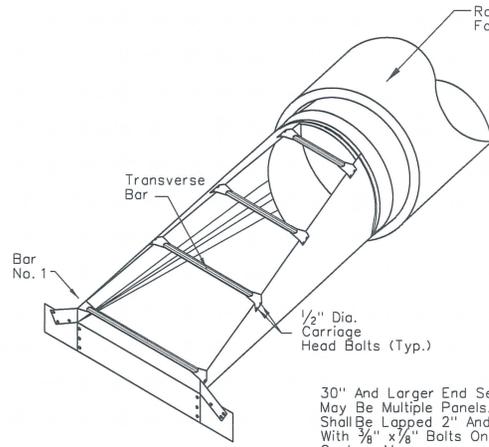


TRANSVERSE BAR DETAIL

3" Pipe: Flatten End, Then Bend Outside 4" To Match End Section Sides, Then Galvanize.

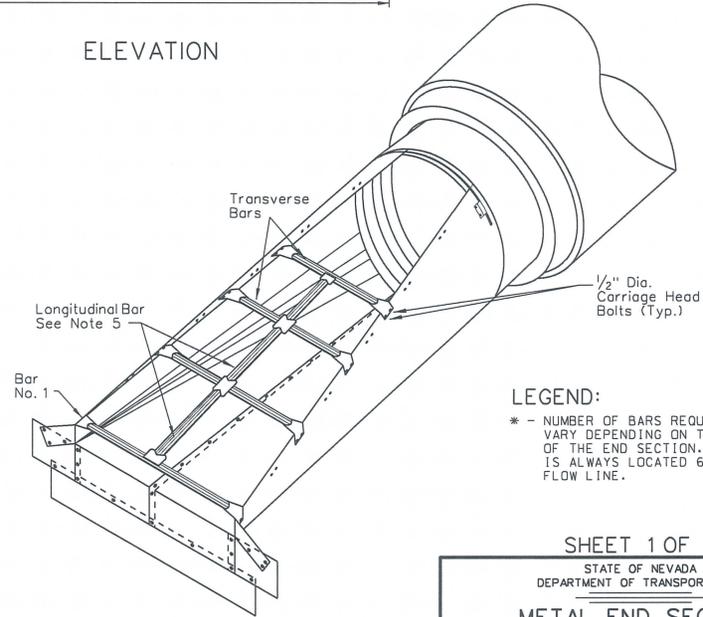


SECTION A-A



PARALLEL DRAINAGE STRUCTURE

30" And Larger End Sections May Be Multiple Panels. Seams Shall Be Lapped 2" And Joined With 3/8" x 7/8" Bolts On 6" Centers Max.



CROSS DRAINAGE STRUCTURE

LEGEND:

* - NUMBER OF BARS REQUIRED WILL VARY DEPENDING ON THE LENGTH OF THE END SECTION. BAR NO. 1 IS ALWAYS LOCATED 6" ABOVE FLOW LINE.

SHEET 1 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

METAL END SECTION SAFETY TYPE FOR CONCRETE AND HDPE PIPES

R-2.2.3	(604)	Signed Original On File
ADOPTED	REVISED	CHIEF HYDRAULICS ENGR.
	1/05	5/09



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-2.3.1

Page No.: R-19

Note: A separate form is required for each change.

Description of requested modification or correction: Modify the Precast End Section Detail to match what is actually being constructed by the Precast Manufacturers.

.....
WE ARE JUST GOING TO UPDATE THE TABLE SINCE COMPANIES
BUILD DIFFERENT STYLES, BUT MEASUREMENT ARE ALMOST THE SAME.
(SEE ATTACHED)
.....

..... (Please attach supporting information).

Reason for request: The current detail is not what is actually for sale from the Precast Industry and so it difficult to determine which detail the engineer should use during design...the NDOT standard or what the contractor will actually purchase from the manufacturer. This must be even more confusing during construction.

Requestor Information: Name: Brian Matthews of Hydraulics

Phone: Ext. 7621

For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

Policy Review:

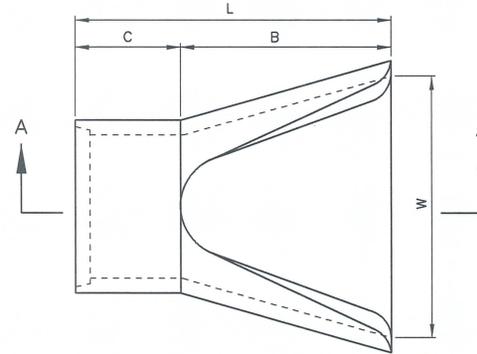
CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

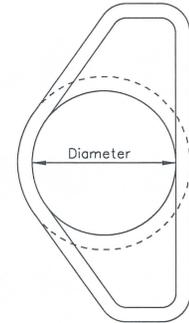
Notes:

DIAMETER	WEIGHT	A	B	C *	L	W
18"	670	9"	27"	46"	73"	36"
24"	1300	9 1/2"	43 1/2"	30"	73 1/2"	48"
30"	1850	12"	54"	19 3/4"	73 3/4"	60"
36"	3500	15"	63"	34 3/4"	97"	72"
42"	4930	21"	63"	35"	98"	78"
48"	6700	24"	72"	26"	98"	84"
54"	7150	27"	65"	35"	100"	90"

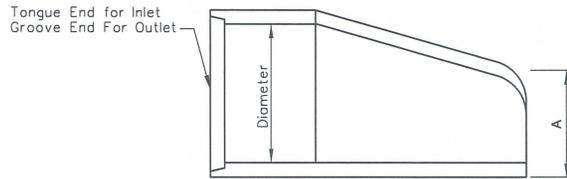
* For Reference Only



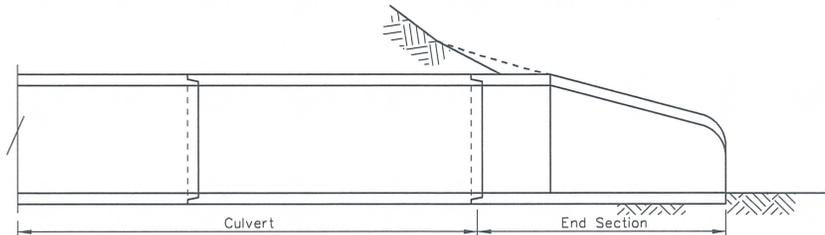
PLAN



END VIEW



SECTION A-A



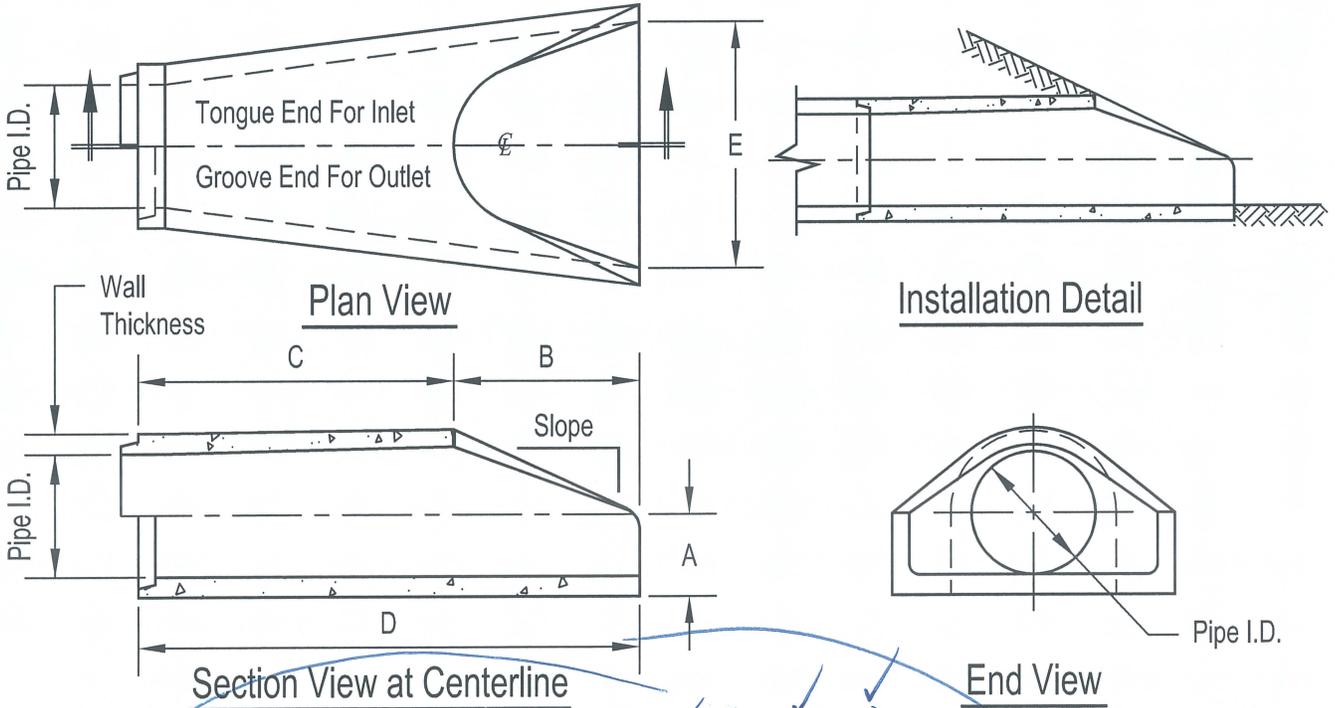
CROSS SECTION VIEW
18" TO 54" RCP

NOTES:

1. Class and type of concrete shall be as specified for reinforced concrete pipe.
2. Structural design of end section shall conform to that of standard reinforced concrete culvert pipe.
3. Length of pipe shown on the design plans does not include connector section (length C).
4. Contact hydraulics engineer for sizes not listed.
5. Actual dimensions of end sections may vary by manufacturer. Adjust pipe lengths as necessary to accommodate precast end sections used. See sheets R-1.1.2 and R-2.1.4 for extension beyond fill slope and pipe pay lengths.

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
RCP END SECTION 18" TO 54" RCP		
R-2.3.1	(603)	Signed Original On File
ADOPTED 1/75	REVISED 5/09	CHIEF HYDRAULICS ENGR.

Flared End Section 12" - 72" Diameter Pipe



Pipe Inner Diameter (inches)	Wall Thickness (inches)	A (inches)	B (inches)	C (inches)	D (inches)	E (inches)	Slope
12	2	4	24	48 7/8	72 7/8	30	3:1
15	2 1/4	6	27	46	73	30	3:1
18 ✓	2 1/2 ✓	9 ✓	27 ✓	46 ✓	73 ✓	36 ✓	3:1
24 ✓	3 ✓	9 1/2 ✓	43 1/2 ✓	30 ✓	73 1/2 ✓	48 ✓	3:1
30 ✓	3 1/2 ✓	12 ✓	54 ✓	19 3/4 ✓	73 3/4 ✓	60 ✓	3:1
36 ✓	4 ✓	15 ✓	63 ✓	34 3/4 ✓	97 3/4 ✓	72 ✓	3:1
42	4 1/2	21	63	35	98	78	3:1
48	5	24	72	26	98	84	3:1
54	5 1/2	27	65	35	100	90	2.4:1
60	6	30	60	39	99	96	2:1
66	6 1/2	32	78	21	99	102	2:1
72	7	34	78	21	99	108	2:1

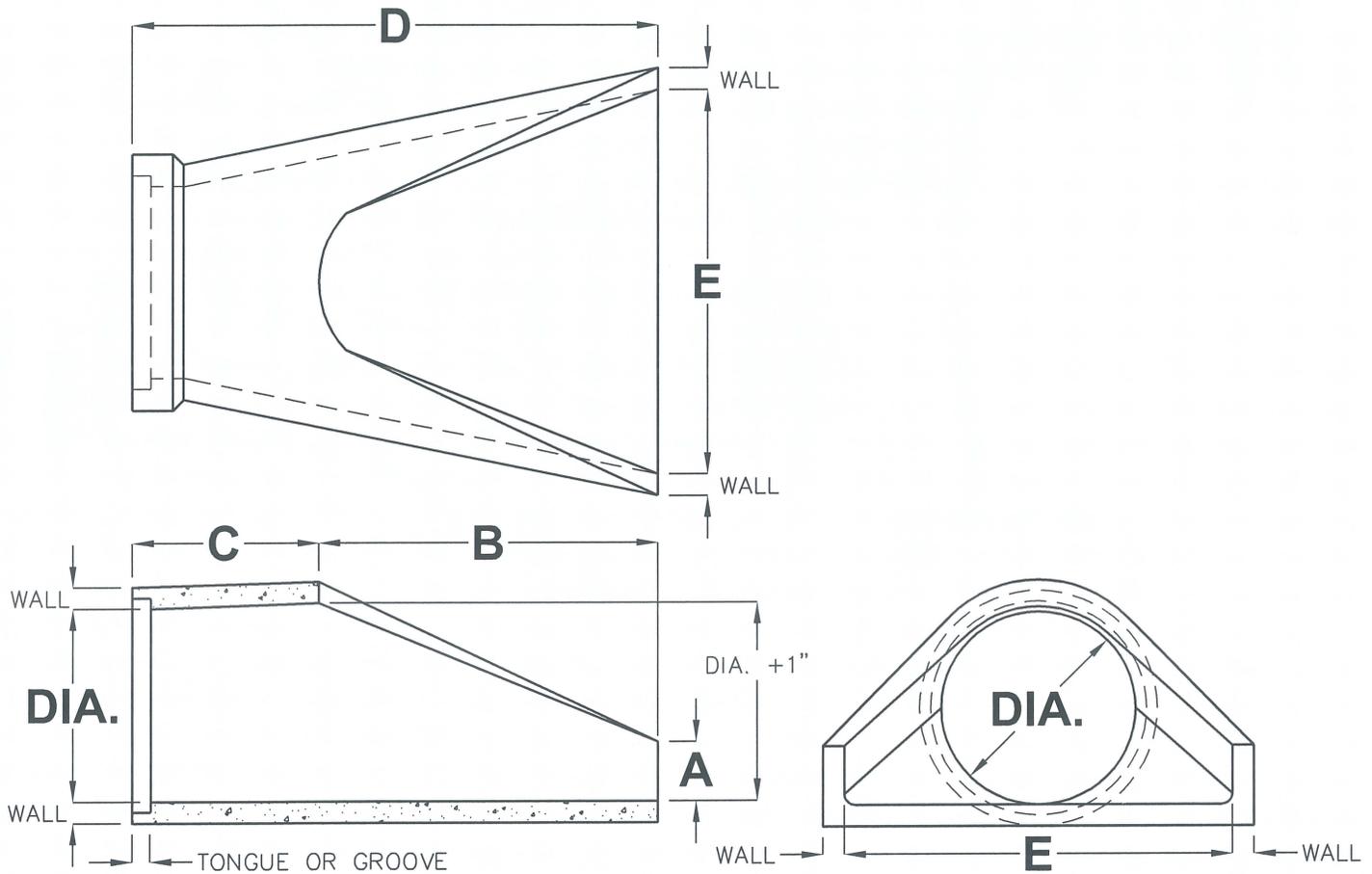
Dimensions may vary depending upon equipment availability.

Notes:

1. Produced to meet ASTM specifications.
2. Contact a Concrete Pipe Division representative for details not listed on this sheet.

REINFORCED CONCRETE PIPE FLARED END SECTIONS

15" TO 36" I.D.



DIA.	WALL	TONGUE OR GROOVE	WEIGHT	A	B	C	D	E
✓ 15"	✓ 2-1/4"	1-3/4"	970	6" ✓	27" ✓	46" ✓	73" ✓	30" ✓
✓ 18"	2-1/2" ✓	1-3/4"	1340	9" ✓	27" ✓	46" ✓	73" ✓	36" ✓
24" ✓	3" ✓	1-3/4"	1820	9-1/2" ✓	43-1/2" ✓	30" ✓	73-1/2" ✓	48" ✓
30" ✓	4-1/4" ✓	3-7/8"	2400	12" ✓	54" ✓	19-3/4" ✓	73-3/4" ✓	60" ✓
36" ✓	4-3/4" ✓	3-7/8"	5500	15" ✓	63" ✓	34-3/4" ✓	97-3/4" ✓	72" ✓

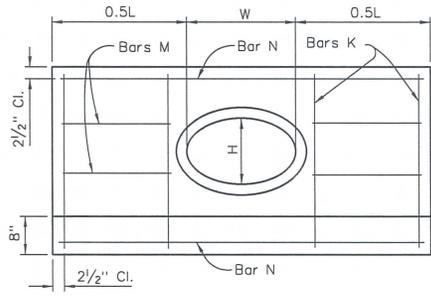
REINFORCED CONCRETE PIPE CONFORMS
TO ASTM C-76, ASTM-C-443, AASHTO M-170,
AND AASHTO M-198.

FOR COMPLETE DESIGN AND PRODUCT INFORMATION
CONTACT JENSEN PRECAST.

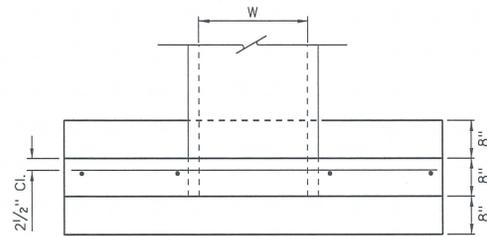
Jensen Precast reserves the right to make changes to product design
and/or dimensions without notice. Please contact Jensen Precast whenever
necessary for confirmation or advice on product design.

JENSEN
PRECAST

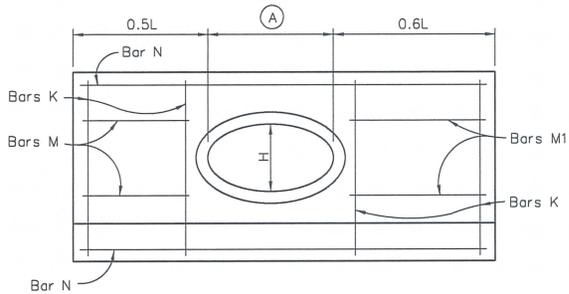
R-31



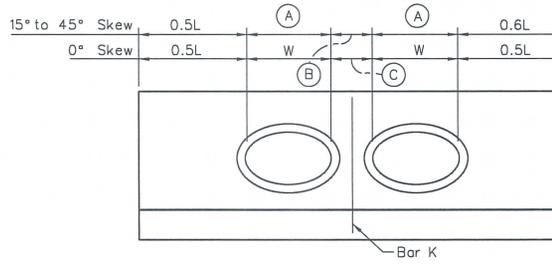
ELEVATION
SINGLE ELLIPTICAL RCP
0° SKEW



PLAN

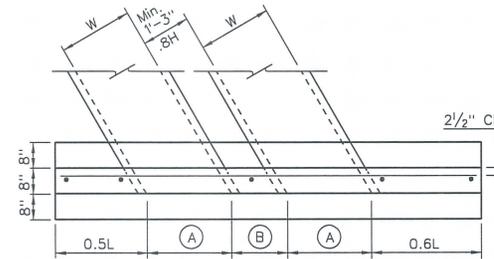


ELEVATION
SINGLE ELLIPTICAL RCP
15° TO 45° SKEW

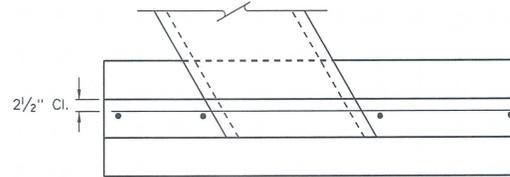


For Reinforcing Not Shown See Single Culvert Headwalls

ELEVATION
DOUBLE ELLIPTICAL RCP
0° TO 45° SKEW



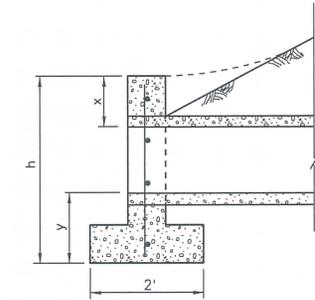
PLAN



PLAN

LEGEND:

- (A) — $W / \cos(\text{SKEW ANGLE})$
- (B) — $.8H / \cos(\text{SKEW ANGLE})$
MIN. $1' / \cos(\text{SKEW ANGLE})$
- (C) — $.8H$ @ RIGHT ANGLE TO PIPE



SECTION
FOR ALL HEADWALLS

SHEET 1 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CULVERT HEADWALLS
23" x 14" ELLIPTICAL RCP TO
60" x 38" ELLIPTICAL RCP

R-2.7.1	(502)	Signed Original On File
ADOPTED 8/69	REVISED 5/09	CHIEF HYDRAULICS ENGR.

QUANTITIES SHOWN BELOW ARE FOR ONE HEADWALL.

OVAL RCP SIZE W & H	LENGTH OF REINFORCING BARS																
	SINGLE ELLIPTICAL RCP					SINGLE OR DOUBLE ELLIPTICAL RCP						DOUBLE ELLIPTICAL RCP					
	0°-45°	0°	15°	30°	45°	0°	15°		30°		45°		0°-45°	0°	15°	30°	45°
	No.4	No.5	No.5	No.5	No.5	No.4	No.4	No.4	No.4	No.4	No.4	No.4	No.4	No.4	No.5	No.5	No.5
K	N	N	N	N	M	M	M1	M	M1	M	M1	M	K	N	N	N	N
23"x14"	6ø3'-1"	2ø6'-5"	2ø7'	2ø7'-2"	2ø7'-8"	2ø1'-11"	1ø1'-9"	1ø2'-6"	1ø1'-8"	1ø2'-7"	1ø1'-5"	1ø2'-10"	7ø3'-1"	2ø9'-7"	2ø10'-3"	2ø10'-10"	2ø12'-2"
30"x19"	6ø3'-6"	2ø8'-6"	2ø9'-3"	2ø9'-6"	2ø10'-2"	4ø2'-7"	2ø2'-5"	2ø3'-3"	2ø2'-4"	2ø3'-4"	2ø2'-1"	2ø3'-7"	7ø3'-6"	2ø12'-3"	2ø13'-1"	2ø13'-11"	2ø15'-6"
34"x22"	6ø3'-10"	2ø9'-7"	2ø10'-4"	2ø10'-9"	2ø11'-5"	4ø3'	2ø2'-10"	2ø3'-9"	2ø2'-9"	2ø3'-10"	2ø2'-6"	2ø4'-1"	7ø3'-10"	2ø13'-11"	2ø14'-10"	2ø15'-8"	2ø17'-6"
38"x24"	6ø4'-1"	2ø10'-5"	2ø11'-3"	2ø11'-8"	2ø12'-6"	4ø3'-2"	2ø3'	2ø4'	2ø2'-11"	2ø4'-1"	2ø2'-8"	2ø4'-4"	7ø4'-1"	2ø15'-2"	2ø16'-3"	2ø17'-2"	2ø19'-3"
42"x27"	8ø4'-4"	2ø11'-6"	2ø12'-5"	2ø12'-11"	2ø13'-9"	4ø3'-7"	2ø3'-5"	2ø4'-6"	2ø3'-6"	2ø4'-9"	2ø3'-3"	2ø5'	9ø4'-4"	2ø16'-10"	2ø17'-11"	2ø19'	2ø21'-3"
45"x29"	8ø4'-7"	2ø12'-6"	2ø13'-6"	2ø14'	2ø14'-11"	4ø3'-10"	2ø3'-8"	2ø4'-9"	2ø3'-7"	2ø4'-10"	2ø3'-4"	2ø5'-1"	9ø4'-7"	2ø18'-2"	2ø19'-5"	2ø20'-7"	2ø23'
53"x34"	10ø5'-1"	2ø14'-5"	2ø15'-7"	2ø16'-2"	2ø17'-3"	6ø4'-6"	3ø4'-4"	3ø5'-7"	3ø4'-3"	3ø5'-8"	3ø4'	3ø5'-11"	11ø5'-1"	2ø21'-1"	2ø22'-6"	2ø23'-10"	2ø26'-9"
60"x38"	10ø5'-6"	2ø16'-3"	2ø17'-7"	2ø18'-2"	2ø19'-6"	6ø5'-1"	3ø4'-11"	3ø6'-3"	3ø4'-10"	3ø6'-4"	3ø4'-7"	3ø6'-7"	11ø5'-6"	2ø23'-9"	2ø25'-5"	2ø26'-10"	2ø30'-2"

QUANTITIES SHOWN BELOW ARE FOR TWO HEADWALLS.

OVAL RCP SIZE W X H	RCP SIZE	OVAL RCP AREA SQ.FT	SINGLE ELLIPTICAL RCP								DOUBLE ELLIPTICAL RCP								X	Y	L	h
			0° SKEW		15° SKEW		30° SKEW		45° SKEW		0° SKEW		15° SKEW		30° SKEW		45° SKEW					
			CONC CU YD	STEEL LB	CONC CU YD	STEEL LB	CONC CU YD	STEEL LB	CONC CU YD	STEEL LB	CONC CU YD	STEEL LB	CONC CU YD	STEEL LB	CONC CU YD	STEEL LB	CONC CU YD	STEEL LB				
23"x14"	18"	1.82	1.37	57	1.49	60	1.52	61	1.60	63	1.94	74	2.08	77	2.18	80	2.40	86	10 3/4"	1' - 2 3/4"	4' - 9"	3" - 3 1/2"
30"x19"	24"	3.21	1.95	79	2.13	82	2.17	83	2.27	86	2.64	98	2.85	103	2.97	106	3.25	113	11 1/4"	1' - 3 1/4"	6' - 3"	3" - 9 1/2"
34"x22"	27"	4.20	2.30	87	2.50	92	2.55	93	2.66	96	3.11	110	3.34	116	3.49	119	3.81	127	11 1/2"	1' - 3 1/2"	7"	4" - 1"
38"x24"	30"	5.15	2.57	93	2.79	99	2.85	100	2.98	104	3.49	119	3.75	125	4.07	129	4.28	137	11 3/4"	1' - 3 3/4"	7" - 6"	4" - 3 1/2"
42"x27"	33"	6.39	2.94	113	3.20	120	3.26	121	3.40	125	4.00	141	4.30	148	4.49	153	4.91	162	11 3/4"	1' - 3 3/4"	8" - 3"	4" - 6 1/2"
45"x29"	36"	7.37	3.31	122	3.53	128	3.68	130	3.82	134	4.48	152	4.81	159	5.04	164	5.47	174	1' - 0 1/2"	1' - 4 1/2"	9"	4" - 10"
53"x34"	42"	10.15	4.06	164	4.42	173	4.50	175	4.68	180	5.48	199	5.90	209	6.14	214	6.69	226	1' - 1"	1' - 5"	10" - 3"	5" - 4"
60"x38"	48"	12.86	4.81	182	5.24	192	5.33	194	5.54	199	6.49	221	6.98	231	7.26	238	7.90	251	1' - 1 1/2"	1' - 5 1/2"	11" - 6"	5" - 9"

NOTES:

- Concrete shall be class A or AA.
- Reinforcing steel shall be deformed bars with maximum spacing of 18" set 2 1/2" clear of surface of concrete except as noted. Bar ends shall be kept 1 1/2" clear of surface of concrete. Reinforcing bars may be cut and bent in field.
- Footings shown are of minimum depth and shall be extended if soil is unsuitable or liable to scour.
- Culvert pipes to be set on a skew shall be mitered when headwalls are constructed. When headwalls are not constructed the pipes shall not be mitered except in overflow section.
- Dimensions X, Y, L, and h to remain constant regardless of minor variations in wall thickness due to class of pipe used.
- For estimating headwall quantities on skewed culverts:
 0° to 10° - use quantities for 0° skew.
 11° to 25° - use quantities for 15° skew.
 26° to 40° - use quantities for 30° skew.
 41° to 55° - use quantities for 45° skew.
 over 55° - calculate quantities required.
 Culverts should be installed on 5° increments where it is feasible.

SHEET 2 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CULVERT HEADWALLS
23" x 14" ELLIPTICAL RCP TO
60" x 38" ELLIPTICAL RCP

R-2.7.1.1	(502)	Signed Original On File
ADOPTED 8/69	REVISED 5/09	CHIEF HYDRAULICS ENGR.

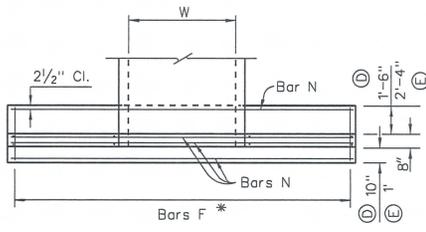
QUANTITIES SHOWN BELOW ARE FOR ONE HEADWALL.

LENGTH OF REINFORCING BARS

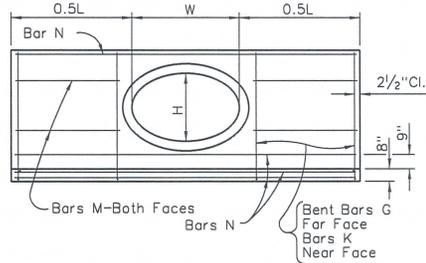
ELLIPTICAL RCP SIZE W & H	SINGLE ELLIPTICAL RCP																						
	0° SKEW					15° SKEW					30° SKEW					45° SKEW							
	No. 5		No. 4			No. 5		No. 4			No. 5		No. 4			No. 5		No. 4					
	F	G	M	N	K	F	G	M	M1	N	K	F	G	M	M1	N	K	F	G	M	M1	N	K
68"x43"	13@2'-9"	10@7'-10"	12@5'-8"	9@18'-2"	10@6'	14@2'-9"	12@7'-10"	6@5'-6"	6@6'-10"	9@19'-8"	11@6'	15@2'-9"	12@7'-10"	6@5'-4"	6@6'-10"	9@20'-4"	12@6'	16@2'-9"	13@7'-10"	6@5'-2"	6@6'-10"	9@21'-10"	13@6'
76"x48"	15@2'-9"	12@8'-4"	12@6'-4"	9@20'-4"	12@6'-6"	16@2'-9"	13@8'-4"	6@6'-2"	6@7'-7"	9@22'	13@6'-6"	16@2'-9"	13@8'-4"	6@6'	6@7'-7"	9@22'-9"	13@6'-6"	17@2'-9"	15@8'-4"	6@5'-10"	6@7'-7"	9@24'-5"	15@6'-6"
91"x58"	25@3'-9"	18@9'-8"	16@7'-7"	10@20'-4"	12@7'-6"	27@3'-9"	20@9'-8"	8@7'-5"	8@9'-1"	10@26'-4"	13@7'-6"	28@3'-9"	21@9'-8"	8@7'-3"	8@9'-1"	10@27'-9"	14@7'-6"	30@3'-9"	23@9'-8"	8@7'-1"	8@9'-1"	10@29'-2"	15@7'-6"
DOUBLE OVAL RCP																							
68"x43"	19@2'-9"	11@7'-10"	12@6'-8"	9@26'-8"	11@6'	20@2'-9"	12@7'-10"	6@5'-6"	6@6'-10"	9@28'-6"	12@6'	21@2'-9"	13@7'-10"	6@5'-4"	6@6'-11"	9@30'-2"	13@6'	24@2'-9"	16@7'-10"	6@5'-2"	6@6'-10"	9@33'-10"	16@6'
76"x48"	21@2'-9"	13@8'-4"	12@6'-4"	9@29'-10"	13@6'-6"	22@2'-9"	14@8'-4"	6@6'-2"	6@7'-7"	9@31'-10"	14@6'-6"	24@2'-9"	16@8'-4"	6@6'	6@7'-7"	9@34'-2"	13@6'-6"	26@2'-9"	19@8'-4"	6@5'-10"	6@7'-7"	9@37'-10"	19@6'-6"
91"x58"	37@3'-9"	21@9'-8"	16@7'-7"	10@35'-9"	14@7'-6"	39@3'-9"	23@9'-8"	8@7'-5"	8@9'-1"	10@38'-2"	16@7'-6"	41@3'-9"	26@9'-8"	8@7'-3"	8@9'-1"	10@40'-5"	17@7'-6"	46@3'-9"	31@9'-8"	8@7'-1"	8@9'-1"	10@45'-4"	20@7'-6"

QUANTITIES SHOWN BELOW ARE FOR TWO HEADWALLS.

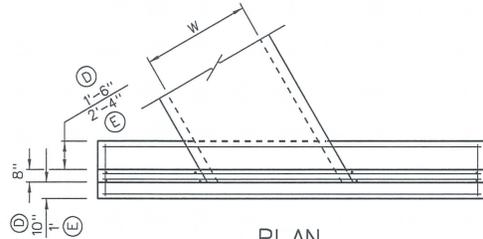
ELLIPTICAL RCP SIZE W X H	RCP SIZE	ELLIPTICAL RCP AREA SQ.FT	SINGLE ELLIPTICAL RCP										DOUBLE ELLIPTICAL RCP						X	Y	L	h
			0° SKEW		15° SKEW		30° SKEW		45° SKEW		0° SKEW		15° SKEW		30° SKEW		45° SKEW					
			CONC. CU. YD.	STEEL LB.	CONC. CU. YD.	STEEL LB.	CONC. CU. YD.	STEEL LB.	CONC. CU. YD.	STEEL LB.	CONC. CU. YD.	STEEL LB.	CONC. CU. YD.	STEEL LB.	CONC. CU. YD.	STEEL LB.	CONC. CU. YD.	STEEL LB.				
68"x43"	54"	16.62	7.19	628	7.82	683	7.98	720	8.34	767	9.86	789	10.58	848	11.07	897	12.11	1031	1'-2 1/2"	2'-2"	12'-9"	6'-11"
76"x48"	60"	20.55	8.39	746	9.13	805	9.32	813	9.71	889	11.47	921	12.31	985	13.06	1075	15.66	1207	1'-2 1/2"	2'-2 1/2"	14'-3"	7'-5"
91"x58"	72"	29.71	12.11	1168	13.18	1273	13.43	1321	14.02	1412	16.59	1495	17.82	1616	18.61	1730	20.36	1965	1'-3 1/2"	2'-3 1/2"	17'	8'-5"



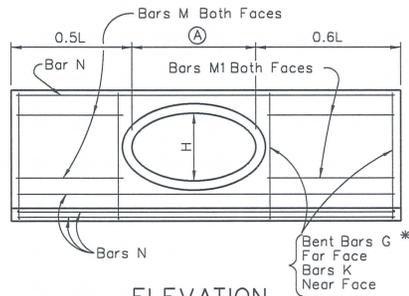
PLAN



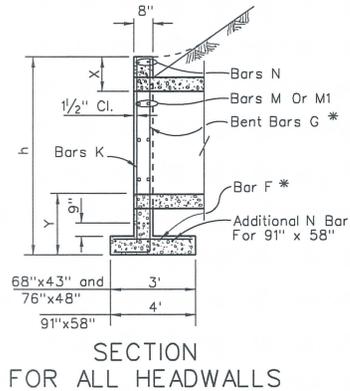
ELEVATION SINGLE ELLIPTICAL RCP 0° SKEW



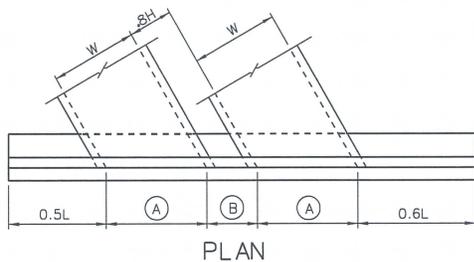
PLAN



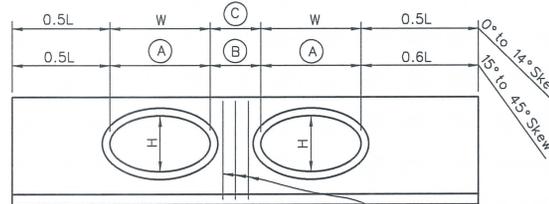
ELEVATION SINGLE ELLIPTICAL RCP 0° TO 45° SKEW



SECTION FOR ALL HEADWALLS



PLAN



ELEVATION DOUBLE ELLIPTICAL RCP 15° TO 45° SKEW

For Details Of Other Reinforcing Bars, See Single Culvert Headwalls

0° To 45° Skew
Add 1-G Bar and 1-K Bar for 68"x43" and 76"x48"
Add 3-G Bars and 2-K Bars for 91"x58"

NOTES:

- Concrete shall be class A or AA.
- Reinforcing steel shall be deformed bars with maximum spacing of 18" set 2 1/2" clear of surface of concrete except as noted. Bar ends shall be kept 1 1/2" clear of surface of concrete. Reinforcing bars may be cut and bent in field.
- Footings shown are of minimum depth and shall be extended if soil is unsuitable or liable to scour.
- Culvert pipes to be set on a skew shall be mitered when headwalls are constructed. When headwalls are not constructed the pipes shall not be mitered except in overflow section.
- Dimensions X, Y, L, and h to remain constant regardless of minor variations in wall thickness due to class of pipe used.
- For estimating headwall quantities on skewed culverts:
0° to 10° - use quantities for 0° skew.
11° to 25° - use quantities for 15° skew.
26° to 40° - use quantities for 30° skew.
41° to 55° - use quantities for 45° skew.
over 55° - calculate quantities required.
Culverts should be installed on 5° increments where it is feasible.

LEGEND:

- (A) - W/COS. SKEW ANGLE
- (B) - .8H/COS. SKEW ANGLE
- (C) - .8H @ RIGHT ANGLE TO PIPE
- (D) - FOR 68"x43" AND 76"x48"
- (E) - FOR 91"x58"
- * - @18" CENTERS 68"x43" AND 76"x48"
@12" CENTERS 91"x58"

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CULVERT HEADWALLS
68" x 43" ELLIPTICAL RCP TO
91" x 58" ELLIPTICAL RCP

R-2.7.2	(502)	Signed Original On File
ADOPTED 8/69	REVISED 8/97	CHIEF HYDRAULICS ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-3.1.2 and R-3.1.3

Page No.: R-37 and R-38

Note: A separate form is required for each change.

Description of requested modification or correction: In Section A-A the note to read "18" Min (See Note 11) replacing the existing "6" Min" note. Then add notes 10 and 11 which describe when to use an Anchor Assembly and how to construct the pipe down a steep slope.

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..... (Please attach supporting information).

Reason for request: The Anchor Assembly is not functioning as intended when the road fill is removed. So in the normal installation, Hydraulics does not feel that the Anchor Assembly is necessary and is recommending that the pipe be buried and if it cannot be buried, than the Anchor Assemblies can be used.

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Requestor Information: Name: Brian Matthews of Hydraulics

Phone: Ext. 7621

For Standards/Manuals Personnel Only: Approved Denied

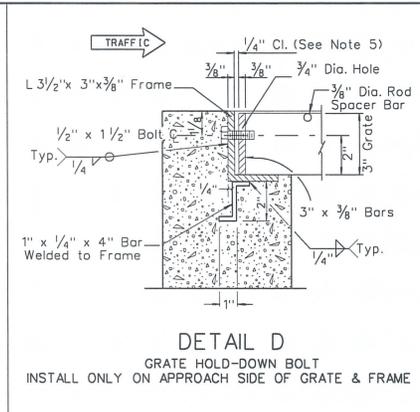
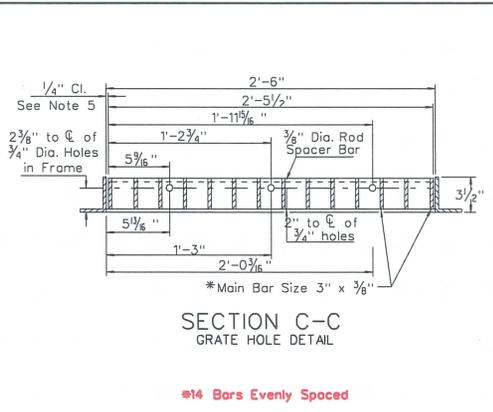
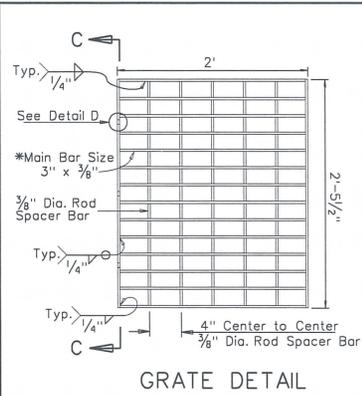
Revised by: Signature: _____ Date: _____

Policy Review:

CADD Standards ASTM AASHTO Design Manual Specifications

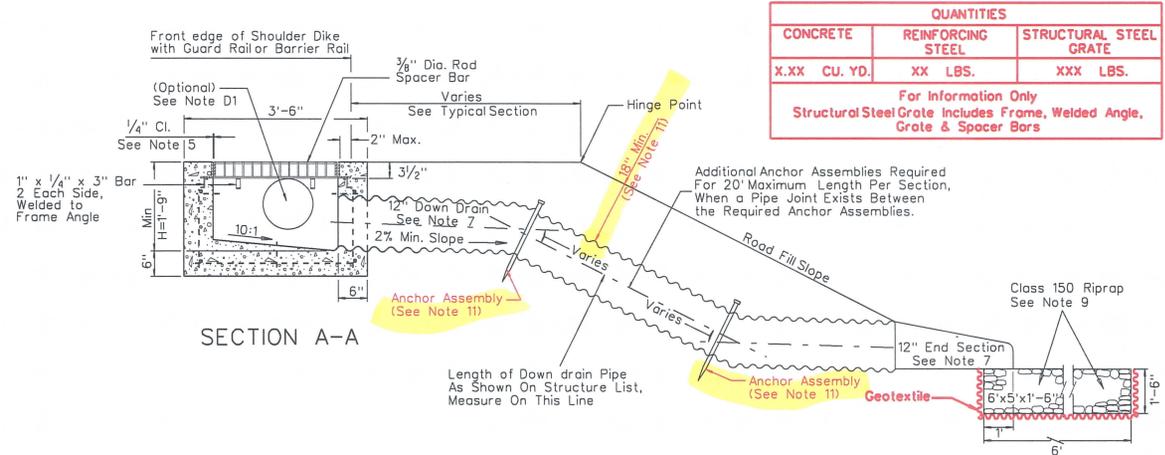
Reviewed by: Signature: _____ Date: _____

Notes:
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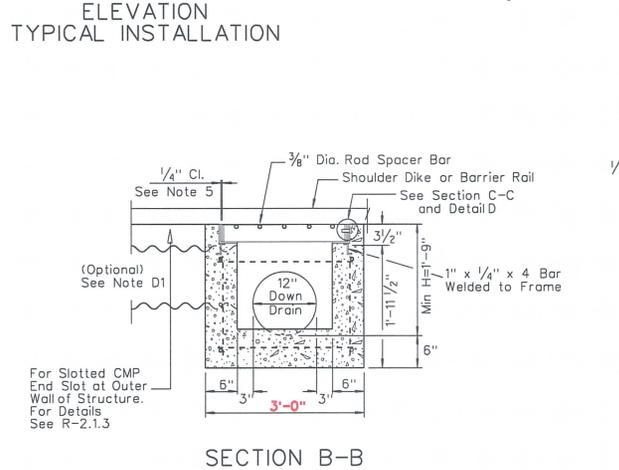
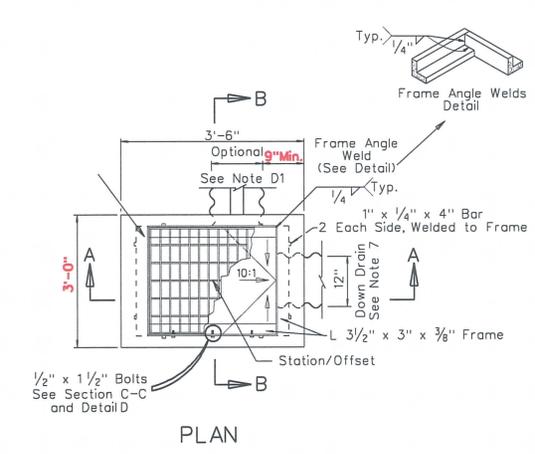
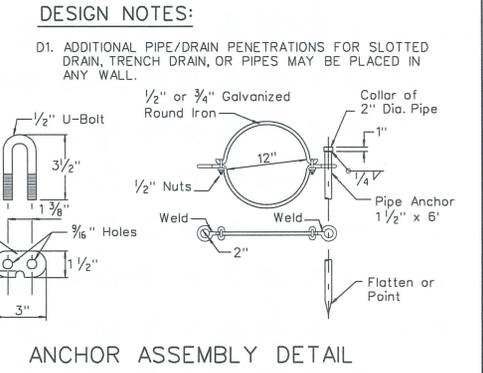
- NOTES:**
1. ALL CONCRETE SHALL BE CLASS A OR AA.
 2. REINFORCING BARS SHALL BE NO. 4 BARS WITH MAXIMUM SPACING AT 18" CENTERS. BARS TO BE EMBEDDED A MINIMUM OF 2" AND BAR ENDS MUST CLEAR SURFACE BY 1/2".
 3. ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 1".
 4. GRATE AND FRAME ANGLE TO BE WELDED AT ALL CONTACT POINTS.
 5. 1/4" MAXIMUM CLEARANCE BETWEEN GRATE & FRAME ON EACH SIDE.
 6. SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION SHAPE FLOWLINE(S) TO OUTLET PIPE, AND PROVIDE A 10:1 SLOPE TO FLOWLINE(S).
 7. 12" DOWN DRAIN PIPE SHOWN, CAN BE UPSIZED TO 15" OR 18" WITH 3" OR 6" INCREASE IN THE BASIN DEPTH RESPECTIVELY. DOWN DRAIN PIPE TO BE CMP OR HDPE OR AS SPECIFIED.
 8. IF OPTIONAL DRAIN IS INSTALLED, ADJUST REBAR TO ACCOMMODATE DRAIN
 9. RIPRAP CAN BE INCREASED TO CLASS 300 WITH A 6" INCREASE IN RIPRAP THICKNESS.
 10. ALL DOWN DRAIN PIPES SHALL BE ADEQUATELY CONNECTED WITH PROPER JOINTS AND ELBOWS TO ACCOMMODATE THE NECESSARY PIPE ALIGNMENT FROM DROP INLET TO TOE OF SLOPE. ALL PIPE JOINTS AND ELBOWS SHALL UTILIZE WATER TIGHT CONNECTIONS WHETHER HDPE OR CMP.
 11. DOWN DRAIN PIPES SHALL BE TRENCHED INTO ROAD FILL SLOPE AND BACKFILLED WITH A MINIMUM OF 18" COVER TO FILL SLOPE WHEN LOCATED IN EXCAVATABLE MATERIAL. ANCHOR ASSEMBLIES ARE NOT REQUIRED, IF APPROVED BY THE ENGINEER, AND IF THE DOWN DRAIN PIPE IS LOCATED IN NON-EXCAVATABLE MATERIAL AND MUST BE RUN ON THE SURFACE OR WITH LESS THAN 18" COVER, OR WHEN SPECIFIED OTHERWISE, ANCHOR ASSEMBLIES SHALL BE USED.

R-37

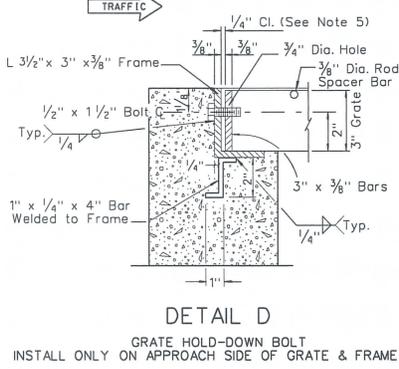
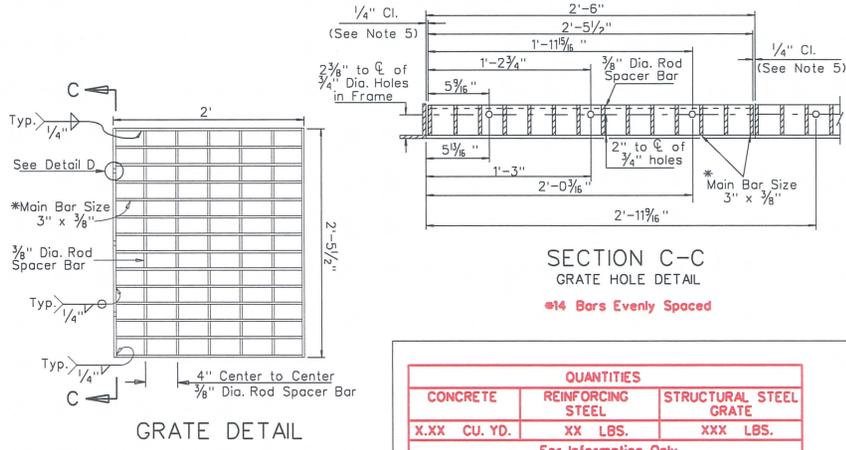


QUANTITIES		
CONCRETE	REINFORCING STEEL	STRUCTURAL STEEL GRATE
X.XX CU. YD.	XX LBS.	XXX LBS.

For Information Only
Structural Steel Grate Includes Frame, Welded Angle, Grate & Spacer Bars

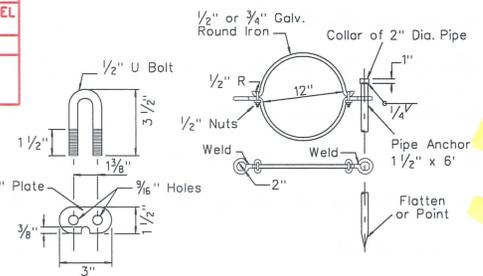


NEVADA DEPARTMENT OF TRANSPORTATION		
EMBANKMENT PROTECTOR TYPE 5		
Signed Original On File	R-3.1.2	(608)
CHIEF HYDRAULICS ENGINEER	ADOPTED R/R/KK	REVISION K/KK

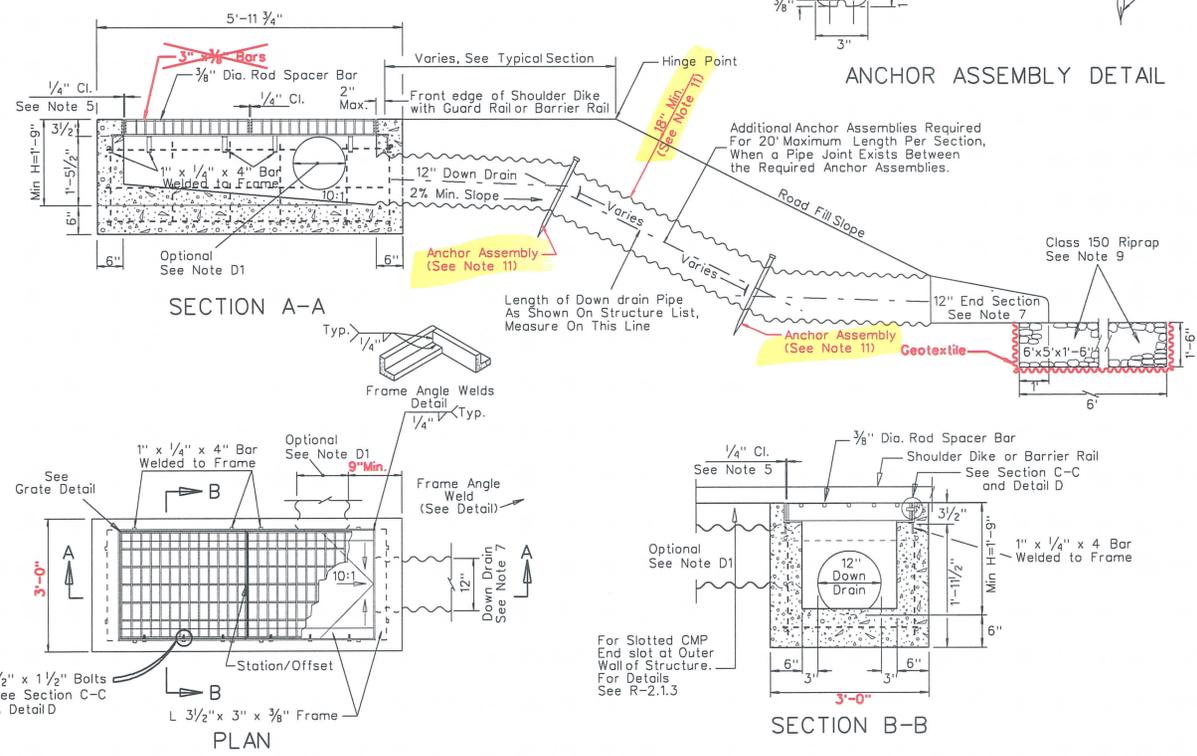


QUANTITIES		
CONCRETE	REINFORCING STEEL	STRUCTURAL STEEL GRATE
X.XX CU. YD.	XX LBS.	XXX LBS.

For Information Only
Structural Steel Grate Includes Frame, Welded Angle, Grate & Spacer Bars.



- NOTES:**
- ALL CONCRETE SHALL BE CLASS A OR AA.
 - REINFORCING BARS SHALL BE NO. 4 BARS WITH MAXIMUM SPACING AT 18" CENTERS. BARS TO BE EMBEDDED A MINIMUM OF 2" AND BAR ENDS MUST CLEAR SURFACE BY 1/2".
 - ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 1".
 - GRATE AND FRAME ANGLE TO BE WELDED AT ALL CONTACT POINTS.
 - 1/4" MAXIMUM CLEARANCE BETWEEN GRATE & FRAME ON EACH SIDE.
 - SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION SHAPE FLOWLINE(S) TO OUTLET PIPE, AND PROVIDE A 10:1 SLOPE TO FLOWLINE(S).
 - 12" DOWN DRAIN PIPE SHOWN, CAN BE UPSIZED TO 15" OR 18" WITH 3" OR 6" INCREASE IN THE BASIN DEPTH RESPECTIVELY. DOWN DRAIN PIPE TO BE CMP OR HDPE OR AS SPECIFIED.
 - IF OPTIONAL DRAIN IS INSTALLED, ADJUST REBAR TO ACCOMMODATE DRAIN
 - RIPRAP CAN BE INCREASED TO CLASS 300 WITH A 6" INCREASE IN RIPRAP THICKNESS.
 - ALL DOWN DRAIN PIPES SHALL BE ADEQUATELY CONNECTED WITH PROPER JOINTS AND ELBOWS TO ACCOMMODATE THE NECESSARY PIPE ALIGNMENT FROM DROP INLET TO TOE OF SLOPE. ALL PIPE JOINTS AND ELBOWS SHALL UTILIZE WATER TIGHT CONNECTIONS WHETHER HDPE OR CMP.
 - DOWN DRAIN PIPES SHALL BE TRENCHED INTO ROAD FILL SLOPE AND BACKFILLED WITH A MINIMUM OF 18" COVER TO FILL SLOPE WHEN LOCATED IN EXCAVATABLE MATERIAL. ANCHOR ASSEMBLIES ARE NOT REQUIRED IF APPROVED BY THE ENGINEER, AND IF THE DOWN DRAIN PIPE IS LOCATED IN NON-EXCAVATABLE MATERIAL AND MUST BE RUN ON THE SURFACE OR WITH LESS THAN 18" COVER, OR WHEN SPECIFIED OTHERWISE, ANCHOR ASSEMBLIES SHALL BE USED.



- DESIGN NOTES:**
- ADDITIONAL PIPE/DRAIN PENETRATIONS FOR SLOTTED DRAIN, TRENCH DRAIN, OR PIPES MAY BE PLACED IN ANY WALL.

NEVADA DEPARTMENT OF TRANSPORTATION	
EMBANKMENT PROTECTOR (TYPE 5-2G)	
Signed Original On File	R-3.1.3 (608)
CHIEF HYDRAULICS ENGINEER	ADOPTED <input checked="" type="checkbox"/> X/XX REVISION <input checked="" type="checkbox"/> X/XX



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-3.1.2, R-3.1.3

Page No.: R-37 to R-38

Note: A separate form is required for each change.

Description of requested modification or correction: Note 7 of the existing detail states that the outlet pipe can be upsized from 12" to 15", however, in order to do this the width of the drop inlet would need to be increased.

Hydraulics suggests increasing the Embankment protectors overall width from 2'6" to 3'0" (with a 2'0" inside span dimension) so we have one uniform size that will accept either a 12", 15", or 18" pipe size. As a result, redesign the Grate to accommodate the 6" increase in span and also to maximize the bare spacing from 1.5" to 2".

Suggestion: The grate span will increase from 1'6" to 2'0", we already have a grate design done for the Type 2 D.I.'s with a 2'0" span (A=2') and an optimized spacing that we should be able to use. This will minimize how much we need to lean on structures for redesign.

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..... (Please attach supporting information).

Reason for request: To provide the contractor information that would be necessary to construct the embankment protector with a larger pipe size. If we increase them all, then either during the design phase or future connections will be easier to make.

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Requestor Information: Name: Brian Matthews of Hydraulics

Phone: Ext. 7621

For Standards/Manuals Personnel Only: Approved Denied

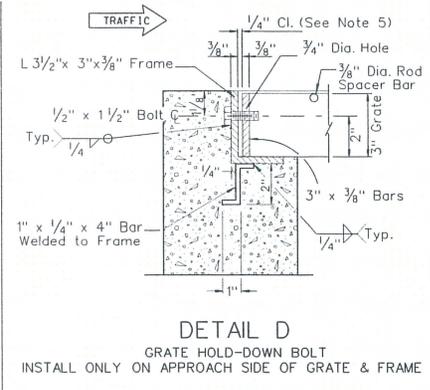
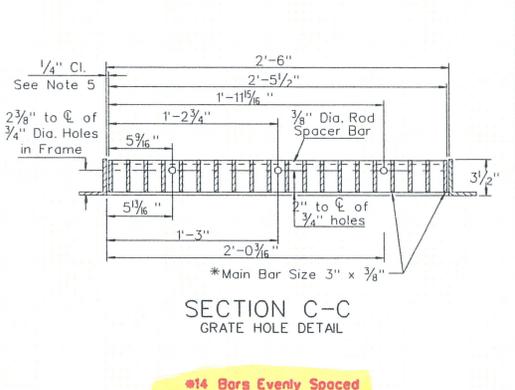
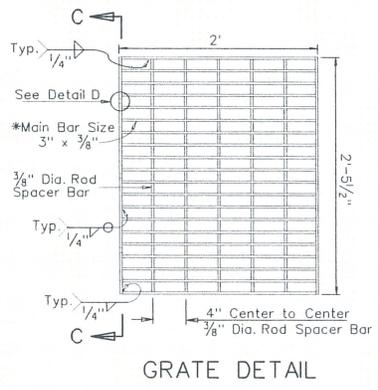
Revised by: Signature: _____ Date: _____

Policy Review:

CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes:
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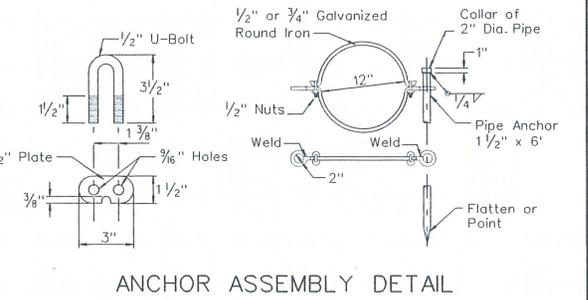
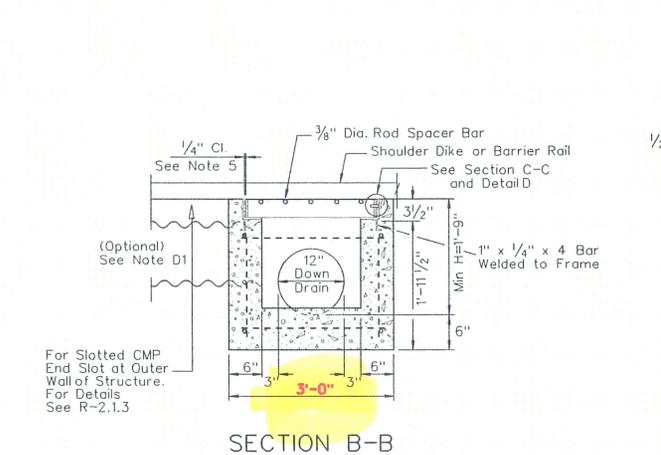
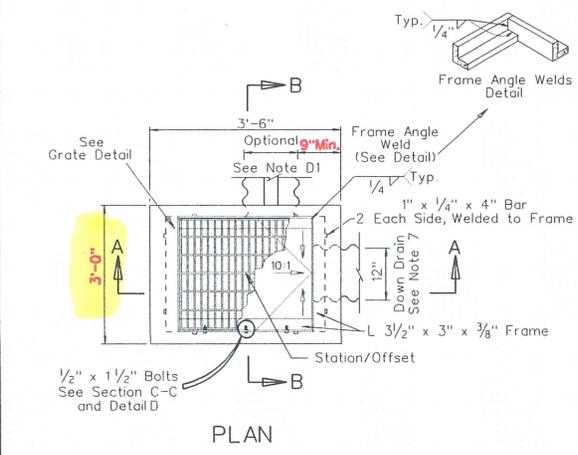
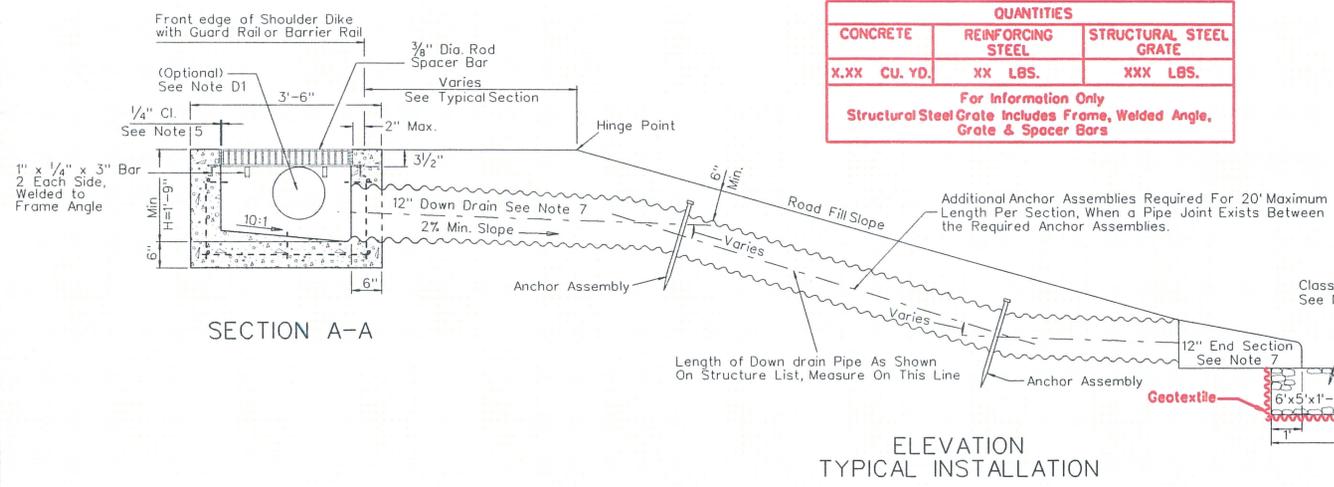


- NOTES:**
- ALL CONCRETE SHALL BE CLASS A OR AA.
 - REINFORCING BARS SHALL BE NO. 4 BARS WITH MAXIMUM SPACING AT 18" CENTERS. BARS TO BE EMBEDDED A MINIMUM OF 2" AND BAR ENDS MUST CLEAR SURFACE BY 1/2".
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 - GRATE AND FRAME ANGLE TO BE WELDED AT ALL CONTACT POINTS.
 - 1/4" MAXIMUM CLEARANCE BETWEEN GRATE & FRAME ON EACH SIDE.
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 - IF OPTIONAL DRAIN IS INSTALLED, ADJUST REBAR TO ACCOMMODATE DRAIN.
 - RIPRAP CAN BE INCREASED TO CLASS 300 WITH A 6" INCREASE IN RIPRAP THICKNESS.

QUANTITIES		
CONCRETE	REINFORCING STEEL	STRUCTURAL STEEL GRATE
X.XX CU. YD.	XX LBS.	XXX LBS.

For Information Only
Structural Steel Grate Includes Frame, Welded Angle, Grate & Spacer Bars

- DESIGN NOTES:**
- D1. ADDITIONAL PIPE/RAIN PENETRATIONS FOR SLOTTED DRAIN, TRENCH DRAIN, OR PIPES MAY BE PLACED IN ANY WALL.



NEVADA DEPARTMENT OF TRANSPORTATION		
EMBANKMENT PROTECTOR TYPE 5		
Signed Original On File	R-3.1.2	(608)
CHIEF HYDRAULICS ENGINEER	ADOPTED	REVISION
	X/XX	X/XX

R-37



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-3.1.2, R-3.1.3

Page No.: R-37 to R-38

Note: A separate form is required for each change.

Description of requested modification or correction: The "Plan" view shows 9" from the right edge of the Embankment Protector to the "Optional" pipe entering the Embankment Protector. Hydraulics wants to add "Min." to the 9".

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..... (Please attach supporting information).

Reason for request: Michael Simmons of Crew 912 said that on one of their jobs the contractor pre-ordered the embankment protectors with a penetration at the 9" offset, but this did not match the preferred location for the trench drains coming into the Embankment Protectors. So they suggested putting "Min." on the detail to inform the contractor that he is not forced to provide a penetration at the 9" location and that it relates more to the location of the incoming pipe.

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Requestor Information: Name: Brian Matthews of Hydraulics

Phone: Ext. 7621

For Standards/Manuals Personnel Only: Approved Denied

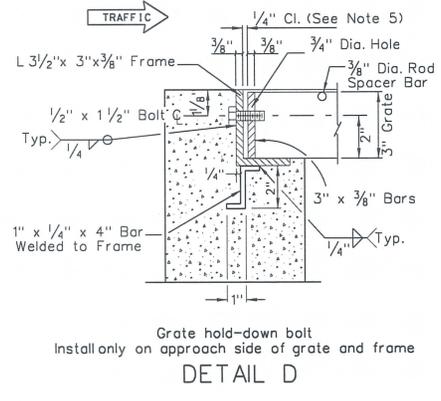
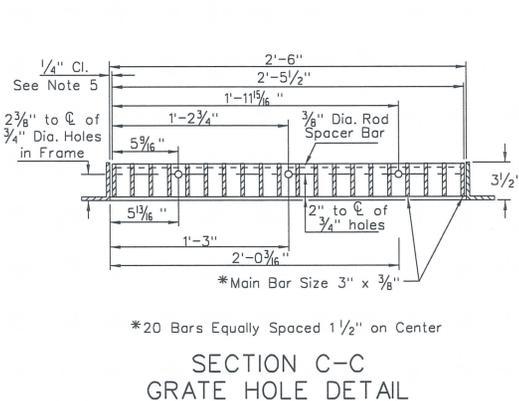
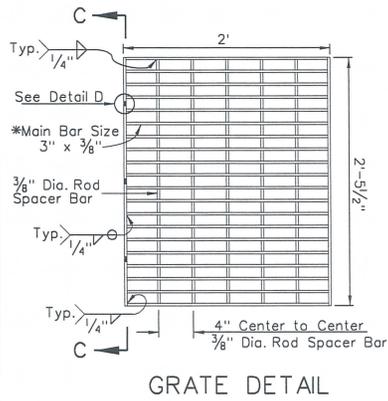
Revised by: Signature: _____ Date: _____

Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes:
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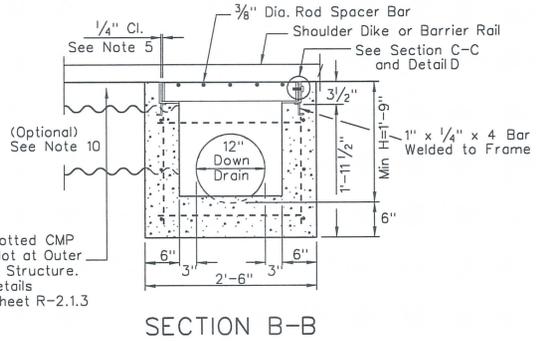
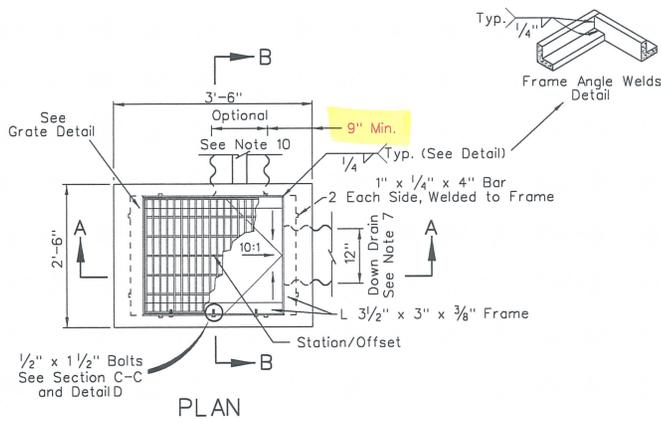
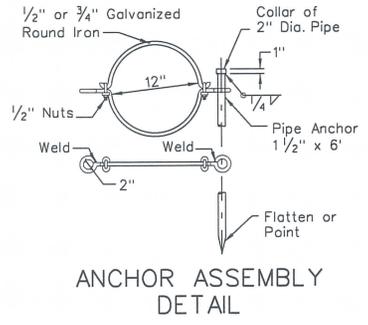
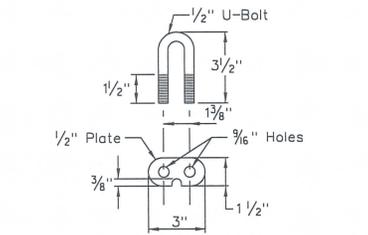
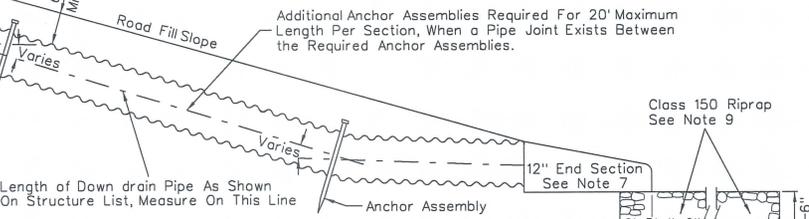
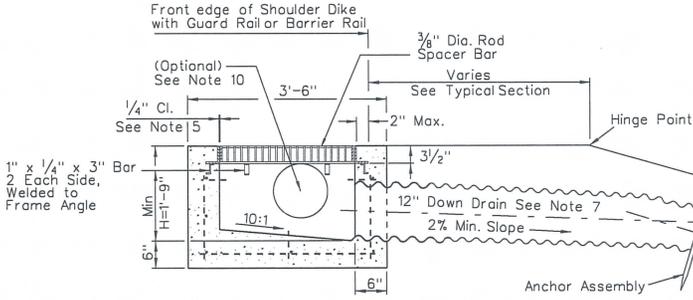
R-37



- NOTES:**
1. All concrete shall be class A or AA.
 2. Reinforcing bars shall be No. 4 bars with maximum spacing at 18" centers. Bars to be embedded a minimum of 2" and bar ends must clear surface by 1/2".
 3. All exposed concrete edges shall be chamfered 1".
 4. Grate and frame angle to be welded at all contact points.
 5. 1/4" maximum clearance between grate and frame on each side.
 6. Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction shape flowline(s) to outlet pipe, and provide a 10:1 slope to flowline(s).
 7. 12" down drain pipe shown, can be upsized to 15" or 18" with 3" or 6" increase in the basin depth respectively. Down drain pipe to be CMP or HDPE or as specified.
 8. If optional drain is installed, adjust rebar to accommodate drain.
 9. Riprap can be increased to class 300 with a 6" increase in riprap thickness.
 10. Additional pipe/drain penetrations for slotted drain, trench drain, or pipes may be placed in any wall.

QUANTITIES		
CONCRETE	REINFORCING STEEL	STRUCTURAL STEEL GRATE
0.46 CU. YD.	30 LBS.	245 LBS.

For Information Only
Structural Steel Grate Includes Frame, Welded Angle, Grate and Spacer Bars

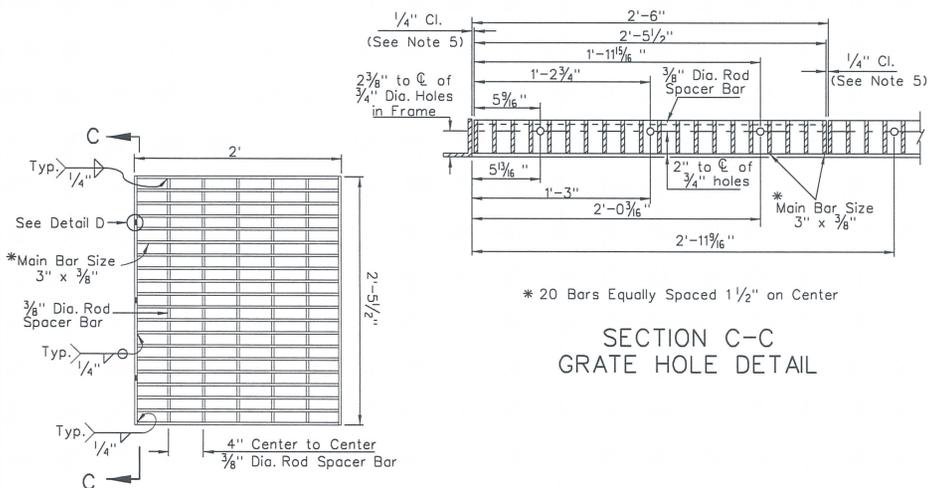


STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

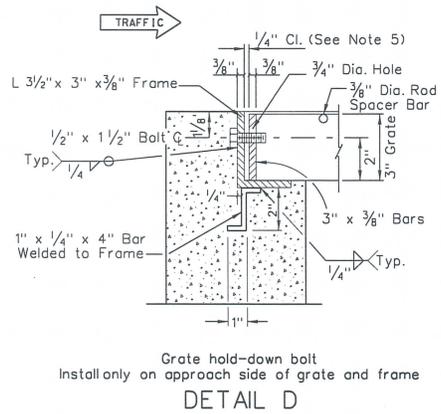
**EMBANKMENT PROTECTOR
TYPE 5**

R-3.1.2	(608)	Signed Original On File
ADOPTED 5/79	REVISED 5/09	CHIEF HYDRAULICS ENGR.

R-38



SECTION C-C
GRATE HOLE DETAIL



DETAIL D
Grate hold-down bolt
Install only on approach side of grate and frame

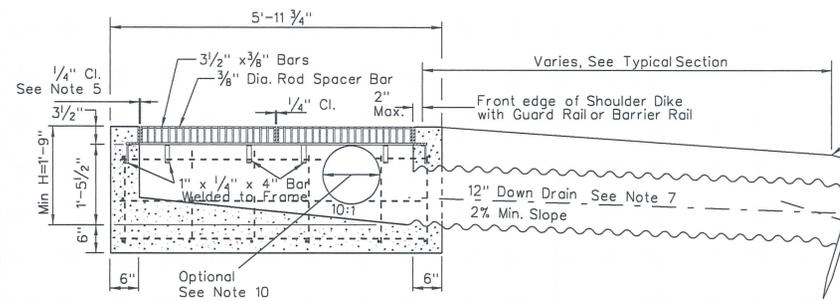
GRATE DETAIL

QUANTITIES		
CONCRETE	REINFORCING STEEL	STRUCTURAL STEEL GRATE
0.78 CU. YD.	52 LBS.	456 LBS.

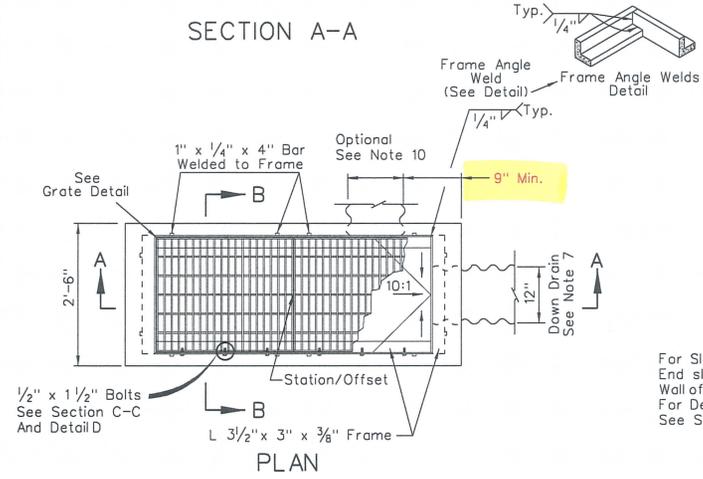
For Information Only
Structural Steel Grate Includes Frame, Welded Angle, Grate and Spacer Bars.

NOTES:

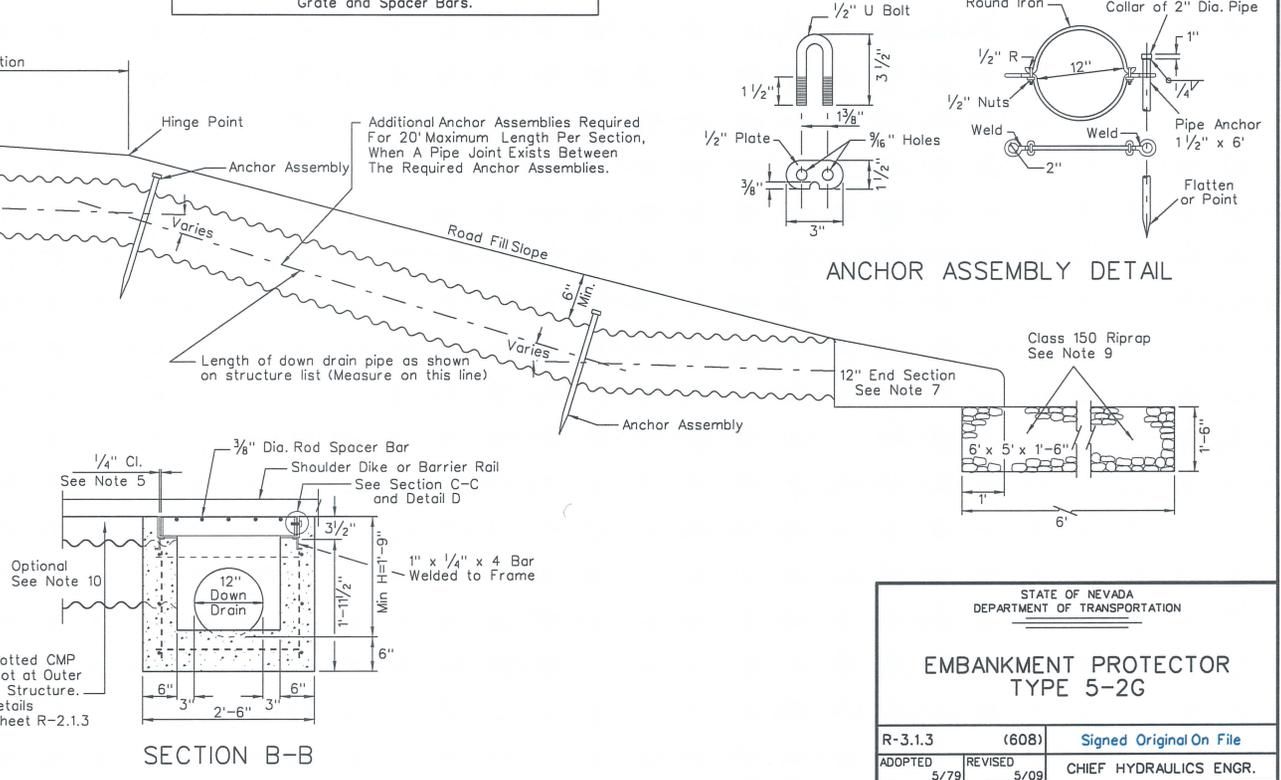
- All concrete shall be class A or AA.
- Reinforcing bars shall be No. 4 bars with maximum spacing at 18" centers. Bars to be embedded a minimum of 2" and bar ends must clear surface by 1/2".
- All exposed concrete edges shall be chamfered 1".
- Grate and frame angle to be welded at all contact points.
- 1/4" maximum clearance between grate and frame on each side.
- Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction shape flowline(s) to outlet pipe, and provide a 10:1 slope to flowline(s).
- 12" down drain pipe shown, can be upsized to 15" or 18" with 3" or 6" increase in the basin depth respectively. Down drain pipe to be CMP or HDPE or as specified.
- If optional drain is installed, adjust rebar to accommodate drain.
- Riprap can be increased to class 300 with a 6" increase in riprap thickness.
- Additional pipe/drain penetrations for slotted drain, trench drain, or pipes may be placed in any wall.



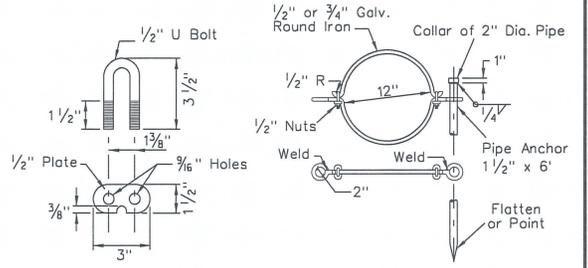
SECTION A-A



PLAN



SECTION B-B



ANCHOR ASSEMBLY DETAIL

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

**EMBANKMENT PROTECTOR
TYPE 5-2G**

R-3.1.3	(608)	Signed Original On File
ADOPTED 5/79	REVISED 5/09	CHIEF HYDRAULICS ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-3.1.2, R-3.1.3

Page No.: R-37 to R-38

Note: A separate form is required for each change.

Description of requested modification or correction: Show a symbol representing a Geotextile underneath the riprap and provide a label.

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..... (Please attach supporting information).

Reason for request: To be consistent with the way riprap is currently installed, shows a Geotextile underneath the riprap.

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Requestor Information: Name: Brian Matthews of Hydraulics

Phone: Ext. 7621

For Standards/Manuals Personnel Only: Approved Denied

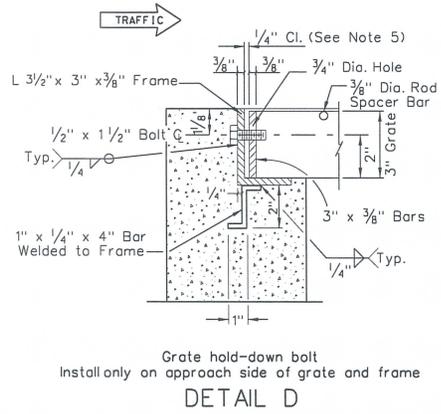
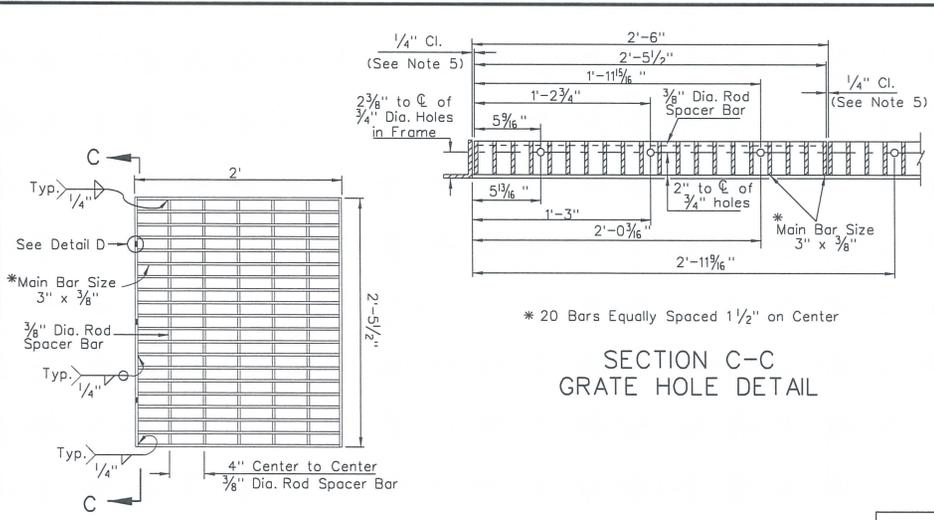
Revised by: Signature: _____ Date: _____

Policy Review:

CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

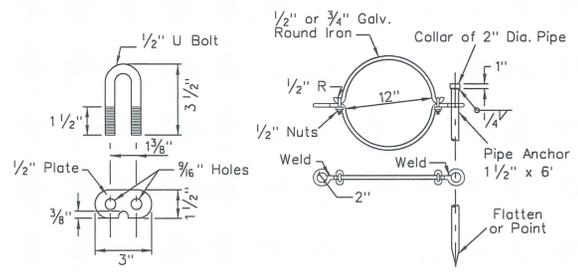
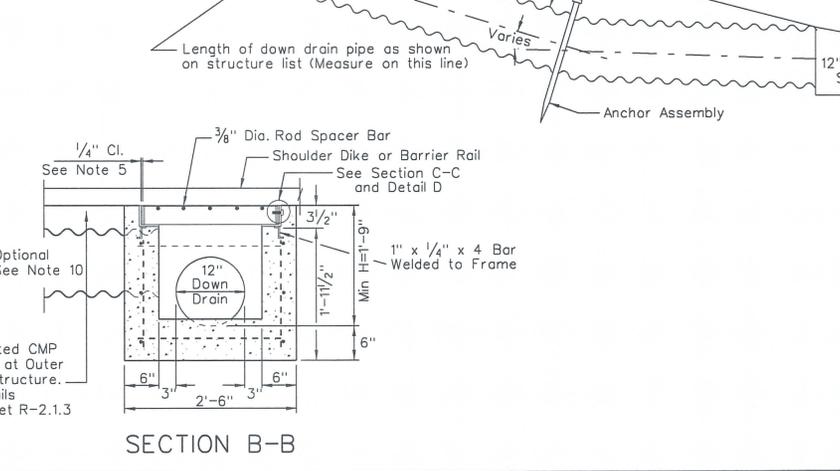
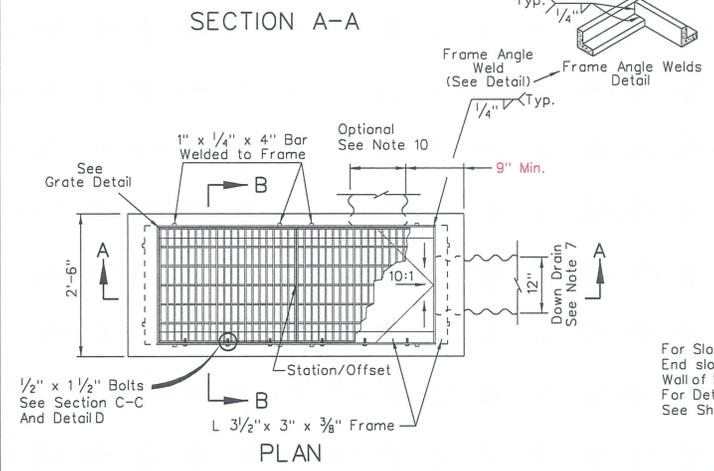
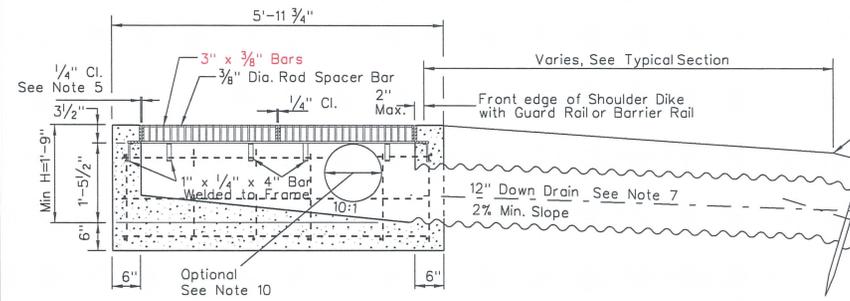
Notes:
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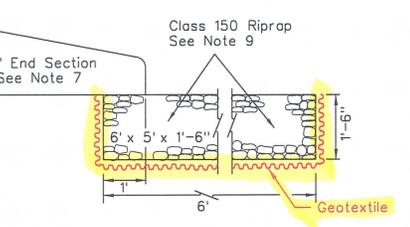
NOTES:

1. All concrete shall be class A or AA.
2. Reinforcing bars shall be No. 4 bars with maximum spacing at 18" centers. Bars to be embedded a minimum of 2" and bar ends must clear surface by 1/2".
3. All exposed concrete edges shall be chamfered 1".
4. Grate and frame angle to be welded at all contact points.
5. 1/4" maximum clearance between grate and frame on each side.
6. Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction shape flowline(s) to outlet pipe, and provide a 10:1 slope to flowline(s).
7. 12" down drain pipe shown, can be upsized to 15" or 18" with 3" or 6" increase in the basin depth respectively. Down drain pipe to be CMP or HDPE or as specified.
8. If optional drain is installed, adjust rebar to accommodate drain.
9. Riprap can be increased to class 300 with a 6" increase in riprap thickness.
10. Additional pipe/drain penetrations for slotted drain, trench drain, or pipes may be placed in any wall.

QUANTITIES		
CONCRETE	REINFORCING STEEL	STRUCTURAL STEEL GRATE
0.78 CU. YD.	52 LBS.	456 LBS.
For Information Only Structural Steel Grate Includes Frame, Welded Angle, Grate and Spacer Bars.		



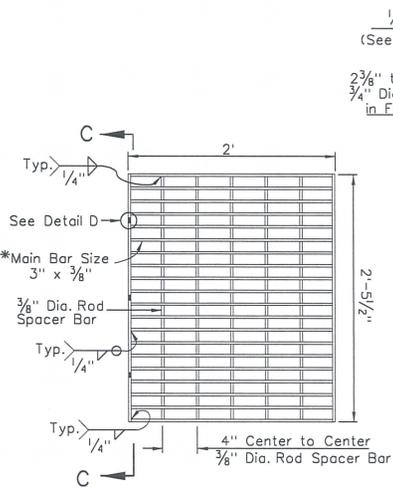
ANCHOR ASSEMBLY DETAIL



STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

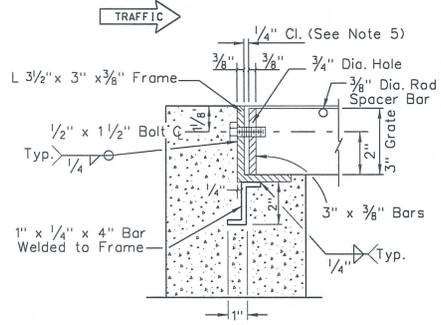
**EMBANKMENT PROTECTOR
TYPE 5-2G**

R-3.1.3	(608)	Signed Original On File
ADOPTED	REVISED	CHIEF HYDRAULICS ENGR.
5/79	5/09	



* 20 Bars Equally Spaced 1 1/2" on Center

SECTION C-C
GRATE HOLE DETAIL



Grate hold-down bolt
Install only on approach side of grate and frame
DETAIL D

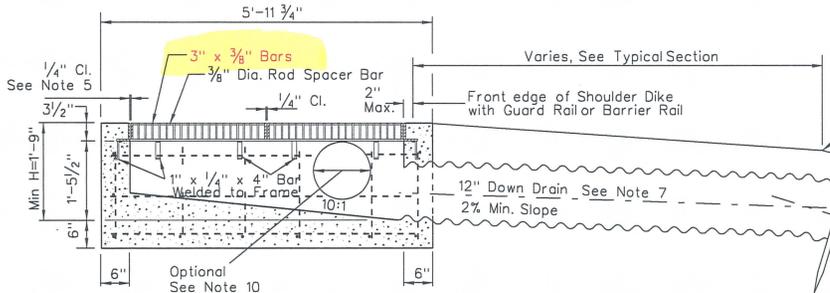
QUANTITIES		
CONCRETE	REINFORCING STEEL	STRUCTURAL STEEL GRATE
0.78 CU. YD.	52 LBS.	456 LBS.

For Information Only
Structural Steel Grate Includes Frame, Welded Angle, Grate and Spacer Bars.

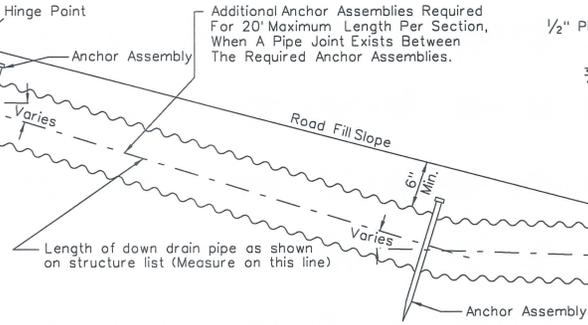
NOTES:

- All concrete shall be class A or AA.
- Reinforcing bars shall be No. 4 bars with maximum spacing at 18" centers. Bars to be embedded a minimum of 2" and bar ends must clear surface by 1/2".
- All exposed concrete edges shall be chamfered 1".
- Grate and frame angle to be welded at all contact points.
- 1/4" maximum clearance between grate and frame on each side.
- Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction shape flowline(s) to outlet pipe, and provide a 10:1 slope to flowline(s).
- 12" down drain pipe shown, can be upsized to 15" or 18" with 3" or 6" increase in the basin depth respectively. Down drain pipe to be CMP or HDPE or as specified.
- If optional drain is installed, adjust rebar to accommodate drain.
- Riprap can be increased to class 300 with a 6" increase in riprap thickness.
- Additional pipe/drain penetrations for slotted drain, trench drain, or pipes may be placed in any wall.

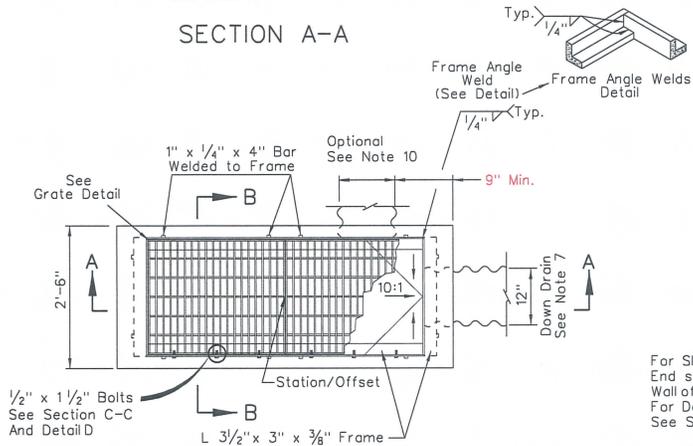
GRATE DETAIL



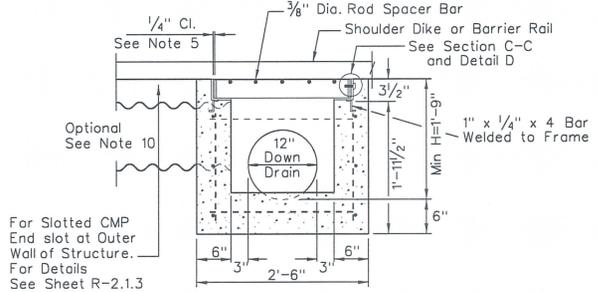
SECTION A-A



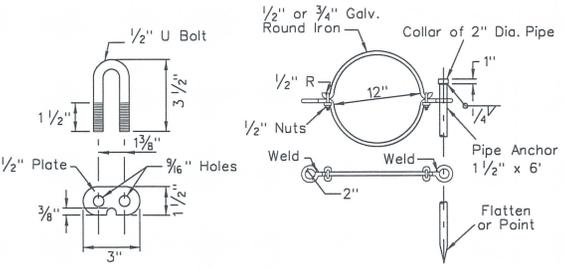
ANCHOR ASSEMBLY DETAIL



PLAN



SECTION B-B

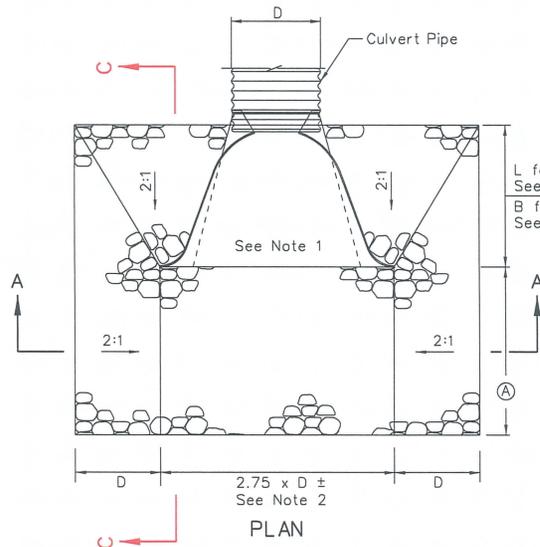


STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

**EMBANKMENT PROTECTOR
TYPE 5-2G**

R-3.1.3	(608)	Signed Original On File
ADOPTED 5/79	REVISED 5/09	CHIEF HYDRAULICS ENGR.

For Slotted CMP
End slot at Outer
Wall of Structure.
For Details
See Sheet R-2.1.3

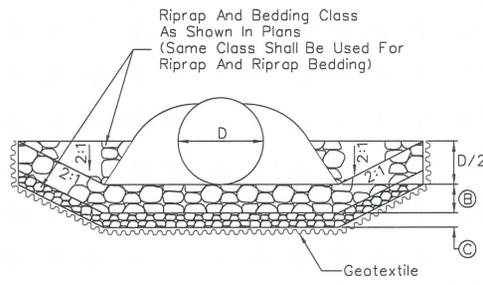


L for Metal End Section
See Sheet R-2.2.1, R-2.2.2 or R-2.2.3
B for Precast End Section
See Sheet R-2.3.1

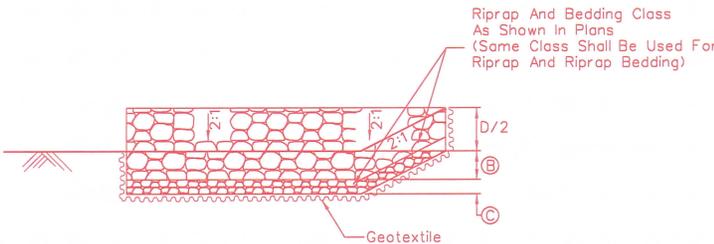
CULVERT SIZE	(A)
12" to 36" PIPE	*3D
42" to 84" PIPE	*4D
RCB	*4H

*OR AS SPECIFIED

RIPRAP AND BEDDING CLASS	(B) in.	(C) in.
150	12	8
300	24	8
400	36	10
550	48	12
700	60	12
900	72	24



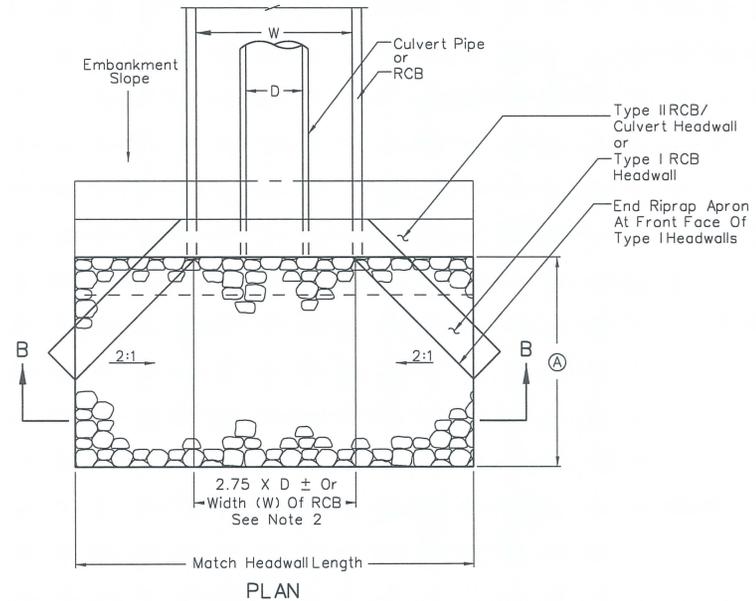
SECTION A-A
RIPRAP APRON
FOR END SECTIONS



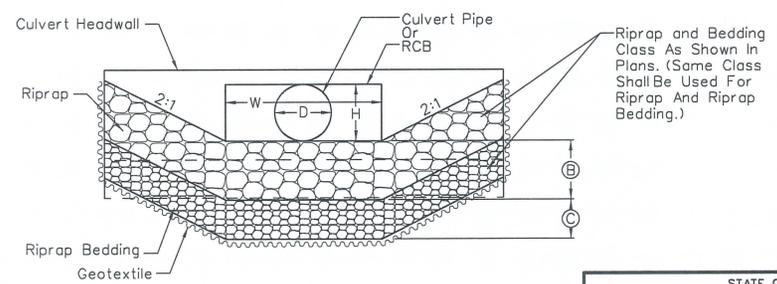
SECTION C-C
RIPRAP APRON
FOR END SECTIONS

NOTES:

1. When no end section is used, additional riprap shall be as required by the hydraulic engineer.
2. For multiple pipe or RCB installations, this dimension shall be adjusted according to the pipe separation information on sheet R-2.1.1 or in the headwall details.
3. Transition end of riprap apron to down stream channel. Apron may be skewed and dimensions adjusted to match and line up with down stream channel.



PLAN

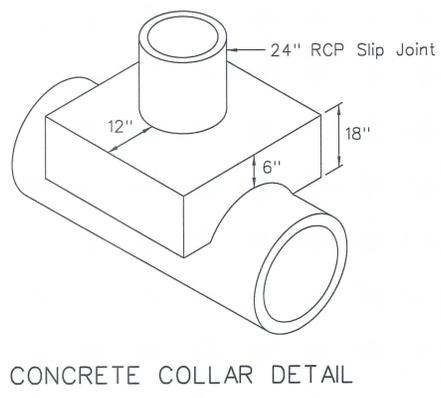
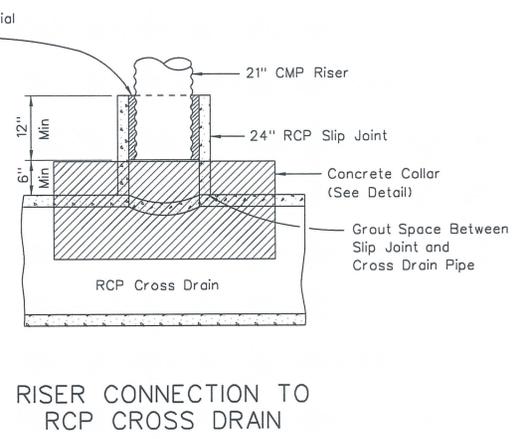
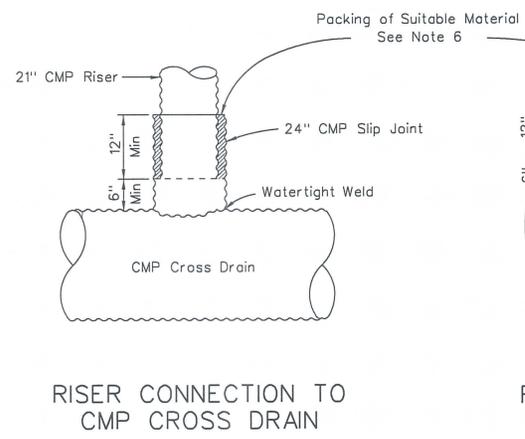
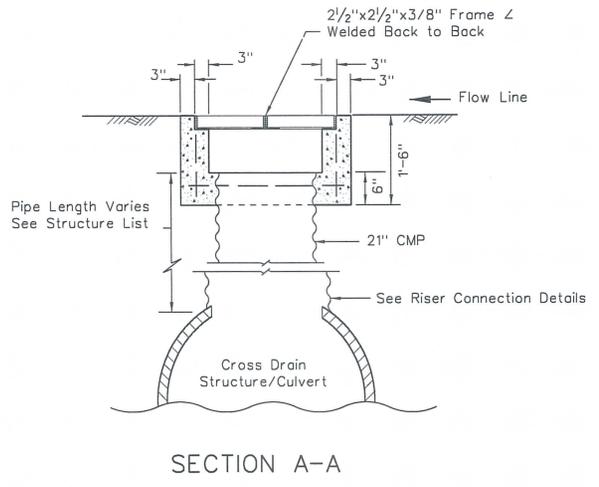
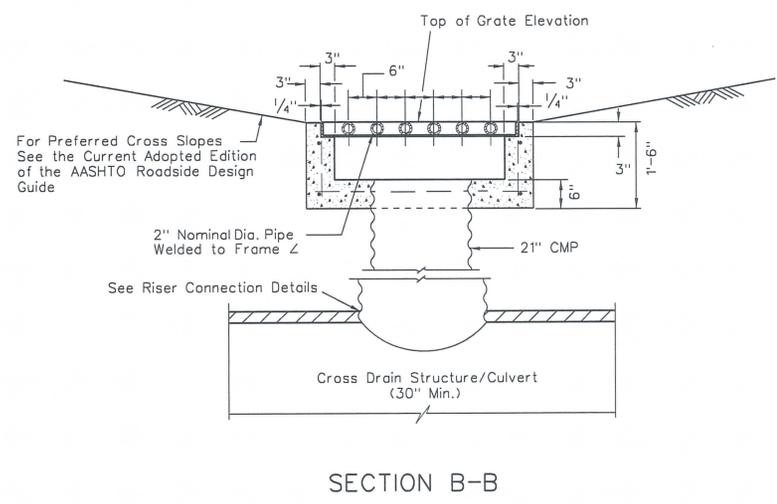
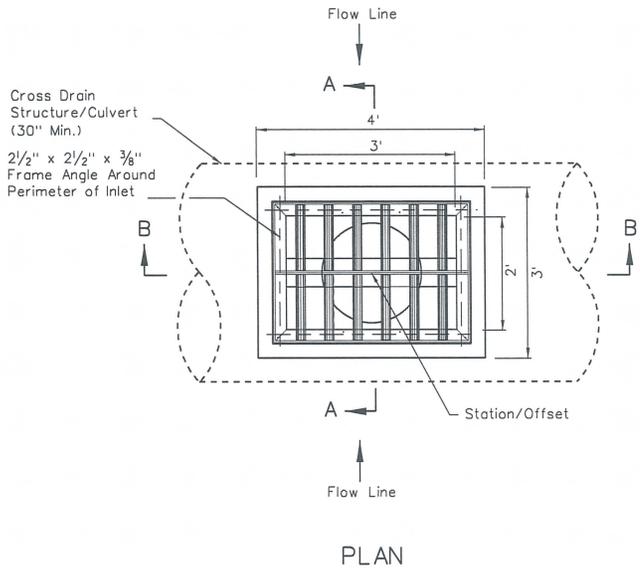


SECTION B-B
RIPRAP APRON
FOR HEADWALLS

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

**RIPRAP APRON FOR
CULVERT HEADWALLS,
TYPE 1 AND 2 RCB HEADWALLS,
AND END SECTIONS**

R-3.1.5	(610)	Signed Original On File
ADOPTED	REVISED	CHIEF HYDRAULICS ENGR.
	5/09	



NOTES:

1. All concrete shall be class A or AA.
2. Reinforcing bars shall be No. 4 bars with maximum spacing at 18" centers. Bars to be embedded a minimum of 2" and bar ends must clear concrete surfaces by 1/2".
3. All exposed concrete edges shall be chamfered 1".
4. Structural steel weight includes 2" pipe and the 2 1/2" x 2 1/2" x 3/8" frame angles.
5. Station/offset distance listed in plans is measured to the center of grate.
6. Pack with oakum or asphalt soaked burlap. Oakum is stranded hemp used in sealing pipe joints. Asphalt soaked burlap shall conform to ASTM D1327, using asphalt conforming to ASTM D449, Type II.
7. Concrete collar can be poured square or round.

QUANTITIES, FOR INFORMATION ONLY

CONCRETE	REINF. STEEL	STRUCT. STEEL
0.36 Cu. Yd.	23 lbs.	170 lbs.

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

PIPE RISER INLET
TYPE 3

R-4.1.1	(609)	Signed Original On File
ADOPTED 8/69	REVISED 5/09	CHIEF HYDRAULICS ENGR.

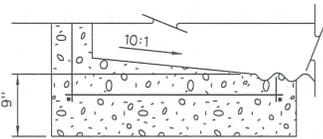
BILL OF MATERIALS (RCP HDPE CMP)

PIPE SIZE (INCH)	SINGLE (ONE GRATE)					DOUBLE (TWO GRATES)					TRIPLE (THREE GRATES)				
	* CONCRETE (CY)		* REINF. (LB.)			* CONCRETE (CY)		* REINF. (LB.)			* CONCRETE (CY)		* REINF. (LB.)		
	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (LB/FT)	STR STEEL (LB)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (LB/FT)	STR STEEL (LB)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (LB/FT)	STR STEEL (LB)
≤15	0.71	0.19	36	10	211	1.06	0.26	50	13	397	1.41	0.33	70	17	583
18	0.89	0.20	40	10	306	1.31	0.28	56	13	574	1.72	0.35	77	18	842
24	1.08	0.22	58	12	349	1.56	0.30	80	15	652	2.04	0.37	105	20	956
30	1.28	0.24	63	12	390	1.83	0.31	86	16	729	2.38	0.39	113	20	1068
36	1.50	0.26	67	13	524	2.11	0.33	92	16	980	2.72	0.41	120	21	1435
42	1.71	0.28	90	15	575	2.39	0.35	120	18	1073	3.07	0.43	154	22	1571
48	1.94	0.30	95	15	707	2.68	0.37	127	18	1329	3.42	0.44	163	23	1951

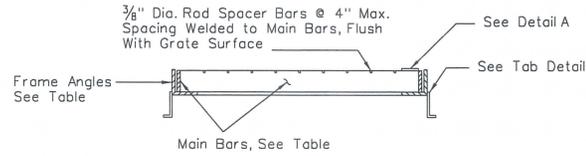
*The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

TABLE OF DIMENSIONS (RCP HDPE CMP)

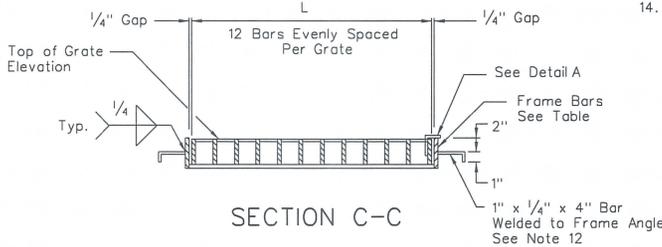
PIPE SIZE (INCH)	A	H Min. (FT)	MAIN BARS (INCH)	FRAME ANGLES (INCH)	FRAME BARS (INCH)	L (FT)
≤ 15	2'	2.50	3 1/2 X 3/8	4 X 3 X 3/8	4 X 3/8	VARIES FROM 2' to 6' @ 6" INTERVALS
18	2' 6"	3.00	4 1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	
24	3'	3.50	4 1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	
30	3' 6"	4.00	4 1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	
36	4'	4.50	5 1/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	
42	4' 6"	5.00	5 1/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	
48	5'	5.50	5 1/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	



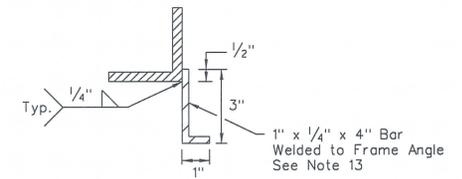
SECTION B-B



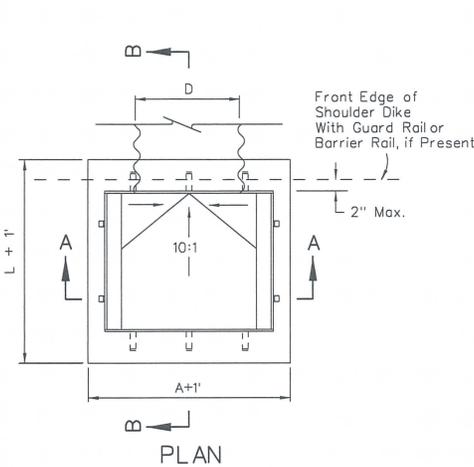
SECTION D-D



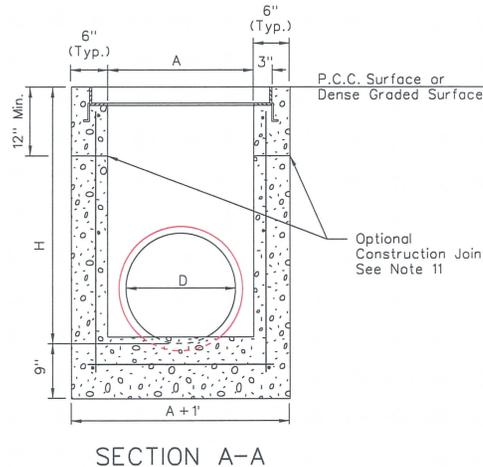
SECTION C-C



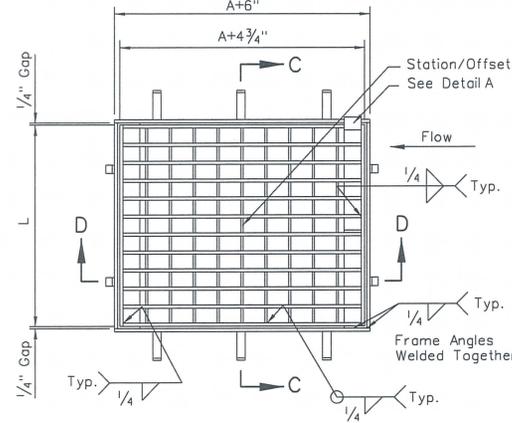
TAB DETAIL



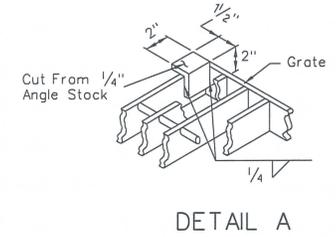
PLAN



SECTION A-A



GRATE AND FRAME



DETAIL A

NOTES:

- All concrete shall be class A or AA.
- Reinforcing steel shall be No.4 bars with maximum spacing at 18" centers, wired tightly at all intersections and embedded 2" clear of all concrete surfaces.
- Exposed edges of concrete shall be chamfered 1".
- Dimensions may be varied to fit local conditions if ordered by the engineer.
- Commercial prefabricated gratings approved by the bridge division may be used in lieu of the field-welded grating shown.
- Extreme low cover situations to be reviewed by hydraulics engineer.
- Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction, shape flow line(s) to outlet pipe and provide a 10:1 slope to flow line(s).
- See sheet R-2.9.1 for details if connecting HDPE pipe.
- A single Type 2 drop inlet shall be constructed unless a double or triple is specified.
- Single grate configuration shown for clarity. Outside dimensions of each grate shall measure 2' by A+4 3/4".
- Run rebar continuous thru construction joint. Joint must be a minimum of 3" from horizontal bars.
- Weld one tab on C of grate and remaining two tabs 6" from edge of frame. Six tabs per inlet, three tabs on each side.
- Weld tabs 6" from edge of frame. Four tabs per grate, two on each side.
- Additional pipe penetrations may be placed in any wall.

R-42

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

**DROP INLET
TYPE 2**

R-4.2.1	(609)	Signed Original On File
ADOPTED 11/70	REVISED 5/09	CHIEF HYDRAULICS ENGR.

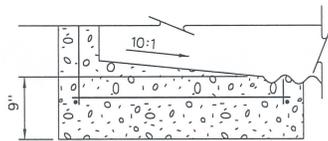
BILL OF MATERIALS (RCP HDPE CMP)

PIPE SIZE (INCH)	SINGLE (ONE GRATE)					DOUBLE (TWO GRATES)					TRIPLE (THREE GRATES)				
	* CONCRETE (CY)		* REINF. (LB.)			* CONCRETE (CY)		* REINF. (LB.)			* CONCRETE (CY)		* REINF. (LB.)		
	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)
≤15	0.71	0.19	36	10	211	1.06	0.26	50	13	397	1.41	0.33	70	17	583
18	0.89	0.20	40	10	306	1.31	0.28	56	13	574	1.72	0.35	77	18	842
24	1.08	0.22	58	12	349	1.56	0.30	80	15	652	2.04	0.37	105	20	956
30	1.28	0.24	63	12	390	1.83	0.31	86	16	729	2.38	0.39	113	20	1068
36	1.50	0.26	67	13	524	2.11	0.33	92	16	980	2.72	0.41	120	21	1435
42	1.71	0.28	90	15	575	2.39	0.35	120	18	1073	3.07	0.43	154	22	1571
48	1.94	0.30	95	15	707	2.68	0.37	127	18	1329	3.42	0.44	163	23	1951

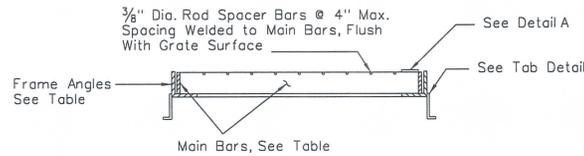
*The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

TABLE OF DIMENSIONS (RCP HDPE CMP)

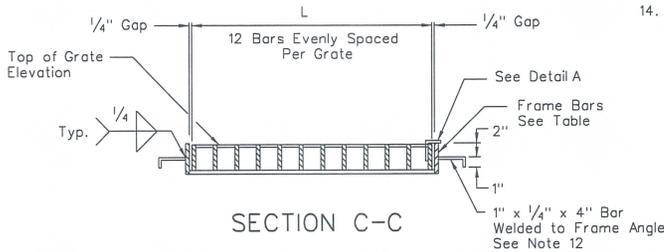
PIPE SIZE (INCH)	A	H Min. (FT)	MAIN BARS (INCH)	FRAME ANGLES (INCH)	FRAME BARS (INCH)	L (FT)		
						SINGLE GRATE	DOUBLE GRATE	TRIPLE GRATE
≤15	2'	2.50	3 1/2 X 3/8	4 X 3 X 3/8	4 X 3/8	2	4	6
18	2' 6"	3.00	4 1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6
24	3'	3.50	4 1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6
30	3' 6"	4.00	4 1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6
36	4'	4.50	5 1/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2	4	6
42	4' 6"	5.00	5 1/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2	4	6
48	5'	5.50	5 1/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2	4	6



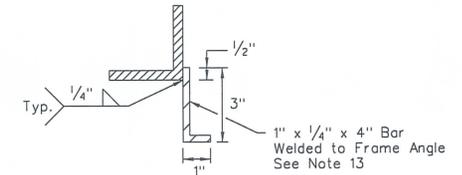
SECTION B-B



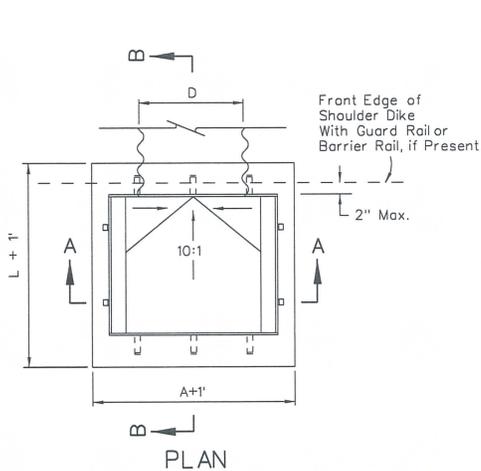
SECTION D-D



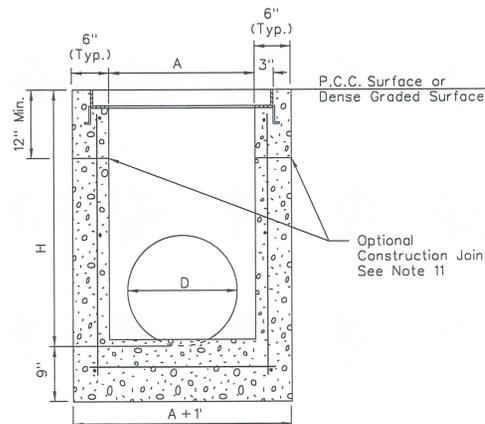
SECTION C-C



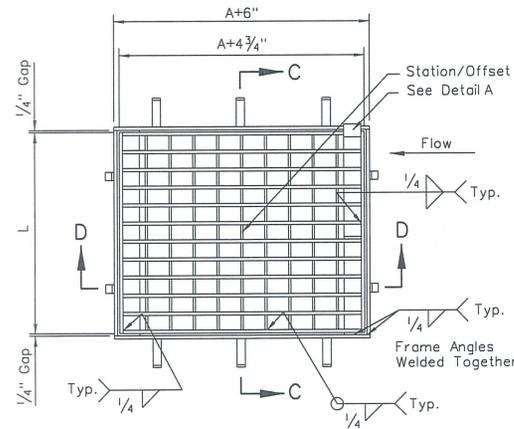
TAB DETAIL



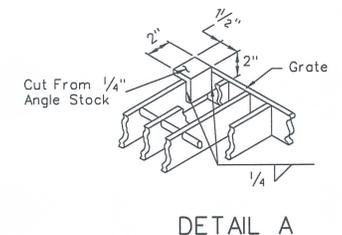
PLAN



SECTION A-A



GRATE AND FRAME



DETAIL A

NOTES:

- All concrete shall be class A or AA.
- Reinforcing steel shall be No.4 bars with maximum spacing at 18" centers, wired tightly at all intersections and embedded 2" clear of all concrete surfaces.
- Exposed edges of concrete shall be chamfered 1".
- Dimensions may be varied to fit local conditions if ordered by the engineer.
- Commercial prefabricated gratings approved by the bridge division may be used in lieu of the field-welded grating shown.
- Extreme low cover situations to be reviewed by hydraulics engineer.
- Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction, shape flow line(s) to outlet pipe and provide a 10:1 slope to flow line(s).
- See sheet R-2.9.1 for details if connecting HDPE pipe.
- A single Type 2 drop inlet shall be constructed unless a double or triple is specified.
- Single grate configuration shown for clarity. Outside dimensions of each grate shall measure 2' by A+4 3/4".
- Run rebar continuous thru construction joint. Joint must be a minimum of 3" from horizontal bars.
- Weld one tab on C of grate and remaining two tabs 6" from edge of frame. Six tabs per inlet, three tabs on each side.
- Weld tabs 6" from edge of frame. Four tabs per grate, two on each side.
- Additional pipe penetrations may be placed in any wall.

R-42

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
DROP INLET TYPE 2		
R-4.2.1	(609)	Signed Original On File
ADOPTED 11/70	REVISED 5/09	CHIEF HYDRAULICS ENGR.

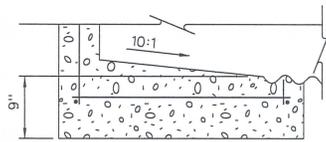
BILL OF MATERIALS (RCP HDPE CMP)

PIPE SIZE (INCH)	SINGLE (ONE GRATE)					DOUBLE (TWO GRATES)					TRIPLE (THREE GRATES)				
	* CONCRETE (CY)		* REINF. (LB.)			* CONCRETE (CY)		* REINF. (LB.)			* CONCRETE (CY)		* REINF. (LB.)		
	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)
≤15	0.71	0.19	36	10	211	1.06	0.26	50	13	397	1.41	0.33	70	17	583
18	0.89	0.20	40	10	306	1.31	0.28	56	13	574	1.72	0.35	77	18	842
24	1.08	0.22	58	12	349	1.56	0.30	80	15	652	2.04	0.37	105	20	956
30	1.28	0.24	63	12	390	1.83	0.31	86	16	729	2.38	0.39	113	20	1068
36	1.50	0.26	67	13	524	2.11	0.33	92	16	980	2.72	0.41	120	21	1435
42	1.71	0.28	90	15	575	2.39	0.35	120	18	1073	3.07	0.43	154	22	1571
48	1.94	0.30	95	15	707	2.68	0.37	127	18	1329	3.42	0.44	163	23	1951

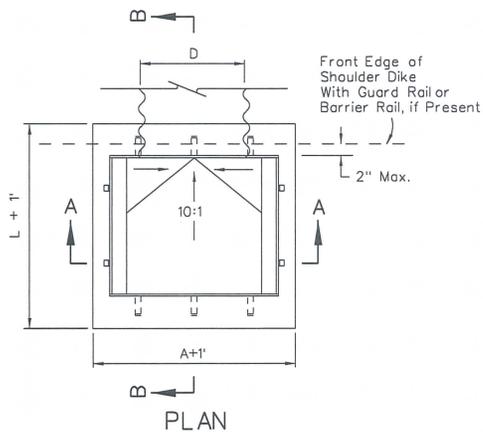
*The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

TABLE OF DIMENSIONS (RCP HDPE CMP)

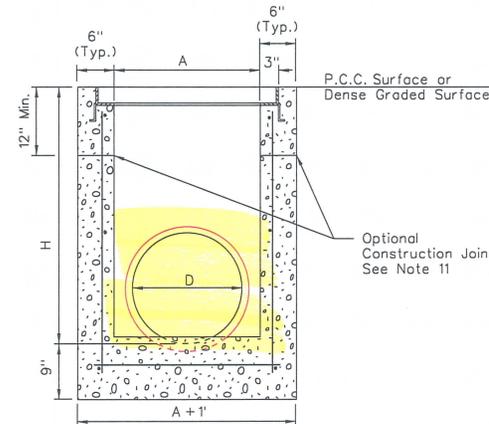
PIPE SIZE (INCH)	A	H Min. (FT)	MAIN BARS (INCH)	FRAME ANGLES (INCH)	FRAME BARS (INCH)	L (FT)		
						SINGLE GRATE	DOUBLE GRATE	TRIPLE GRATE
						≤15	2'	2.50
18	2' 6"	3.00	4 1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6
24	3'	3.50	4 1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6
30	3' 6"	4.00	4 1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6
36	4'	4.50	5 1/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2	4	6
42	4' 6"	5.00	5 1/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2	4	6
48	5'	5.50	5 1/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2	4	6



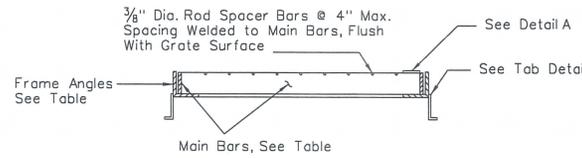
SECTION B-B



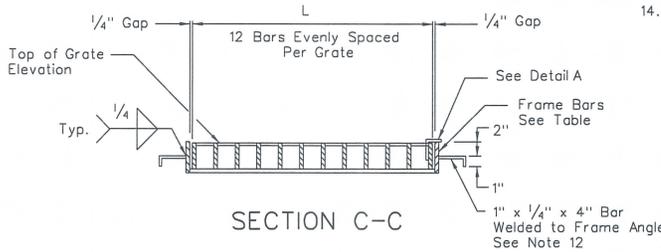
PLAN



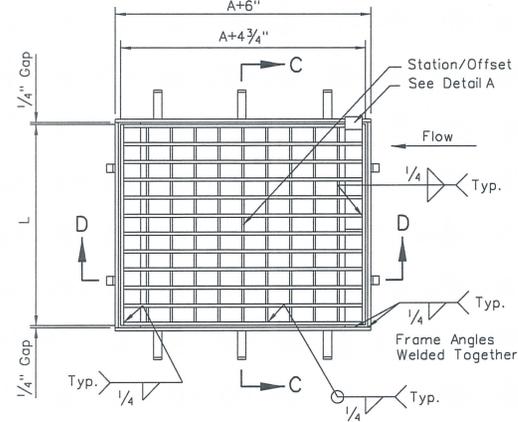
SECTION A-A



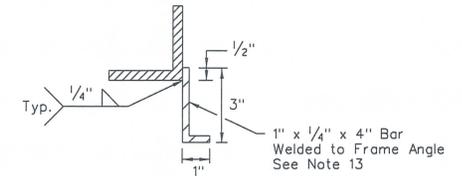
SECTION D-D



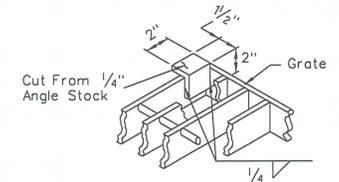
SECTION C-C



GRATE AND FRAME



TAB DETAIL



DETAIL A

NOTES:

- All concrete shall be class A or AA.
- Reinforcing steel shall be No. 4 bars with maximum spacing at 18" centers, wired tightly at all intersections and embedded 2" clear of all concrete surfaces.
- Exposed edges of concrete shall be chamfered 1".
- Dimensions may be varied to fit local conditions if ordered by the engineer.
- Commercial prefabricated gratings approved by the bridge division may be used in lieu of the field-welded grating shown.
- Extreme low cover situations to be reviewed by hydraulics engineer.
- Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction, shape flow line(s) to outlet pipe and provide a 10:1 slope to flow line(s).
- See sheet R-2.9.1 for details if connecting HDPE pipe.
- A single Type 2 drop inlet shall be constructed unless a double or triple is specified.
- Single grate configuration shown for clarity. Outside dimensions of each grate shall measure 2' by A+4 3/4".
- Run rebar continuous thru construction joint. Joint must be a minimum of 3" from horizontal bars.
- Weld one tab on C of grate and remaining two tabs 6" from edge of frame. Six tabs per inlet, three tabs on each side.
- Weld tabs 6" from edge of frame. Four tabs per grate, two on each side.
- Additional pipe penetrations may be placed in any wall.

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
DROP INLET TYPE 2		
R-4.2.1	(609)	Signed Original On File
ADOPTED	REVISED	CHIEF HYDRAULICS ENGR.
11/70	5/09	

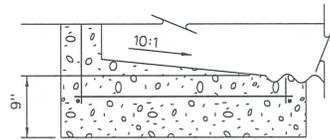
BILL OF MATERIALS (RCP HDPE CMP)

PIPE SIZE (INCH)	SINGLE (ONE GRATE)					DOUBLE (TWO GRATES)					TRIPLE (THREE GRATES)				
	* CONCRETE (CY)		* REINF. (LB.)		STR STEEL (LB)	* CONCRETE (CY)		* REINF. (LB.)		STR STEEL (LB)	* CONCRETE (CY)		* REINF. (LB.)		STR STEEL (LB)
	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (LB/FT)		BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (LB/FT)		BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (LB/FT)	
≤15	0.71	0.19	36	10	211	1.06	0.26	50	13	397	1.41	0.33	70	17	583
18	0.89	0.20	40	10	306	1.31	0.28	56	13	574	1.72	0.35	77	18	842
24	1.08	0.22	58	12	349	1.56	0.30	80	15	652	2.04	0.37	105	20	956
30	1.28	0.24	63	12	390	1.83	0.31	86	16	729	2.38	0.39	113	20	1068
36	1.50	0.26	67	13	524	2.11	0.33	92	16	980	2.72	0.41	120	21	1435
42	1.71	0.28	90	15	575	2.39	0.35	120	18	1073	3.07	0.43	154	22	1571
48	1.94	0.30	95	15	707	2.68	0.37	127	18	1329	3.42	0.44	163	23	1951

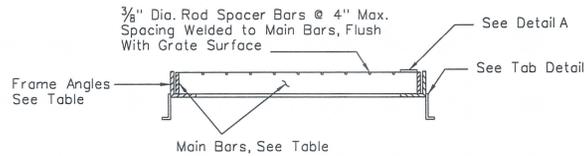
*The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

TABLE OF DIMENSIONS (RCP HDPE CMP)

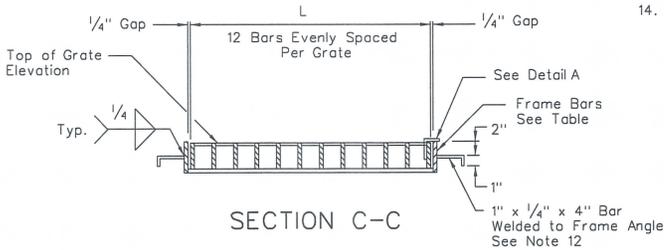
PIPE SIZE (INCH)	A	H Min. (FT)	MAIN BARS (INCH)	FRAME ANGLES (INCH)	FRAME BARS (INCH)	L (FT)		
						SINGLE GRATE	DOUBLE GRATE	TRIPLE GRATE
≤15	2'	2.50	3/2 X 3/8	4 X 3 X 3/8	4 X 3/8	2	4	6
18	2' 6"	3.00	4/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6
24	3'	3.50	4/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6
30	3' 6"	4.00	4/2 X 3/8	5 X 3 X 3/8	5 X 3/8	2	4	6
36	4'	4.50	5/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2	4	6
42	4' 6"	5.00	5/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2	4	6
48	5'	5.50	5/2 X 3/8	6 X 3 1/2 X 3/8	6 X 3/8	2	4	6



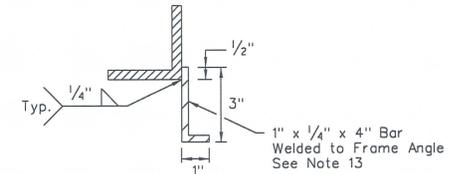
SECTION B-B



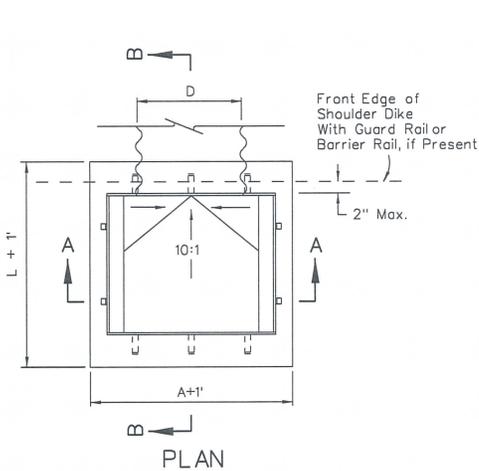
SECTION D-D



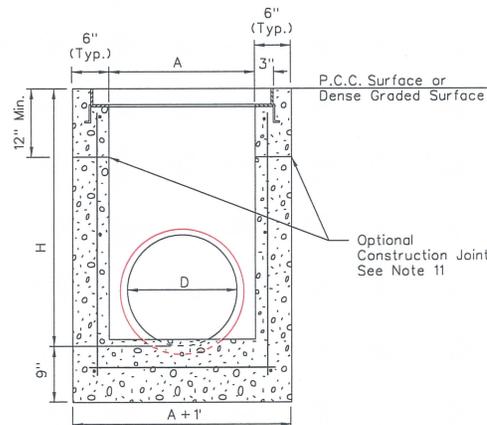
SECTION C-C



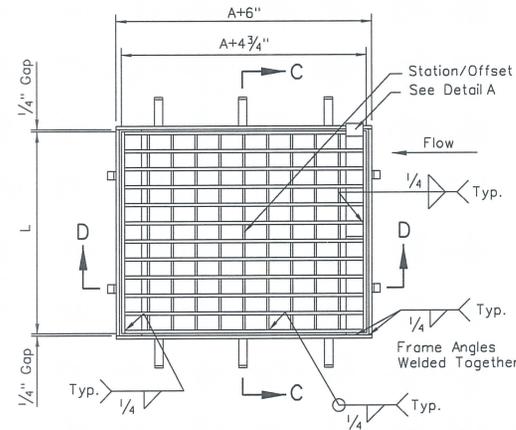
TAB DETAIL



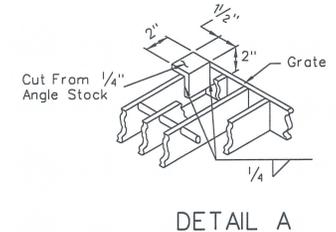
PLAN



SECTION A-A



GRATE AND FRAME



DETAIL A

NOTES:

- All concrete shall be class A or AA.
- Reinforcing steel shall be No. 4 bars with maximum spacing at 18" centers, wired tightly at all intersections and embedded 2" clear of all concrete surfaces.
- Exposed edges of concrete shall be chamfered 1".
- Dimensions may be varied to fit local conditions if ordered by the engineer.
- Commercial prefabricated gratings approved by the bridge division may be used in lieu of the field-welded grating shown.
- Extreme low cover situations to be reviewed by hydraulics engineer.
- Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction, shape flow line(s) to outlet pipe and provide a 10:1 slope to flow line(s).
- See sheet R-2.9.1 for details if connecting HDPE pipe.
- A single Type 2 drop inlet shall be constructed unless a double or triple is specified.
- Single grate configuration shown for clarity. Outside dimensions of each grate shall measure 2' by A+4 3/4".
- Run rebar continuous thru construction joint. Joint must be a minimum of 3" from horizontal bars.
- Weld one tab on C of grate and remaining two tabs 6" from edge of frame. Six tabs per inlet, three tabs on each side.
- Weld tabs 6" from edge of frame. Four tabs per grate, two on each side.
- Additional pipe penetrations may be placed in any wall.

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

**DROP INLET
TYPE 2**

R-4.2.1	(609)	Signed Original On File
ADOPTED 11/70	REVISED 5/09	CHIEF HYDRAULICS ENGR.

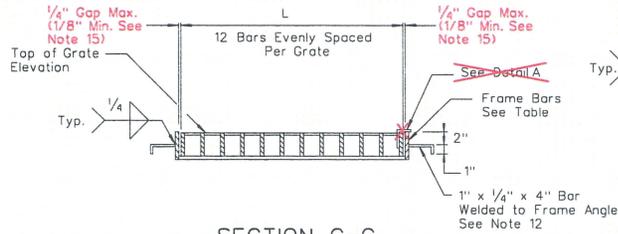
**BILL OF MATERIALS
(RCP HDPE CMP)**

PIPE SIZE (INCH)	SINGLE (ONE GRATE)					DOUBLE (TWO GRATES)					TRIPLE (THREE GRATES)				
	* CONCRETE (CY)		* REINF. (LB.)			* CONCRETE (CY)		* REINF. (LB.)			* CONCRETE (CY)		* REINF. (LB.)		
	BASE QUAN. (H. MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H. MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)	BASE QUAN. (H. MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H. MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)	BASE QUAN. (H. MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H. MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)
≤15	0.71	0.19	36	10	211	1.06	0.26	50	13	397	1.41	0.33	70	17	583
18	0.89	0.20	40	10	306	1.31	0.28	56	13	574	1.72	0.35	77	18	842
24	1.08	0.22	58	12	349	1.56	0.30	80	15	652	2.04	0.37	105	20	956
30	1.28	0.24	63	12	390	1.83	0.31	86	16	729	2.38	0.39	113	20	1068
36	1.50	0.26	67	13	524	2.11	0.33	92	16	980	2.72	0.41	120	21	1435
42	1.71	0.28	90	15	575	2.39	0.35	120	18	1073	3.07	0.43	154	22	1571
48	1.94	0.30	95	15	707	2.68	0.37	127	18	1329	3.42	0.44	163	23	1951

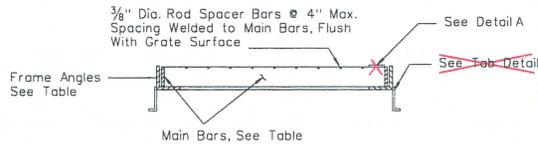
*The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

**TABLE OF DIMENSIONS
(RCP HDPE CMP)**

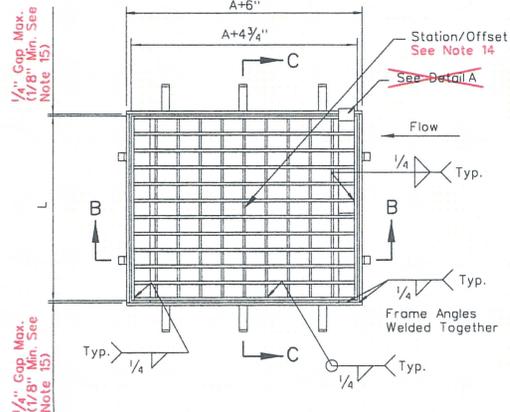
PIPE SIZE (INCH)	A	H Min. (FT)	MAIN BARS (INCH)	FRAME ANGLES (INCH)	FRAME BARS (INCH)	L (FT)		
						SINGLE GRATE	DOUBLE GRATE	TRIPLE GRATE
≤ 15	2'	2.50	3/2 x 3/8	4 x 3 x 3/8	4 x 3/8	2	4	6
18	2' 6"	3.00	4/2 x 3/8	5 x 3 x 3/8	5 x 3/8	2	4	6
24	3'	3.50	4/2 x 3/8	5 x 3 x 3/8	5 x 3/8	2	4	6
30	4'	4.00	4/2 x 3/8	5 x 3 x 3/8	5 x 3/8	2	4	6
36	4'	4.50	5/2 x 3/8	6 x 3/2 x 3/8	6 x 3/8	2	4	6
42	5'	5.00	5/2 x 3/8	6 x 3/2 x 3/8	6 x 3/8	2	4	6
48	5'	5.50	5/2 x 3/8	6 x 3/2 x 3/8	6 x 3/8	2	4	6



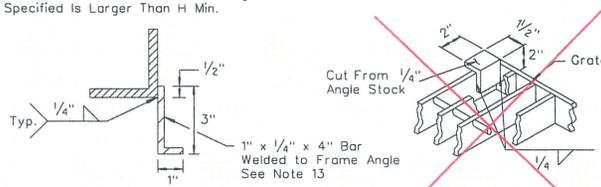
SECTION C-C



SECTION B-B



GRATE AND FRAME

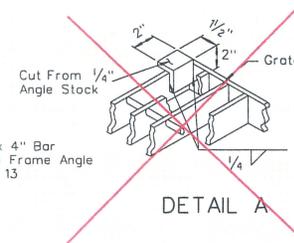


TAB DETAIL
NOTES:

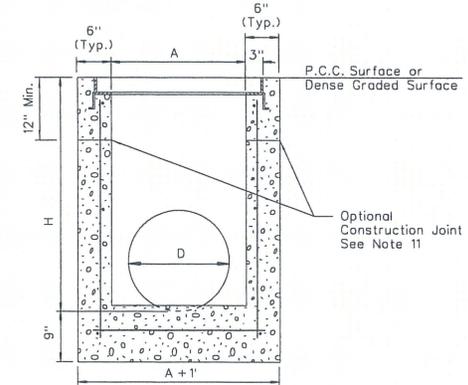
1. ALL CONCRETE SHALL BE CLASS A OR AA.
2. REINFORCING STEEL SHALL BE NO.4 BARS WITH MAXIMUM SPACING AT 18" CENTERS, WIRED TIGHTLY AT ALL INTERSECTIONS AND EMBEDDED 2" CLEAR OF ALL CONCRETE SURFACES.
3. EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1".
4. DIMENSIONS MAY BE VARIED TO FIT LOCAL CONDITIONS IF ORDERED BY THE ENGINEER.
5. COMMERCIAL PREFABRICATED GRATINGS APPROVED BY THE BRIDGE DIVISION MAY BE USED IN LIEU OF THE FIELD-WELDED GRATING SHOWN ABOVE.
6. EXTREME LOW COVER SITUATIONS TO BE REVIEWED BY HYDRAULICS ENGINEER.
7. SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE AND PROVIDE A 10:1 SLOPE TO FLOW LINE(S).
8. SEE SHEET R-2.9.1 FOR DETAILS IF CONNECTING HDPE PIPE.
9. A SINGLE TYPE 2 DROP INLET SHALL BE CONSTRUCTED UNLESS A DOUBLE OR TRIPLE IS SPECIFIED.
10. SINGLE GRATE CONFIGURATION SHOWN FOR CLARITY. OUTSIDE DIMENSIONS OF EACH GRATE SHALL MEASURE 2' BY A+4 3/4".
11. RUN REBAR CONTINUOUS THRU CONSTRUCTION JOINT. JOINT MUST BE A MINIMUM OF 3" FROM HORIZONTAL BARS.
12. WELD ONE TAB ON C OF GRATE AND REMAINING TWO TABS 6" FROM EDGE OF FRAME. SIX TABS PER INLET, THREE TABS ON EACH SIDE.
13. WELD TABS 6" FROM EDGE OF FRAME. FOUR TABS PER GRATE, TWO ON EACH SIDE.
14. FOR MULTIPLE GRATE INSTALLATIONS, THE STATION/OFFSET IS TO THE CENTER OF THE CONCRETE DROP INLET STRUCTURE. PIPE PENETRATIONS ARE TO BE TO THE CENTER OF THE STRUCTURE UNLESS SPECIFIED OTHERWISE.
15. GRATE IS TO FIT IN THE FRAME AND BE EASILY REMOVED. IF THE GAP BETWEEN THE GRATE AND THE FACE IS GREATER THAN 1/4", A FILLER STRIP SHALL BE WELDED IN PLACE USING 1/4" FILLET CONTINUOUSLY, TO OBTAIN A GAP NO LARGER THAN 1/4" MAX.

DESIGN NOTES:

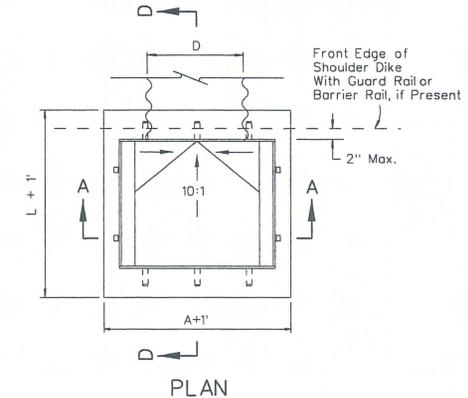
1. ADDITIONAL PIPE PENETRATIONS MAY BE PLACED IN ANY WALL.



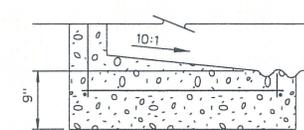
DETAIL A



SECTION A-A



PLAN



SECTION D-D

NEVADA DEPARTMENT OF TRANSPORTATION

**TYPE 2
DROP INLET**

Signed Original On File	R-4.2.1	(609)
CHIEF HYDRAULICS ENGINEER	ADOPTED	REVISION
	2/2/21	2/21

TABLE A

PIPE SIZE		STRUCTURAL STEEL *									
CMP Round	HDPE Round	RCP Round	A & J Value	Max H	MAIN BARS	FRAME ANGLES	FRAME BAR	GRATE LBS.	FRAME LBS.	CHANNEL & PLATES, LBS.	TOTAL LBS.
12" to 18"			2'-6"	21'	4-1/2"X3/8"	5"X3"X3/8"	5"X3/8"	229	88	93	409
24"			3'-0"	21'	4-1/2"X3/8"	5"X3"X3/8"	5"X3/8"	265	96	107	468
30"			3'-6"	16'	4-1/2"X3/8"	5"X3"X3/8"	5"X3/8"	300	104	126	530
36"			4'-0"	9'	5-1/2"X3/8"	6"X3-1/2"X3/8"	6"X3/8"	409	134	143	685
42"			4'-6"	7'	5-1/2"X3/8"	6"X3-1/2"X3/8"	6"X3/8"	451	144	160	755
48"			5'-0"	7'	5-1/2"X7/16"	6"X3-1/2"X3/8"	6"X3/8"	550	160	176	886

The "A" and "J" values represent the minimum side dimension of the drop inlet (see detail R-4.2.3) when a pipe penetrates the "A" or "J" side of that drop inlet. If no pipe penetrates the "A" side, use A=2'6". If no pipe penetrates the "J" side, use J=2'2". If pipes penetrate both of the sides, use the values above for each side of the drop inlet, depending on the size of the penetrating pipe.

When installing an arch or elliptical pipe, using the horizontal dimension (span), choose the equivalent or next larger round diameter dimension as described in the table above.

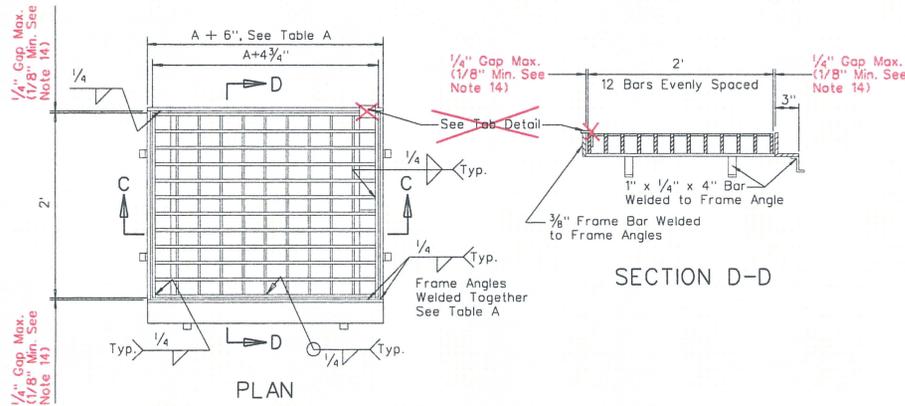
Maximum H is based upon the drop inlet having #4 bars at 12" on center.

* Varies with "A" dimension only.

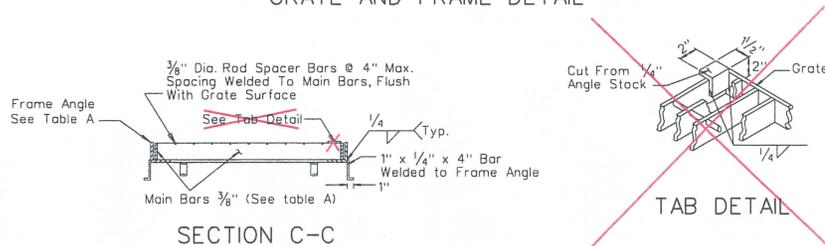
NOTES:

- ALL CONCRETE SHALL BE CLASS A OR AA.
- ALL REINFORCING STEEL SHALL BE TIGHTLY WIRED AND EMBEDDED 1/2" CLEAR OF CONCRETE SURFACE. EXCEPT AS NOTED, ALL REINFORCING SHALL BE NO. 4 BARS WITH MAXIMUM SPACING OF 12" CENTERS, FOR ALL VALUES OF H TO THE MAXIMUM AS SHOWN IN TABLE A. IF H EXCEEDS THESE MAXIMUMS, DROP INLET WILL REQUIRE SPECIAL DESIGN.
- EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1".
- WHERE PIPE INTERSECTS DROP INLET ON A 12° OR LARGER SKEW INCREASE J TO $\frac{J}{\cos \text{SKEW } \angle}$, REDESIGN FOR SKEWS AT A.
- WHERE PIPE INTERSECTS DROP INLET ON A 12° OR LARGER SKEW INCREASE SPAN TO $\frac{\text{SPAN}}{\cos \text{SKEW } \angle}$, REDESIGN FOR SKEWS AT A.
- FOR VALUES OF "H" SEE PLANS.
- "H" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUT FLOW PIPE AND THE NORMAL GUTTER GRADE LINE AT THE CURB FACE MINUS 3".
- PIPE(S) CAN BE PLACED IN ANY WALL.
- FOR DROP INLET, CONFIGURATIONS WITH 2 PIPES-INFLOW PIPE INVERT ELEVATION SHALL BE ≥ 0.1' ABOVE OUTFLOW PIPE INVERT ELEVATION.
- EXTREME LOW COVER SITUATIONS TO BE REVIEWED BY THE HYDRAULICS ENGINEER.
- SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE, AND PROVIDE A 10:1 SLOPE TO FLOW LINE(S).
- STATION/OFFSET DISTANCE LISTED IN PLANS IS MEASURED TO THE FACE OF CURB AT THE GUTTER FLOW LINE.
- SEE SHEET R-2.9.1 FOR DETAILS IF CONNECTING TO HDPE PIPE.
- GRATE IS TO FIT IN THE FRAME AND BE EASILY REMOVED. IF THE GAP BETWEEN THE GRATE AND THE FACE IS GREATER THAN 1/4", A FILLER STRIP SHALL BE WELDED IN PLACE USING 1/4" FILLET CONTINUOUSLY, TO OBTAIN A GAP NO LARGER THAN 1/4" MAX.

R-46



GRATE AND FRAME DETAIL



SHEET 2 OF 2

NEVADA DEPARTMENT OF TRANSPORTATION

**DROP INLET
TYPE 3**

Signed Original On File R-4.2.3.1 (609)
CHIEF HYDRAULICS ENGINEER ADOPTED RR/XX REVISION X/XX



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-4.2.1, R-4.2.3.1

Page No.: R-42, R-46,

Note: A separate form is required for each change.

Description of requested modification or correction: Remove the Tab that is located in the corner of the grate, as shown in "Detail A" on page R-42 and on the "TAB DETAIL" on page R-46. Do NOT Remove (or be confused) with the "Tab Detail" on Page R-42, as this is a different type of Tab, which is below the grate.

P.S. By changing Type 3 Drop Inlet grate, this also changes the Grates on Type 11 (which is desirable)

..... (Please attach supporting information).

Reason for request: The plows are hitting the TAB that is located above the grate frame. Maintenance does not feel that the TAB is necessary and would like to have it removed. I believe they are removing it as we speak off of existing drop inlets.

Requestor Information: Name: Brian Matthews of Hydraulics

Phone: Ext. 7621

For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

Policy Review:

CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes:

TABLE A

PIPE SIZE		STRUCTURAL STEEL *									
CMP Round	HDPE Round	RCP Round	A & J Value	Max H	MAIN BARS	FRAME ANGLES	FRAME BAR	GRATE LBS.	FRAME LBS.	CHANNEL & PLATES, LBS.	TOTAL LBS.
12" to 18"	2'-6"	2'1"	4-1/2"x3/8"	5"x3"x3/8"	5"x3/8"	229	89	93	409		
24"	3'-0"	2'1"	4-1/2"x3/8"	5"x3"x3/8"	5"x3/8"	265	96	107	468		
30"	3'-6"	16'	4-1/2"x3/8"	5"x3"x3/8"	5"x3/8"	300	104	126	530		
36"	4'-0"	9'	5-1/2"x3/8"	6"x3-1/2"x3/8"	6"x3/8"	409	134	143	685		
42"	4'-6"	7'	5-1/2"x3/8"	6"x3-1/2"x3/8"	6"x3/8"	451	144	160	755		
48"	5'-0"	7'	5-1/2"x7/16"	6"x3-1/2"x3/8"	6"x3/8"	550	160	176	886		

The "A" and "J" values represent the minimum side dimension of the drop inlet (see detail R-4.2.3) when a pipe penetrates the "A" or "J" side of that drop inlet. If no pipe penetrates the "A" side, use A=2'6". If no pipe penetrates the "J" side, use J=2'2". If pipes penetrate both of the sides, use the values above for each side of the drop inlet, depending on the size of the penetrating pipe.

When installing an arch or elliptical pipe, using the horizontal dimension (span), choose the equivalent or next larger round diameter dimension as described in the table above.

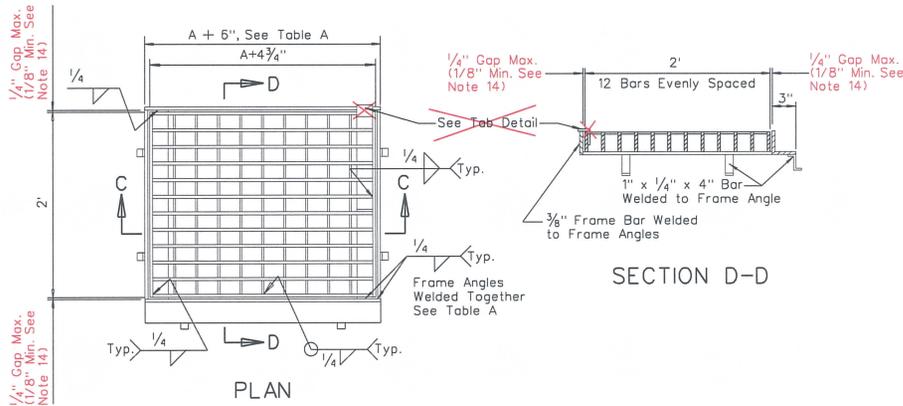
Maximum H is based upon the drop inlet having #4 bars at 12" on center.

* Varies with "A" dimension only.

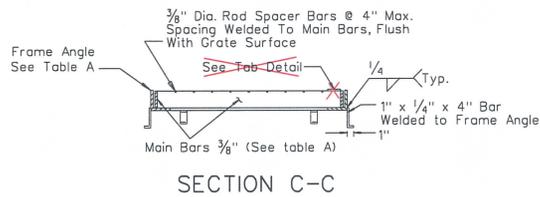
NOTES:

- ALL CONCRETE SHALL BE CLASS A OR AA.
- ALL REINFORCING STEEL SHALL BE TIGHTLY WIRED AND EMBEDDED 1/2" CLEAR OF CONCRETE SURFACE. EXCEPT AS NOTED, ALL REINFORCING SHALL BE NO. 4 BARS WITH MAXIMUM SPACING OF 12" CENTERS, FOR ALL VALUES OF H TO THE MAXIMUM AS SHOWN IN TABLE A. IF H EXCEEDS THESE MAXIMUMS, DROP INLET WILL REQUIRE SPECIAL DESIGN.
- EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1".
- WHERE PIPE INTERSECTS DROP INLET ON A 12° OR LARGER SKEW INCREASE J TO $\frac{J}{\cos \text{SKEW } \angle}$, REDESIGN FOR SKEWS AT A.
- WHERE PIPE INTERSECTS DROP INLET ON A 12° OR LARGER SKEW INCREASE SPAN TO $\frac{\text{SPAN}}{\cos \text{SKEW } \angle}$, REDESIGN FOR SKEWS AT A.
- FOR VALUES OF "H" SEE PLANS.
- "H" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUT FLOW PIPE AND THE NORMAL GUTTER GRADE LINE AT THE CURB FACE MINUS 3".
- PIPE(S) CAN BE PLACED IN ANY WALL.
- FOR DROP INLET, CONFIGURATIONS WITH 2 PIPES-INFLOW PIPE INVERT ELEVATION SHALL BE ≥ 0.1' ABOVE OUTFLOW PIPE INVERT ELEVATION.
- EXTREME LOW COVER SITUATIONS TO BE REVIEWED BY THE HYDRAULICS ENGINEER.
- SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE, AND PROVIDE A 10:1 SLOPE TO FLOW LINE(S).
- STATION/OFFSET DISTANCE LISTED IN PLANS IS MEASURED TO THE FACE OF CURB AT THE GUTTER FLOW LINE.
- SEE SHEET R-2.9.1 FOR DETAILS IF CONNECTING TO HDPE PIPE.
- SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE, AND PROVIDE A 10:1 SLOPE TO FLOW LINE(S).
- STATION/OFFSET DISTANCE LISTED IN PLANS IS MEASURED TO THE FACE OF CURB AT THE GUTTER FLOW LINE.
- SEE SHEET R-2.9.1 FOR DETAILS IF CONNECTING TO HDPE PIPE.
- GRATE IS TO FIT IN THE FRAME AND BE EASILY REMOVED. IF THE GAP BETWEEN THE GRATE AND THE FACE IS GREATER THAN 1/4", A FILLER STRIP SHALL BE WELDED IN PLACE USING 1/4" FILLET CONTINUOUSLY, TO OBTAIN A GAP NO LARGER THAN 1/4" MAX.

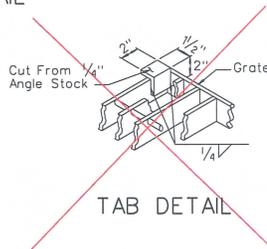
R-46



GRATE AND FRAME DETAIL



SECTION C-C



TAB DETAIL

SHEET 2 OF 2

NEVADA DEPARTMENT OF TRANSPORTATION

DROP INLET
TYPE 3

Signed Original On File R-4.2.3.1 (609)
CHIEF HYDRAULICS ENGINEER ADOPTED 8/2/XX REVISION 2/XX



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-4.2.1, R-4.2.2, R-4.2.3, R-4.2.6

Page No.: R-37, R-38, R-43, R-44

Note: A separate form is required for each change.

Description of requested modification or correction: Put a note where there is a gap between the grate and frame and state "1/4" Max. Gap."

R-37, R-38 HAVE A NOTE "1/4" MAX"

(Please attach supporting information).

Reason for request: This is related to the concerns that if the gap is greater than 1/4:" that a bike tire could enter the gap and the results could be disastrous.

Requestor Information: Name: Brian Matthews of Hydraulics

Phone: Ext. 7621

For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

Policy Review:

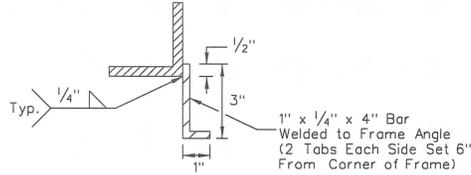
CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes: _____

R C P H D P E C M P	PIPE SIZE (INCH)	A	H Min. (FT)	CONCRETE (CU. YD.)		REINFORCING (LB)		STRUCTURAL STEEL (LB)
				BASE QUAN. (H Min.)	ADD RATE (CU. YD./FT)	BASE QUAN. (H Min.)	ADD RATE (LB/FT)	
	15"	2'	2.50	0.71	0.19	36	10	200
	18"	2' 6"	3.00	0.89	0.20	40	10	220
	24"	3'	3.50	1.08	0.22	58	12	240
	30"	3' 6"	4.00	1.28	0.24	63	12	260
	36"	4'	4.50	1.50	0.26	67	13	280
	42"	4' 6"	5.00	1.71	0.28	90	15	300
	48"	5'	5.50	1.94	0.30	95	15	319

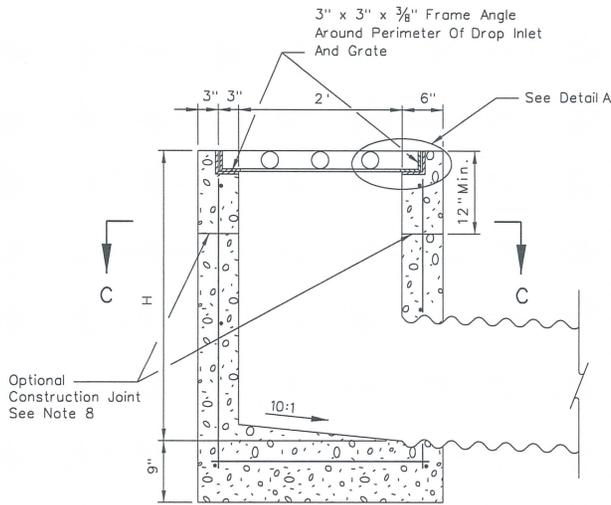
The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.



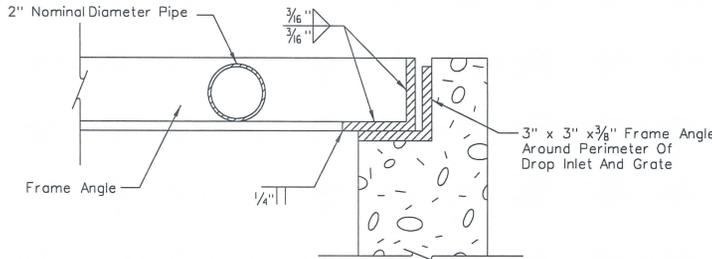
TAB DETAIL

NOTES:

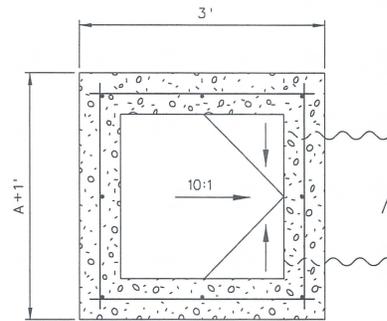
1. All concrete shall be class A or AA.
2. Reinforcing steel shall be No. 4 bars with maximum spacing at 18" centers, wired tightly at all intersections and embedded 2" clear of all concrete surfaces.
3. Exposed edges of concrete shall be chamfered 1".
4. Structural steel weight includes the 2" normal diameter pipe standard weight and 3"x 3"x 3/8" frame angles.
5. For 2" nominal diameter pipe see ASTM A53.
6. See sheet R-2.9.1 for details if connecting HDPE pipe.
7. Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction, shape flow line(s) to outlet pipe and provide a 10:1 slope to flow line(s).
8. Run rebar continuous thru construction joint. Joint must be a minimum 3" from horizontal bars.
9. Additional pipe penetrations may be placed in any wall.



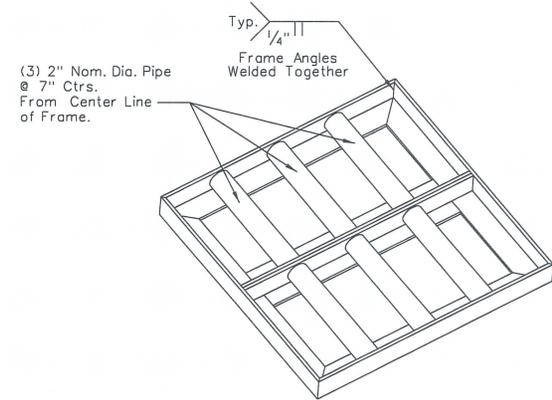
SECTION A-A



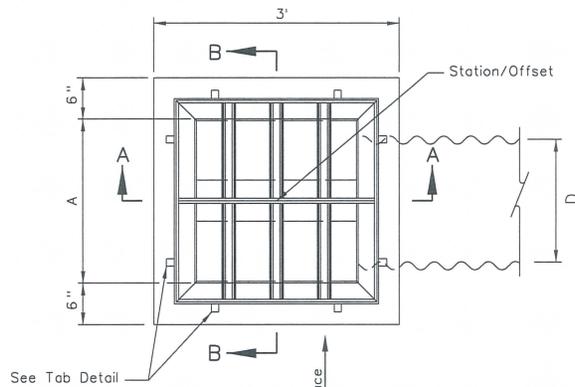
DETAIL A



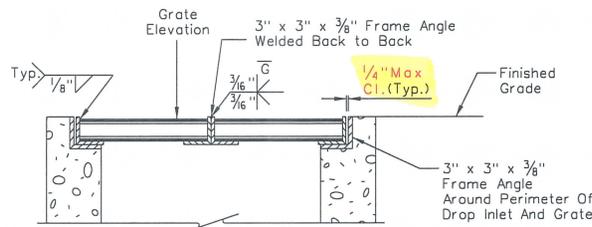
SECTION C-C



GRATE DETAIL



PLAN

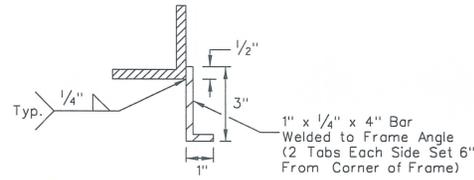


SECTION B-B

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION			
DROP INLET TYPE 2A			
R-4.2.1.1	(609)	Signed Original On File	
ADOPTED 11/70	REVISED 5/09	CHIEF HYDRAULICS ENGR.	

R C P	PIPE SIZE (INCH)	A	H Min. (FT)	CONCRETE (CU. YD.)		REINFORCING (LB)		STRUCTURAL STEEL (LB)
				BASE QUAN. (H Min.)	ADD RATE (CU. YD./FT)	BASE QUAN. (H Min.)	ADD RATE (LB/FT)	
H D P E	15"	2'	2.50	0.71	0.19	36	10	215
	18"	2' 6"	3.00	0.89	0.20	40	10	239
	24"	3'	3.50	1.08	0.22	58	12	262
	30"	3' 6"	4.00	1.28	0.24	63	12	286
C M P	36"	4'	4.50	1.50	0.26	67	13	309
	42"	4' 6"	5.00	1.71	0.28	90	15	333
	48"	5'	5.50	1.94	0.30	95	15	356

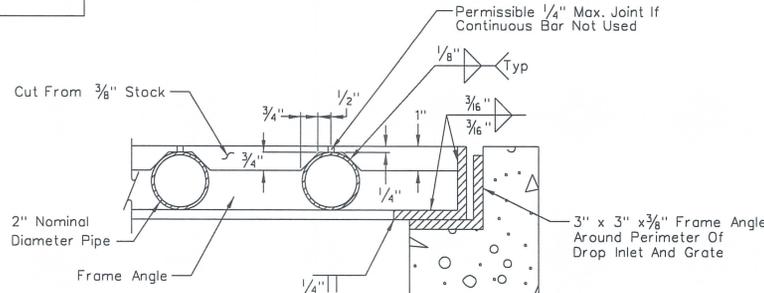
The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.



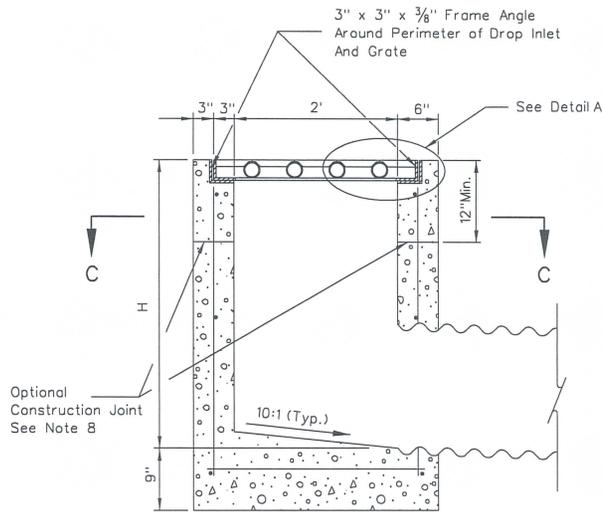
TAB DETAIL

NOTES:

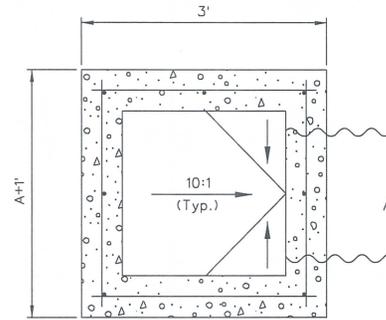
- All concrete shall be class A or AA.
- Reinforcing steel shall be No. 4 bars with maximum spacing at 18" centers, wired tightly at all intersections and embedded 2" clear of all concrete surfaces.
- Exposed edges of concrete shall be chamfered 1".
- Structural steel weight includes the 2" normal diameter pipe standard weight and 3" x 3" x 3/8" frame angles.
- For 2" nominal diameter pipe see ASTM A53.
- See sheet R-2.9.1 for details if connecting HDPE pipe.
- Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction, shape flow line(s) to outlet pipe and provide a 10:1 slope to flow line(s).
- Run rebar continuous thru construction joint. Joint must be a minimum 3" from horizontal bars.
- Additional pipe penetrations may be placed in any wall.



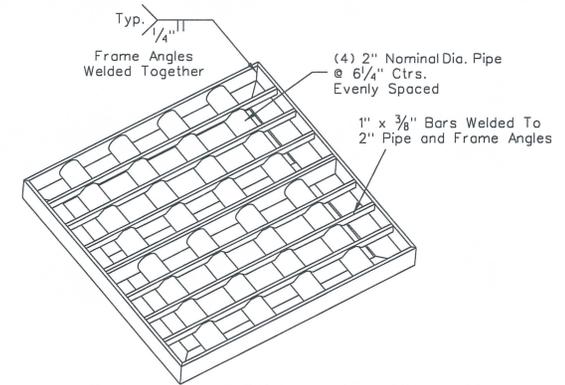
DETAIL A



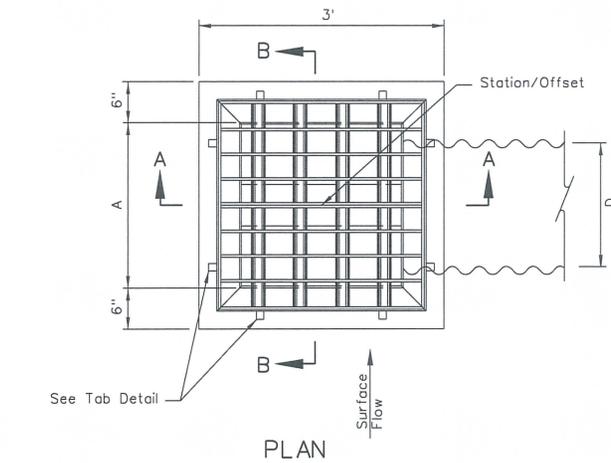
SECTION A-A



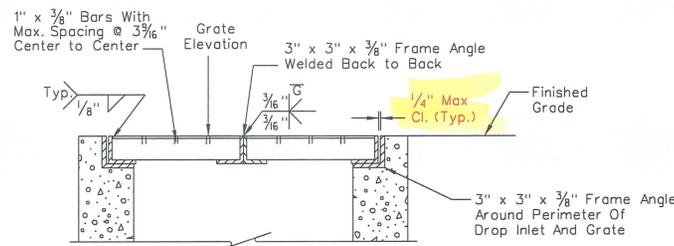
SECTION C-C



GRATE DETAIL



PLAN



SECTION B-B

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
DROP INLET TYPE 2B		
R-4.2.2	(609)	Signed Original On File
ADOPTED 11/06	REVISED 5/09	CHIEF HYDRAULICS ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-4.2.3 and R-4.2.3.1

Page No.: R-45 and R-46

Note: A separate form is required for each change.

Description of requested modification or correction: Create a table to clearly dimension the drop inlet, both the "A" values as well as the "J" values and any other information that could clarify how to construct the drop inlet. With this change or reference to any other tables on these sheets, all reference to "Lo-Hed" should be replaced with "Elliptical RCP".

.....
.....
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.....
.....
..... (Please attach supporting information).

Reason for request: The notes below the Section A-A and B-B, and on R-4.2.3.1 notes 4-5 describe how the drop inlet is to be constructed. However, after multiple reviews of this detail, we cannot find anyone who can actually tell you how to build this drop inlet based upon the detail. Hydraulics would just like to provide sufficient information in a table so that a contractor does not have to guess when he is building it. The name change brings consistency to the plans.

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.....
.....

Requestor Information: Name: Brian Matthews of Hydraulics

Phone: Ext. 7621

For Standards/Manuals Personnel Only: Approved Denied

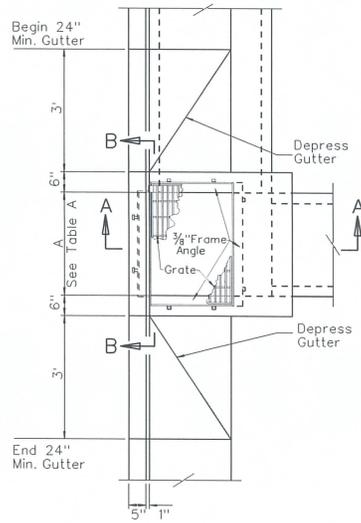
Revised by: Signature: _____ Date: _____

Policy Review:

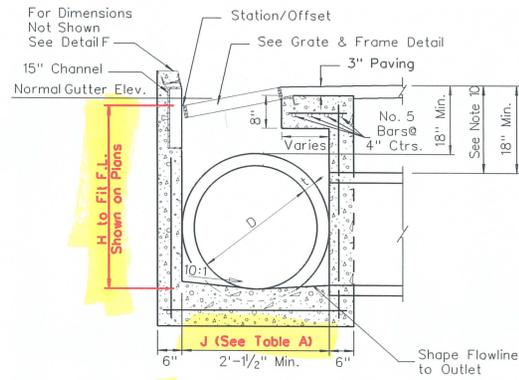
CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes:
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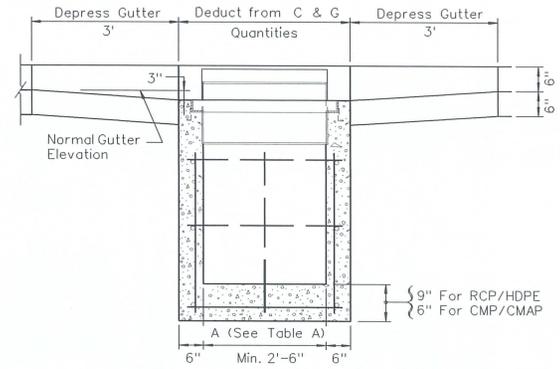


PLAN



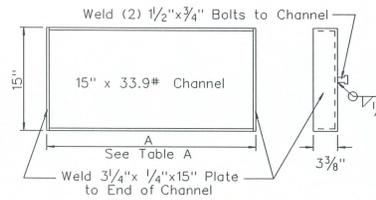
~~S FOR CMAP
D FOR CMP
D+6" FOR RCP/HDPE 24" OR LESS
D+2t FOR RCP/HDPE 30" OR MORE
S+2t FOR LO-HED RCP~~

SECTION A-A
(FOR CMAP, CMP, RCP, HDPE & LO-HED RCP)

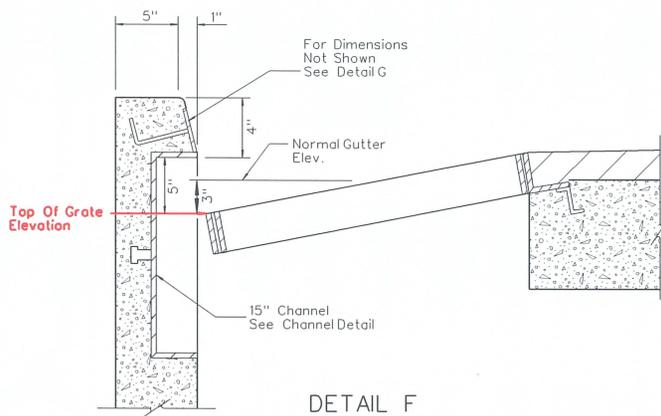
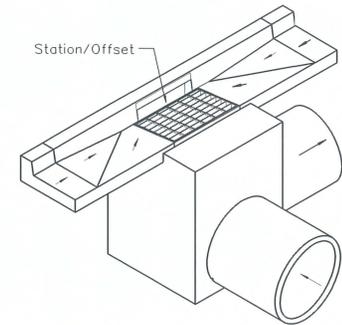


~~S FOR CMAP
D FOR CMP
D+6" FOR RCP/HDPE 42" OR LESS
D+2t FOR RCP/HDPE 48" OR MORE
S+6" FOR LO-HED RCP 29"x45" OR LESS
S+2t FOR LO-HED RCP 34"x53" OR MORE~~

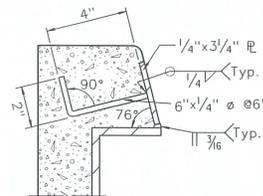
SECTION B-B
(FOR CMAP, CMP, RCP, HDPE & LO-HED RCP)



CHANNEL DETAIL



DETAIL F



DETAIL G

SHEET 1 OF 2

NEVADA DEPARTMENT OF TRANSPORTATION

**DROP INLET
TYPE 3**

Signed Original On File	R-4.2.3	(609)
CHIEF HYDRAULICS ENGINEER	ADOPTED XX/XX	REVISION X/XX

TABLE A

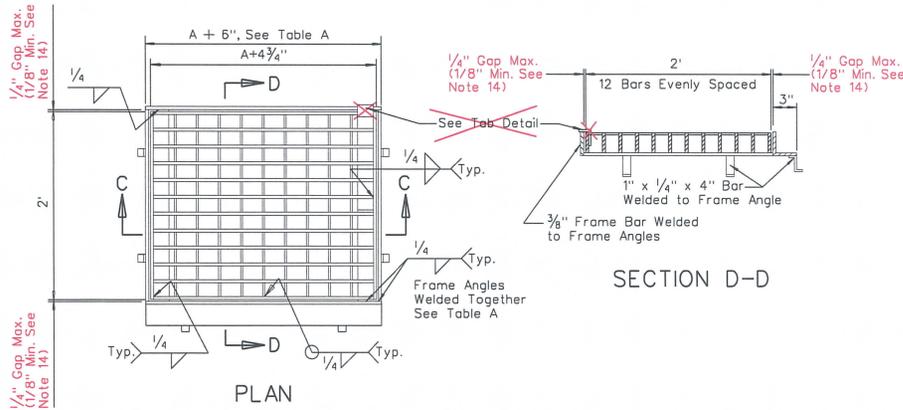
PIPE SIZE			STRUCTURAL STEEL *								
CMP Round	HDPE Round	RCP Round	A & J Value	Max H	MAIN BARS	FRAME ANGLES	FRAME BAR	GRATE LBS.	FRAMES LBS.	CHANNEL & PLATES, LBS.	TOTAL LBS.
12" to 18"	2'-6"	2'	2'-6"	21"	4-1/2"X3/8"	5"X3"X3/8"	5"X3/8"	229	88	93	409
24"	3'-0"	2'	3'-0"	21"	4-1/2"X3/8"	5"X3"X3/8"	5"X3/8"	265	96	107	468
30"	3'-6"	16'	3'-6"	16"	4-1/2"X3/8"	5"X3"X3/8"	5"X3/8"	300	104	126	530
36"	4'-0"	9'	4'-0"	9"	5-1/2"X3/8"	6"X3-1/2"X3/8"	6"X3/8"	409	134	143	685
42"	4'-6"	7'	4'-6"	7"	5-1/2"X3/8"	6"X3-1/2"X3/8"	6"X3/8"	451	144	160	755
48"	5'-0"	7'	5'-0"	7"	5-1/2"X7/16"	6"X3-1/2"X3/8"	6"X3/8"	550	160	176	886

The "A" and "J" values represent the minimum side dimension of the drop inlet (see detail R-4.2.3) when a pipe penetrates the "A" or "J" side of that drop inlet. If pipe penetrates the "A" side, use A=2'6". If no pipe penetrates the "J" side, use J=2'2". If pipes penetrate both of the sides, use the values above for each side of the drop inlet, depending on the size of the penetrating pipe.

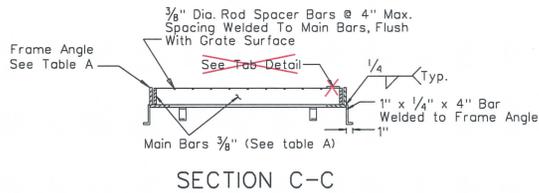
When installing an arch or elliptical pipe, using the horizontal dimension (span), choose the equivalent or next larger round diameter dimension as described in the table above.

Maximum H is based upon the drop inlet having #4 bars at 12" on center.

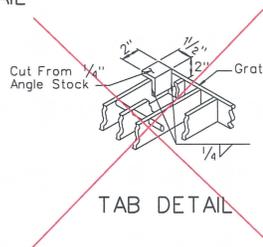
* Varies with "A" dimension only.



GRATE AND FRAME DETAIL



SECTION C-C



TAB DETAIL

NOTES:

- ALL CONCRETE SHALL BE CLASS A OR AA.
- ALL REINFORCING STEEL SHALL BE TIGHTLY WIRED AND EMBEDDED 1/2" CLEAR OF CONCRETE SURFACE. EXCEPT AS NOTED, ALL REINFORCING SHALL BE NO. 4 BARS WITH MAXIMUM SPACING OF 12" CENTERS. FOR ALL VALUES OF H TO THE MAXIMUM AS SHOWN IN TABLE A. IF H EXCEEDS THESE MAXIMUMS, DROP INLET WILL REQUIRE SPECIAL DESIGN.
- EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1".
- WHERE PIPE INTERSECTS DROP INLET ON A 12° OR LARGER SKEW INCREASE J TO $J \cdot \frac{1}{\cos \text{SKEW}}$, REDESIGN FOR SKEWS AT A.
- WHERE PIPE INTERSECTS DROP INLET ON A 12° OR LARGER SKEW INCREASE SPAN TO $\frac{\text{SPAN}}{\cos \text{SKEW}}$, REDESIGN FOR SKEWS AT A.
- FOR VALUES OF "H" SEE PLANS.
- "H" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUT FLOW PIPE AND THE NORMAL GUTTER GRADE LINE AT THE CURB FACE MINUS 3".
- PIPE(S) CAN BE PLACED IN ANY WALL.
- FOR DROP INLET, CONFIGURATIONS WITH 2 PIPES-INFLOW PIPE INVERT ELEVATION SHALL BE ≥ 0.1' ABOVE OUTFLOW PIPE INVERT ELEVATION.
- EXTREME LOW COVER SITUATIONS TO BE REVIEWED BY THE HYDRAULICS ENGINEER.
- SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE, AND PROVIDE A 10:1 SLOPE TO FLOW LINE(S).
- STATION/OFFSET DISTANCE LISTED IN PLANS IS MEASURED TO THE FACE OF CURB AT THE GUTTER FLOW LINE.
- SEE SHEET R-2.9.1 FOR DETAILS IF CONNECTING TO HDPE PIPE.
- GRATE IS TO FIT IN THE FRAME AND BE EASILY REMOVED. IF THE GAP BETWEEN THE GRATE AND FRAME IS GREATER THAN 1/4" ON EACH SIDE OF THE GRATE, THE GRATE AND FRAME SHALL BE REMOVED AND RECONSTRUCTED TO THE TOLERANCES SPECIFIED OR, WITH APPROVAL OF THE ENGINEER, A FILLER STRIP UP TO 1/4" IN THICKNESS MAY BE WELDED FLUSH TO THE TOP OF THE FRAME TO REDUCE THE GAP TO A MAXIMUM OF 1/4"

R-46

SHEET 2 OF 2

NEVADA DEPARTMENT OF TRANSPORTATION

DROP INLET
TYPE 3

Signed Original On File R-4.2.3.1 (609)
CHIEF HYDRAULICS ENGINEER ADOPTED REVISION 1/2/XX



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-4.2.3 and R-4.2.3.1

Page No.: R-45 and R-46

Note: A separate form is required for each change.

Description of requested modification or correction: Locate the Station and Offset and the Elevation for the drop inlet in the same location. This location will be at the front face of curb, where the existing detail shows the Station and Offset. With this in mind, the grate elevation will be the Normal Gutter Flowline Depth MINUS 3" at that location (This is the location of the actual grate elevation at the call-out location). To better see where the station and offset and the elevation are being called out, Detail F should be blown up a bit with the labels in their proper place.

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..... (Please attach supporting information).

Reason for request: The current location for the elevation of the grate is the Edge of Pavement where it meets the grate. This is not a straight forward location for the elevation and has to be evaluated to obtain. So if an evaluation is necessary, might as well do the calculation from the same spot as the station and offset.

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Requestor Information: Name: Brian Matthews of Hydraulics

Phone: Ext. 7621

For Standards/Manuals Personnel Only: Approved Denied

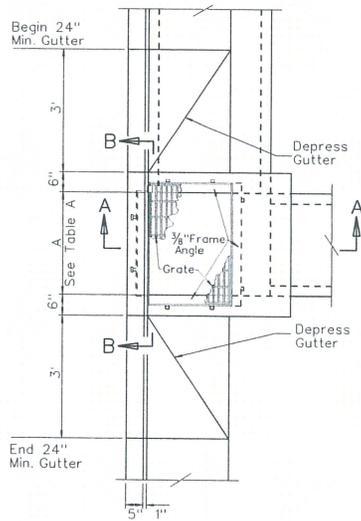
Revised by: Signature: _____ Date: _____

Policy Review:

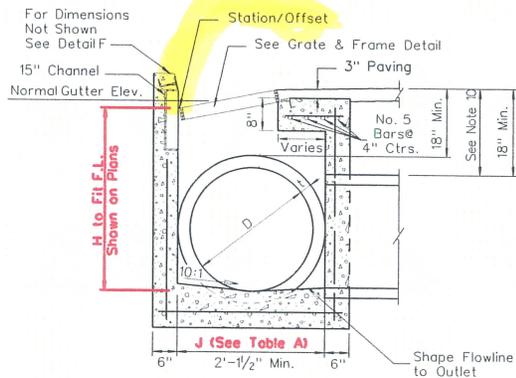
CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes:
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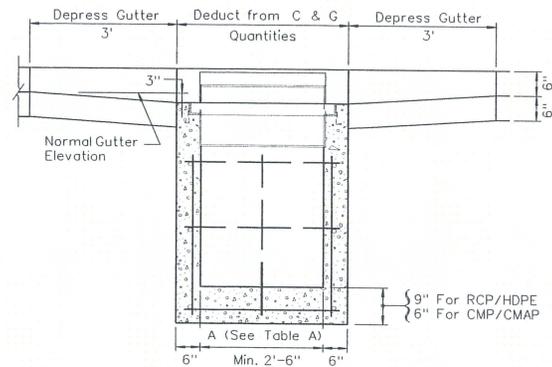


PLAN



~~S FOR CMAP
D FOR CMP
D+6" FOR RCP/HDPE 24" OR LESS
D+2t FOR RCP/HDPE 30" OR MORE
S+2t FOR LO-HED RCP~~

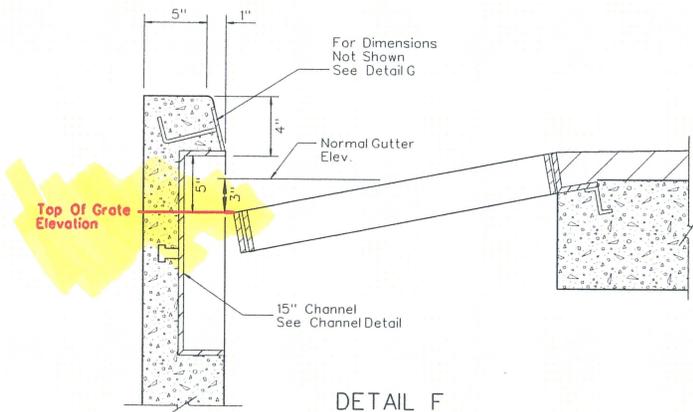
~~SECTION A-A
(FOR CMAP, CMP, RCP, HDPE & LO-HED RCP)~~



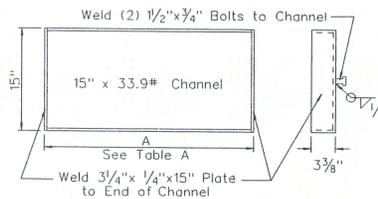
~~S FOR CMAP
D FOR CMP
D+6" FOR RCP/HDPE 42" OR LESS
D+2t FOR RCP/HDPE 48" OR MORE
S+6" FOR LO-HED RCP 29"x43" OR LESS
S+2t FOR LO-HED RCP 34"x53" OR MORE~~

~~SECTION B-B
(FOR CMAP, CMP, RCP, HDPE & LO-HED RCP)~~

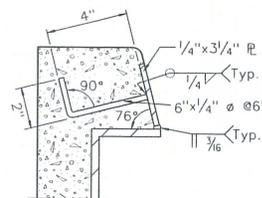
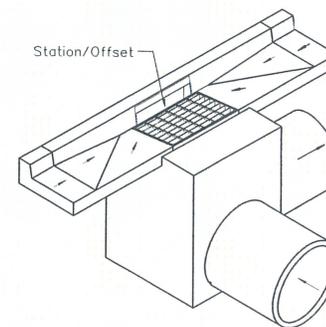
R-45



DETAIL F



CHANNEL DETAIL



DETAIL G

SHEET 1 OF 2

NEVADA DEPARTMENT OF TRANSPORTATION

DROP INLET
TYPE 3

Signed Original On File R-4.2.3 (609)
ADOPTED REVISION
CHIEF HYDRAULICS ENGINEER

TABLE A

PIPE SIZE		STRUCTURAL STEEL *									
CMP Round	HDPE Round	RCP Round	A & J Value	Max H	MAIN BARS	FRAME ANGLES	FRAME BAR	GRATE LBS.	FRAME LBS.	CHANNEL & PLATES LBS.	TOTAL LBS.
12" to 18"	2'-6"	21'	4-1/2"X3/8"	5"X3/8"	5"X3/8"	229	88	93	409		
24"	3'-0"	21'	4-1/2"X3/8"	5"X3/8"	5"X3/8"	265	96	107	468		
30"	3'-6"	16'	4-1/2"X3/8"	5"X3/8"	5"X3/8"	300	104	126	530		
36"	4'-0"	9'	5-1/2"X3/8"	6"X3-1/2"X3/8"	6"X3/8"	409	134	143	685		
42"	4'-6"	7'	5-1/2"X3/8"	6"X3-1/2"X3/8"	6"X3/8"	451	144	160	755		
48"	5'-0"	7'	5-1/2"X7/16"	6"X3-1/2"X3/8"	6"X3/8"	550	160	176	885		

The "A" and "J" values represent the minimum side dimension of the drop inlet (see detail R-4.2.3) when a pipe penetrates the "A" or "J" side of that drop inlet. If no pipe penetrates the "A" side, use A=2'6". If no pipe penetrates the "J" side, use J=2'2". If pipes penetrate both of the sides, use the values above for each side of the drop inlet, depending on the size of the penetrating pipe.

When installing an arch or elliptical pipe, using the horizontal dimension (span), choose the equivalent or next larger round diameter dimension as described in the table above.

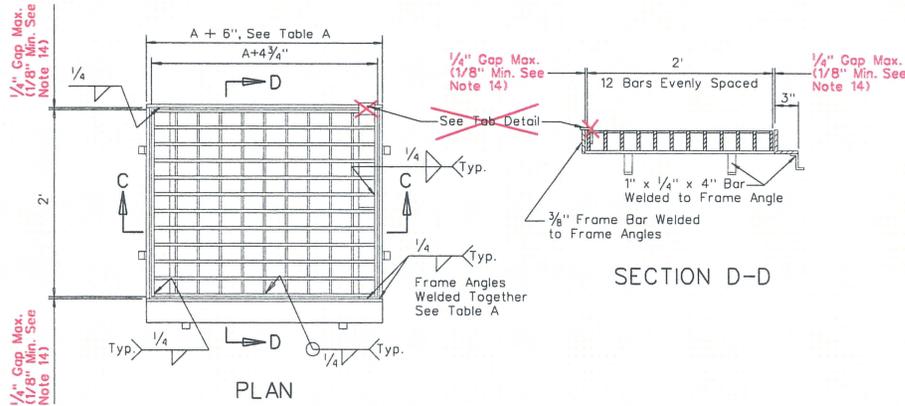
Maximum H is based upon the drop inlet having #4 bars at 12" on center.

* Varies with "A" dimension only.

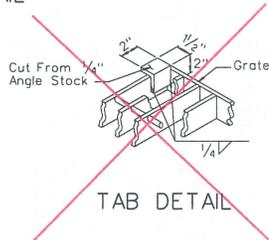
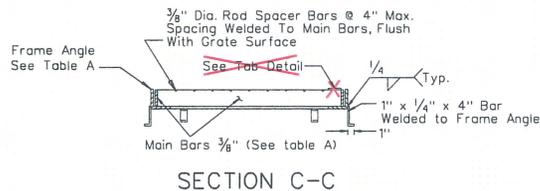
NOTES:

- ALL CONCRETE SHALL BE CLASS A OR AA.
- ALL REINFORCING STEEL SHALL BE TIGHTLY WIRED AND EMBEDDED 1/2" CLEAR OF CONCRETE SURFACE. EXCEPT AS NOTED, ALL REINFORCING SHALL BE NO. 4 BARS WITH MAXIMUM SPACING OF 12" CENTERS. FOR ALL VALUES OF H TO THE MAXIMUM AS SHOWN IN TABLE A, IF H EXCEEDS THESE MAXIMUMS, DROP INLET WILL REQUIRE SPECIAL DESIGN.
- EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1".
- WHERE PIPE INTERSECTS DROP INLET ON A 12° OR LARGER SKEW INCREASE J TO $\frac{J}{\cos \text{SKEW } \angle}$, REDESIGN FOR SKEWS AT A. $\frac{J}{\cos \text{SKEW } \angle}$
- WHERE PIPE INTERSECTS DROP INLET ON A 12° OR LARGER SKEW INCREASE SPAN TO $\frac{\text{SPAN}}{\cos \text{SKEW } \angle}$, REDESIGN FOR SKEWS AT A. $\frac{\text{SPAN}}{\cos \text{SKEW } \angle}$
- FOR VALUES OF "H" SEE PLANS.
- "H" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUT FLOW PIPE AND THE NORMAL GUTTER GRADE LINE AT THE CURB FACE MINUS 3".
- PIPE(S) CAN BE PLACED IN ANY WALL.
- FOR DROP INLET, CONFIGURATIONS WITH 2 PIPES-INFLOW PIPE INVERT ELEVATION SHALL BE ≥ 0.1' ABOVE OUTFLOW PIPE INVERT ELEVATION.
- EXTREME LOW COVER SITUATIONS TO BE REVIEWED BY THE HYDRAULICS ENGINEER.
- SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE, AND PROVIDE A 10:1 SLOPE TO FLOW LINE(S).
- STATION/OFFSET DISTANCE LISTED IN PLANS IS MEASURED TO THE FACE OF CURB AT THE GUTTER FLOW LINE.
- SEE SHEET R-2.9.1 FOR DETAILS IF CONNECTING TO HDPE PIPE.
- GRATE IS TO FIT IN THE FRAME AND BE EASILY REMOVED. IF THE GAP BETWEEN THE GRATE AND FRAME IS GREATER THAN 1/4" ON EACH SIDE OF THE GRATE, THE GRATE AND FRAME SHALL BE REMOVED AND RECONSTRUCTED TO THE TOLERANCES SPECIFIED OR, WITH APPROVAL OF THE ENGINEER, A FILLER STRIP UP TO 1/4" IN THICKNESS MAY BE WELDED FLUSH TO THE TOP OF THE FRAME TO REDUCE THE GAP TO A MAXIMUM OF 1/4"

R-46



GRATE AND FRAME DETAIL



SHEET 2 OF 2

NEVADA DEPARTMENT OF TRANSPORTATION

DROP INLET
TYPE 3

Signed Original On File R-4.2.3.1 (609)
CHIEF HYDRAULICS ENGINEER ADOPTED REVISION R/XX



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-4.2.3 and R-4.2.3.1

Page No.: R-45 and R-46

Note: A separate form is required for each change.

Description of requested modification or correction: Increase the throat width (to like 9" – currently 3-3/8") at the opening in the curb. Keep in mind that the change to the throat will not be allowed to affect the sidewalk above. Also, the angle of the metal frame at the bottom of the throat should be changed from a 90° angle to say a 45° angle.

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..... (Please attach supporting information).

Reason for request: The existing throat width limits the ability for garbage to enter the drop inlet, which can be considered positive, however, Hydraulics feels that the smaller throat is collecting garbage and reducing the capacity of the inlet. By increasing the throat width to 9", the typical piece of garbage would be able to fall into the basin and keep the grate free to receive water.

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Requestor Information: Name: Brian Matthews of Hydraulics

Phone: Ext. 7621

For Standards/Manuals Personnel Only: Approved Denied

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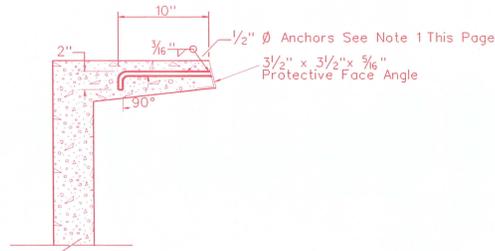
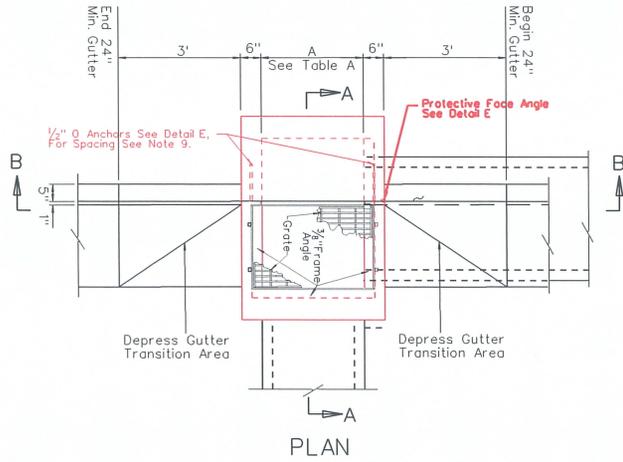
Revised by: Signature: _____ Date: _____

Policy Review:

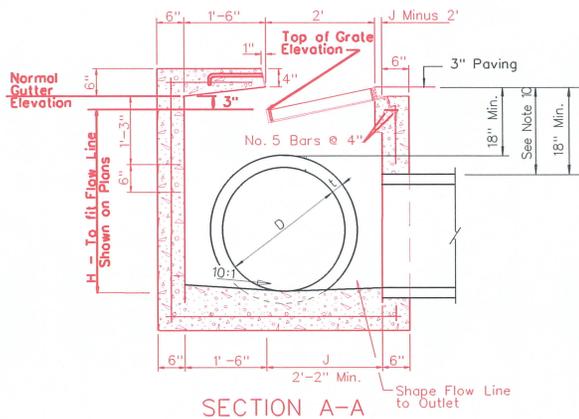
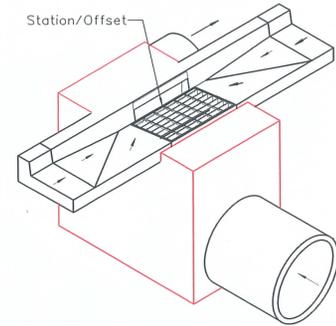
CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes:
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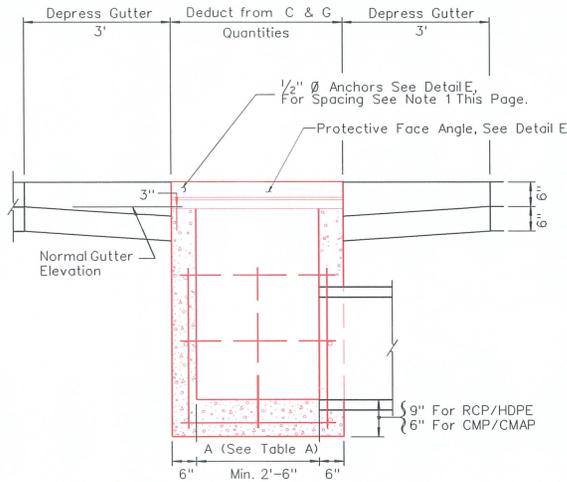


1. ANGLE ANCHORS SHALL BE EMBEDDED MIDPOINT IN EACH ENDWALL, EVENLY SPACED, AND MAXIMUM SPACING OF 5'.



~~S FOR CMAP
D FOR CMP
D+6" FOR RCP/HDPE 24" OR LESS
D+2t FOR RCP/HDPE 30" OR MORE
S+2t FOR LO-HED RCP~~

~~SECTION A-A
(FOR CMAP, CMP, RCP, HDPE & LO-HED RCP)~~



~~S FOR CMAP
D FOR CMP
D+6" FOR RCP/HDPE 42" OR LESS
D+2t FOR RCP/HDPE 48" OR MORE
S+6" FOR LO-HED RCP 29"x45" OR LESS
S+2t FOR LO-HED RCP 34"x53" OR MORE~~

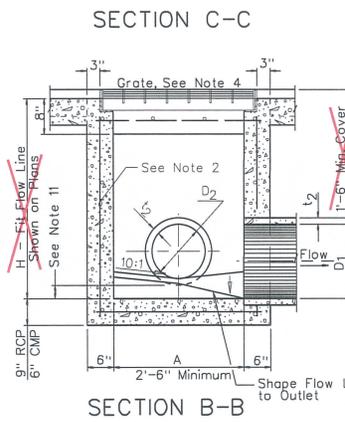
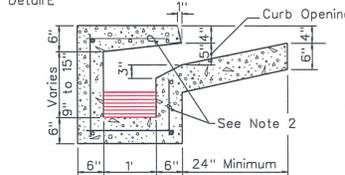
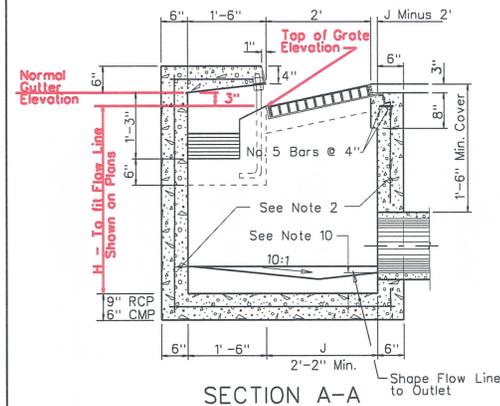
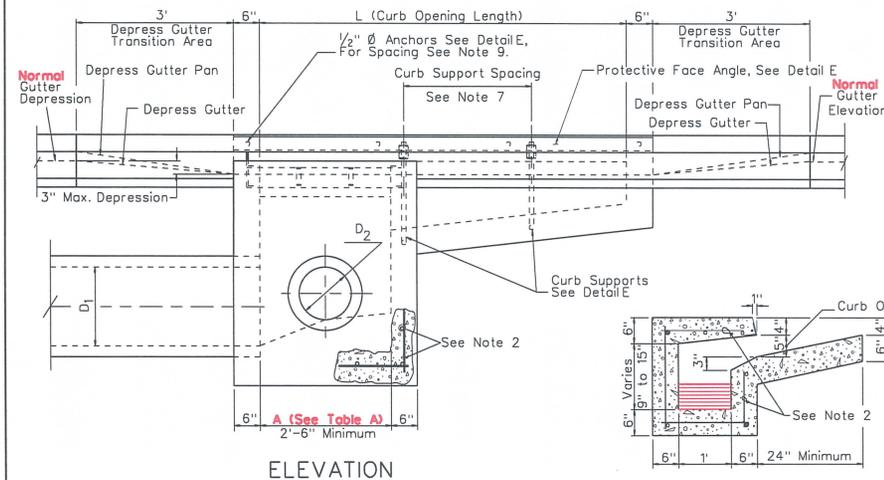
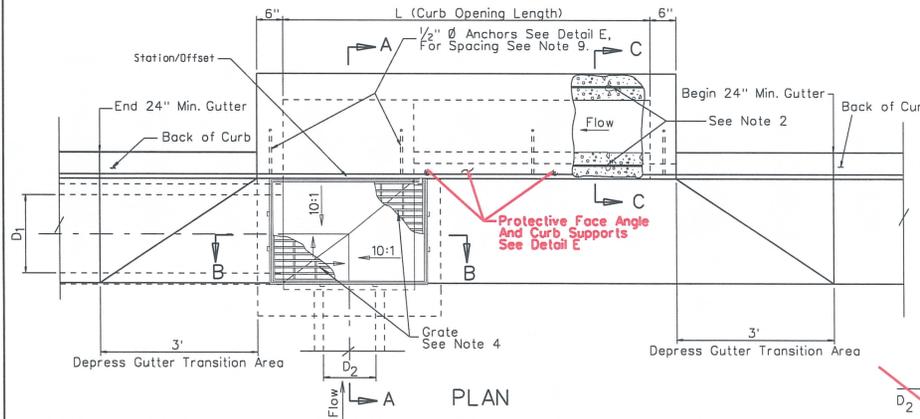
~~SECTION B-B
(FOR CMAP, CMP, RCP, HDPE & LO-HED RCP)~~

SHEET 1 OF 2

NEVADA DEPARTMENT OF TRANSPORTATION

DROP INLET
TYPE 3

Signed Original On File	R-4.2.3	(609)
CHIEF HYDRAULICS ENGINEER	ADOPTED 2X/XX	REVISION X/XX



*** QUANTITIES**

24" RCP / HDPE	18" RCP / HDPE	OUTLET PIPE	CURB OPENING	STRUCTURAL STEEL (LBS.)	REINFORCING STEEL (LBS.)	CONCRETE (CU.YDS.)
		7'	7"	357	126	1.64
		10'	10"	384	155	2.01
		12'	12"	399	176	2.26
		12'	12"	399	179	2.34
		15'	15"	426	209	2.72

* ASSUMED MINIMUM H 15" INLET PIPE

NOTES:

1. ALL CONCRETE SHALL BE CLASS AA OR A.
2. REINFORCING STEEL SHALL BE NO. 4 BARS, EXCEPT AS NOTED, WITH MAXIMUM SPACE AT 12" CENTERS, WIRED TIGHTLY AT ALL INTERSECTIONS, AND EMBEDDED AT LEAST 1/2" CLEAR OF CONCRETE SURFACE, EXCEPT AS NOTED.
3. EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1".
4. FOR GRATE AND FRAME DETAIL, SEE SHEET R-4.2.3.
5. FOR VALUES OF "H" AND "L" SEE PLANS.
6. "H" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUT PIPE FLOW LINE AND THE NORMAL GUTTER GRADE LINE AT THE CURB FACE **MINUS 3"**.
7. CURB OPENINGS LONGER THAN 7' SHALL HAVE ONE CURB SUPPORT FOR EACH 7' INCREMENT OR FRACTION THEREOF, EVENLY SPACED.
8. PIPE(S) CAN BE PLACED IN ANY WALL.
9. ANGLE ANCHORS SHALL BE EMBEDDED MIDPOINT IN EACH ENDWALL, EVENLY SPACED, AND MAXIMUM SPACING OF 5'.
10. FOR DROP INLET CONFIGURATIONS WITH 2 PIPES—INFLOW PIPE INVERT ELEVATION SHALL BE ≥ 0.1' ABOVE OUTFLOW PIPE INVERT ELEVATIONS.
11. SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE, AND PROVIDE A 10:1 SLOPE TO FLOW LINE(S).
12. STATION/OFFSET DISTANCE LISTED IN PLANS IS MEASURED TO THE FACE OF CURB AT THE GUTTER FLOW LINE.
13. SEE SHEET R-2.9.1 FOR DETAILS IF CONNECTING TO HDPE PIPE.
14. GRATE IS TO FIT IN THE FRAME AND BE EASILY REMOVED. IF THE GAP BETWEEN THE GRATE AND FRAME IS GREATER THAN 1/4" ON EACH SIDE OF THE GRATE, THE GRATE AND FRAME SHALL BE REMOVED AND RECONSTRUCTED TO THE TOLERANCES SPECIFIED OR, WITH APPROVAL OF THE ENGINEER, A FILLER STRIP UP TO 1/4" IN THICKNESS MAY BE WELDED FLUSH TO THE TOP OF THE FRAME TO REDUCE THE GAP TO A MAXIMUM OF 1/4".

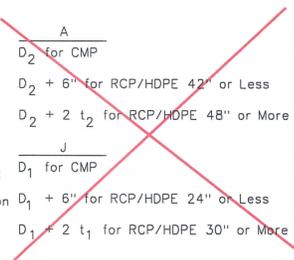


TABLE A

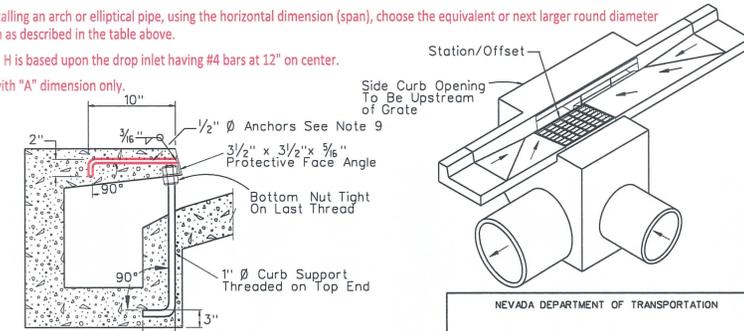
PIPE SIZE		STRUCTURAL STEEL *									
CMP Round	HDPE Round	RCP Round	A & J Value	Max H	MAIN BARS	FRAME ANGLES	FRAME BAR	GRATE LBS.	FRAME LBS.	CHANNEL & PLATES, LBS.	TOTAL LBS.
12" to 18"		2'-6"	2'1"	2'1"	4-1/2"x3/8"	5"x3"x3/8"	5"x3/8"	229	88	93	409
24"		3'-0"	2'1"	2'1"	4-1/2"x3/8"	5"x3"x3/8"	5"x3/8"	265	96	107	468
30"		3'-6"	1'6"	1'6"	4-1/2"x3/8"	5"x3"x3/8"	5"x3/8"	300	104	126	530
36"		4'-0"	9"	9"	5-1/2"x3/8"	6"x3-1/2"x3/8"	6"x3/8"	409	134	143	685
42"		4'-6"	7"	7"	5-1/2"x3/8"	6"x3-1/2"x3/8"	6"x3/8"	451	144	160	755
48"		5'-0"	7"	7"	5-1/2"x7/16"	6"x3-1/2"x3/8"	6"x3/8"	550	160	176	886

The "A" and "J" values represent the minimum side dimension of the drop inlet (see detail R-4.2.3) when a pipe penetrates the "A" or "J" side of that drop inlet. If no pipe penetrates the "A" side, use A=2'6". If no pipe penetrates the "J" side, use J=2'2". If pipes penetrate both of the sides, use the values above for each side of the drop inlet, depending on the size of the penetrating pipe.

When installing an arch or elliptical pipe, using the horizontal dimension (span), choose the equivalent or next larger round diameter dimension as described in the table above.

Maximum H is based upon the drop inlet having #4 bars at 12" on center.

* Varies with "A" dimension only.

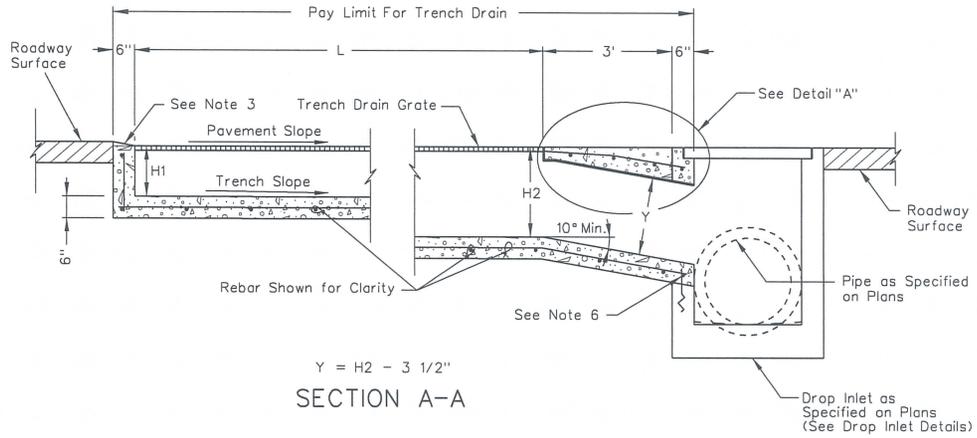


DETAIL E
For Rebar Installation
See Section C-C

NEVADA DEPARTMENT OF TRANSPORTATION

DROP INLET TYPE 11

Signed Original On File	R-4.2.6	(609)
CHIEF HYDRAULICS ENGINEER	ADOPTED	REVISION
	X/XX	X/XX

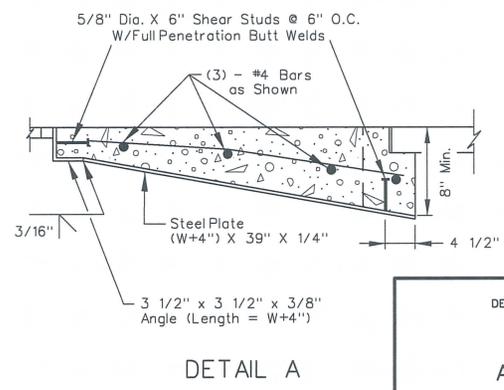
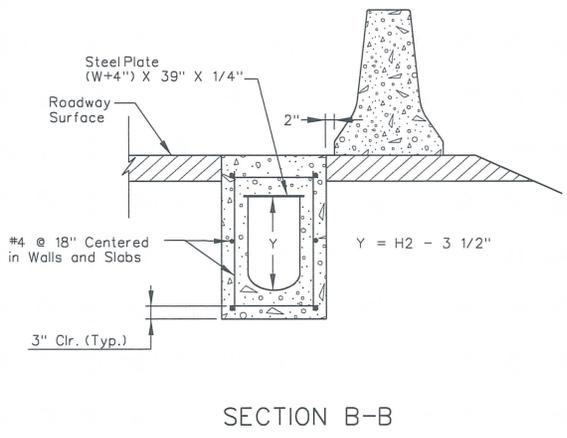
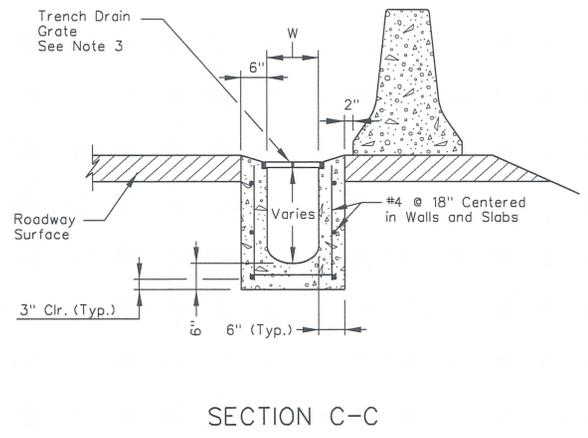
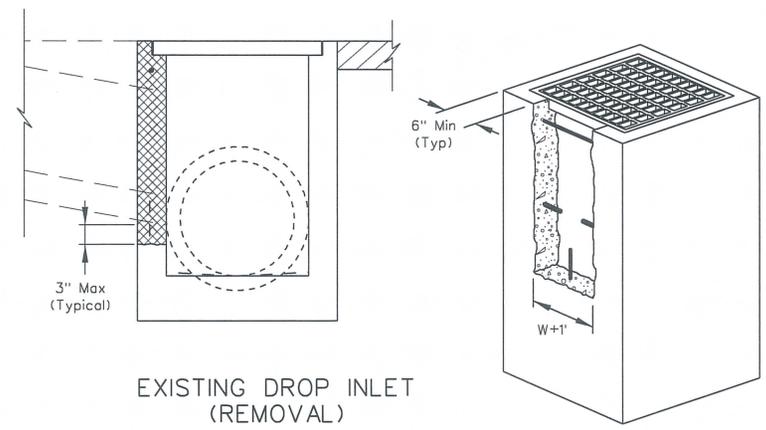
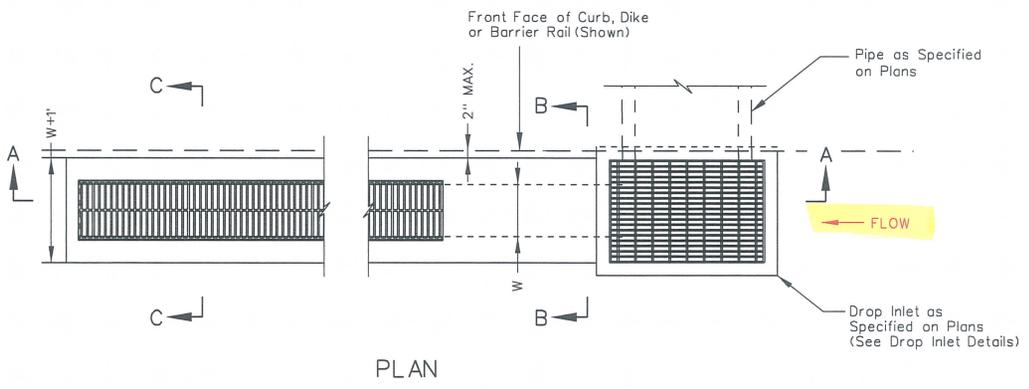


NOTES:

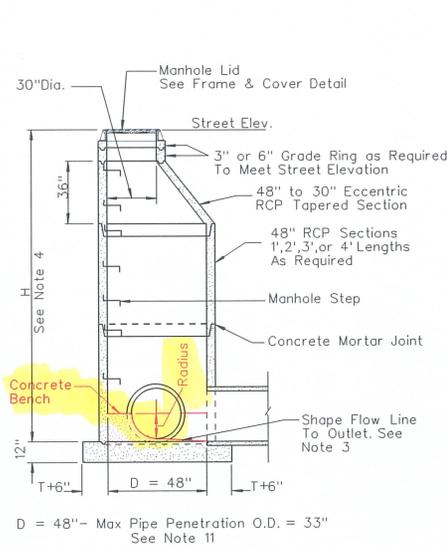
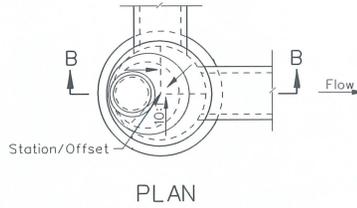
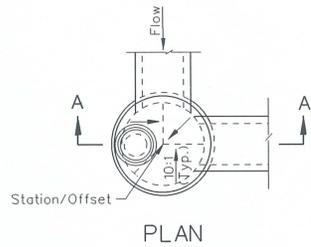
1. Revisions require approval by the engineer in writing prior to construction.
2. Construction of the trench drain shall follow the manufacturers recommendations.
3. Trench drain grate to be 1/4" to 3/8" below adjacent pavement surface.
4. L,W, H1, and H2 as specified on plans.
5. All concrete shall be class A or AA.
6. If retrofitting to an existing drop inlet preserve existing rebar during removal of side wall as needed to tie to trench drain reinforcement. Install additional rebar to facilitate connection to drop inlet and replace damaged existing rebar. Doweling perpendicular to side wall in lieu of connecting to existing rebar is not permitted.

LEGEND:

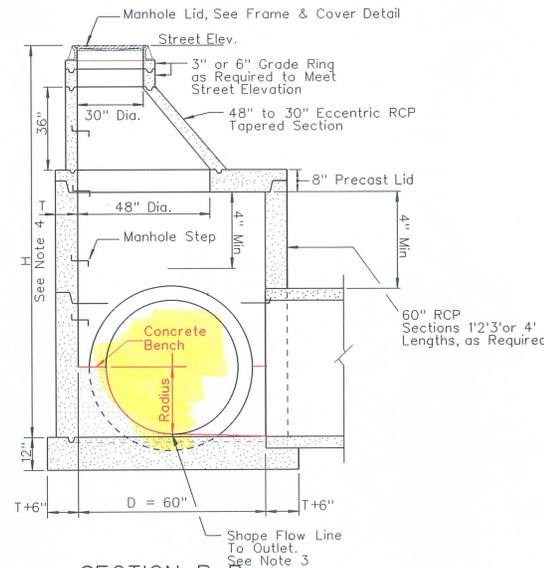
- LIMITS OF REMOVAL



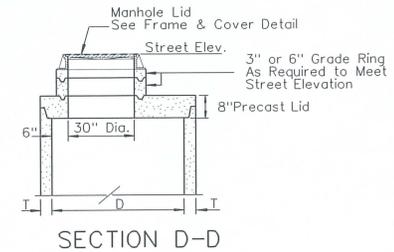
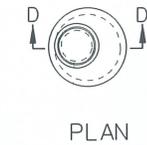
STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
TRENCH DRAIN AND DROP INLET CONNECTION		
R-4.2.8	(600)	Signed Original On File
ADOPTED	REVISED	CHIEF HYDRAULICS ENGR.
	5/09	



SECTION A-A
TYPE 1 MANHOLE
ECCENTRIC



SECTION B-B
TYPE 2 MANHOLE
ECCENTRIC



TYPE 1 & 2 MANHOLE
MODIFIED
For Use in Minimum Cover Situation Where
Tapered Section Will Not Fit.

NOTES:

- FOR CAST IN PLACE CONCRETE BASE ALL REINFORCING STEEL TO BE NO. 4 BARS AT 18" CENTERS TIGHTLY WOUND AT ALL INTERSECTIONS AND EMBEDDED IN CONCRETE AT LEAST 2" AND BAR ENDS MUST CLEAR CONCRETE SURFACES BY 1/2". PRECAST CONCRETE BASE MAY BE USED IN LIEU OF CAST-IN PLACE BASE.
- ALL CONCRETE SHALL BE CLASS A OR AA.
- INFLOW PIPE INVERT ELEVATIONS SHALL BE $\geq 0.1'$ ABOVE OUTFLOW PIPE ELEVATION.
- FOR VALUES OF "H" SEE PLANS. "H" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUTFLOW PIPE INVERT ELEVATION AND THE TOP OF MANHOLE ELEVATION AT STREET GRADE.
- DO NOT PLACE PIPES IN TAPERED SECTION.
- MANHOLE COVER SHALL BEAR ENTITY IDENTIFICATION AND SYSTEM FUNCTION (IF APPLICABLE).
- PRECAST CONCRETE PIPE SECTIONS, TAPERED SECTIONS, LIDS, GRADE RINGS, BASES AND STEPS SHALL CONFORM TO AASHTO M 199 (ASTM C-478).
- SHAPE FLOW LINE IN MANHOLE TO OUTLET PIPE, AND PROVIDE A 10:1 MINIMUM SLOPE FROM ALL DIRECTIONS TOWARD FLOW LINE.
- T = MANHOLE PIPE WALL THICKNESS.
- ROTATE PRECAST LID OR ECCENTRIC RCP TAPERED SECTION TO LOCATE LADDER AWAY FROM PIPE OPENINGS AND TO KEEP MANHOLE COVER OUT OF THE WHEEL PATH OR OTHER UNDESIRABLE LOCATIONS AS DIRECTED BY THE ENGINEER.

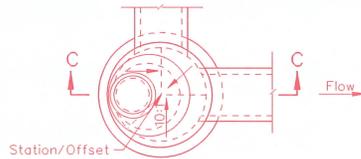
11. THE CLEAR DISTANCE BETWEEN ADJACENT PIPE PENETRATIONS SHALL NOT BE LESS THEN 6". A LARGER MANHOLE MAY BE NECESSARY TO MAINTAIN ADEQUATE SPACING.

R-53

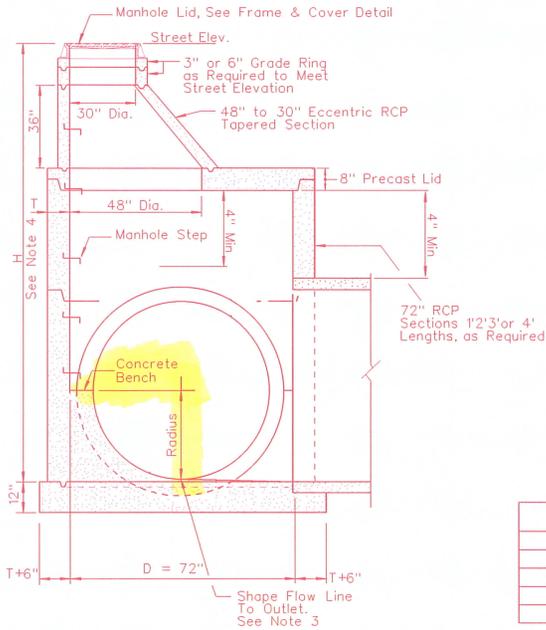
TYPE 1 MANHOLE ECCENTRIC	
Material	Pipe Size
Round RCP	15", 18", 21", 24"
Concrete Arch Pipe	11"x18" (15" Eqv), 13-1/2"x22" (18" Eqv)
Concrete Elliptical	14"x23" (18" Eqv)
HDPE	15", 18", 24"

TYPE 2 MANHOLE ECCENTRIC	
Material	Pipe Size
Round RCP	27", 30", 33", 36"
Concrete Arch Pipe	18"x28-1/2" (24" Eqv), 22-1/2"x36-1/4" (30" Eqv)
Concrete Elliptical	19"x30" (24" Eqv), 22"x34" (27" Eqv)
HDPE	30", 36"

NEVADA DEPARTMENT OF TRANSPORTATION		
TYPE 1 & 2 AND TYPE 1 & 2 MODIFIED MANHOLES		
Signed Original On File	R-4.3.1	(609)
CHIEF HYDRAULICS ENGINEER	ADOPTED	REVISION
	XX/XX	XX/XX



PLAN

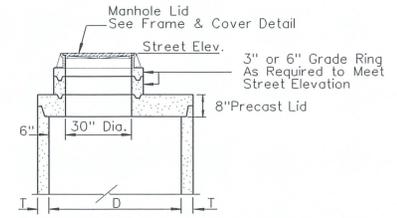


SECTION C-C

TYPE 3 MANHOLE ECCENTRIC



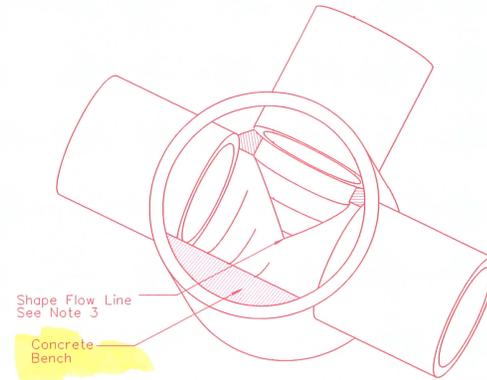
PLAN



SECTION D-D

TYPE 3 MANHOLE MODIFIED

For Use in Minimum Cover Situation Where Tapered Section Will Not Fit.



TYPE 3 MANHOLE ECCENTRIC	
Material	Pipe Size
Round RCP	39", 42"
Concrete Arch Pipe	26-5/8"x43-3/4" (36" Eqv)
Concrete Elliptical	24"x38" (30" Eqv), 27"x42" (33" Eqv), 29"x45" (36" Eqv), 32"x49" (39" Eqv)
HDPE	42", 48"

D = 72" - Max Pipe Penetration O.D. = 58"
See Note 11

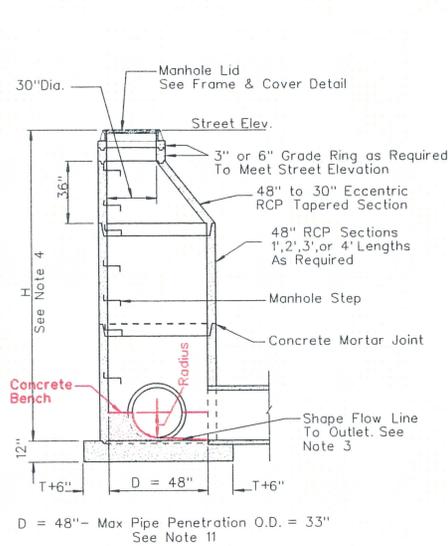
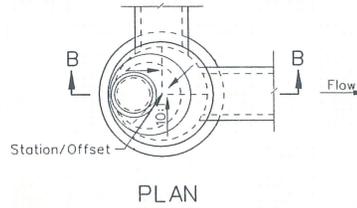
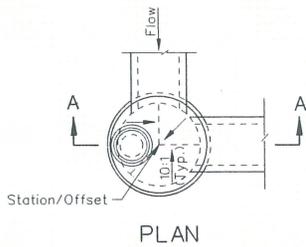
NOTES:

- FOR CAST IN PLACE CONCRETE BASE ALL REINFORCING STEEL TO BE NO. 4 BARS AT 18" CENTERS TIGHTLY WOUND AT ALL INTERSECTIONS AND EMBEDDED IN CONCRETE AT LEAST 2" AND BAR ENDS MUST CLEAR CONCRETE SURFACES BY 1/2". PRECAST CONCRETE BASE MAY BE USED IN LIEU OF CAST-IN PLACE BASE.
- ALL CONCRETE SHALL BE CLASS A OR AA.
- INFLOW PIPE INVERT ELEVATIONS SHALL BE $\geq 0.1'$ ABOVE OUTFLOW PIPE ELEVATION.
- FOR VALUES OF "H" SEE PLANS. "H" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUTFLOW PIPE INVERT ELEVATION AND THE TOP OF MANHOLE ELEVATION AT STREET GRADE.
- DO NOT PLACE PIPES IN TAPERED SECTION.
- MANHOLE COVER SHALL BEAR ENTITY IDENTIFICATION AND SYSTEM FUNCTION (IF APPLICABLE).
- PRECAST CONCRETE PIPE SECTIONS, TAPERED SECTIONS, LIDS, GRADE RINGS, BASES, AND STEPS SHALL CONFORM TO AASHTO M 199 (ASTM C-478).
- SHAPE FLOW LINE IN MANHOLE TO OUTLET PIPE, AND PROVIDE A 10:1 MINIMUM SLOPE FROM ALL DIRECTIONS TOWARD FLOW LINE.
- T = MANHOLE PIPE WALL THICKNESS.
- ROTATE PRECAST LID OR ECCENTRIC RCP TAPERED SECTION TO LOCATE LADDER AWAY FROM PIPE OPENINGS AND TO KEEP MANHOLE COVER OUT OF THE WHEEL PATH OR OTHER UNDESIRABLE LOCATIONS AS DIRECTED BY THE ENGINEER.

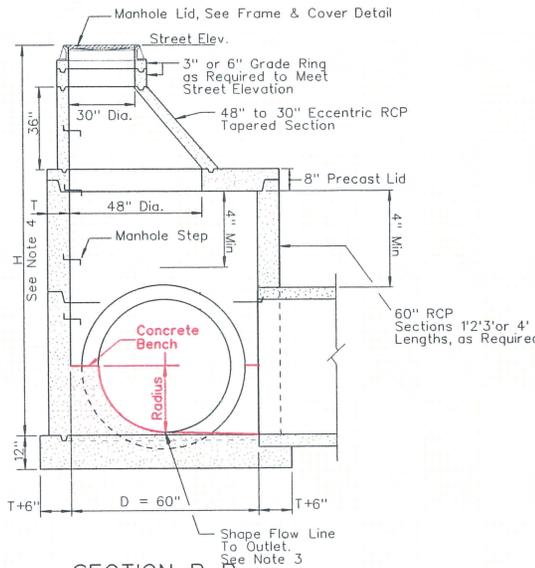
11. THE CLEAR DISTANCE BETWEEN ADJACENT PIPE PENETRATIONS SHALL NOT BE LESS THEN 6". A LARGER MANHOLE MAY BE NECESSARY TO MAINTAIN ADEQUATE SPACING.

R-53

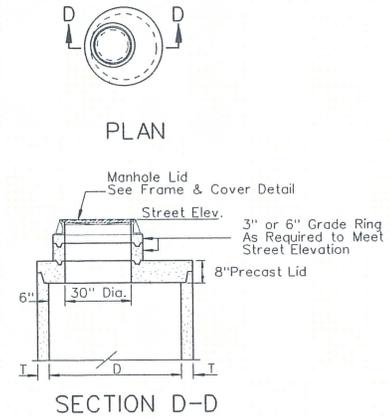
NEVADA DEPARTMENT OF TRANSPORTATION		
TYPE 3 AND TYPE 3 MODIFIED MANHOLES		
Signed Original On File	R-4.3.1.1	(609)
CHIEF HYDRAULICS ENGINEER	ADOPTED XX/XX	REVISION X/XX



SECTION A-A
TYPE 1 MANHOLE
ECCENTRIC



SECTION B-B
TYPE 2 MANHOLE
ECCENTRIC



TYPE 1 & 2 MANHOLE
MODIFIED
For Use in Minimum Cover Situation Where
Tapered Section Will Not Fit.

NOTES:

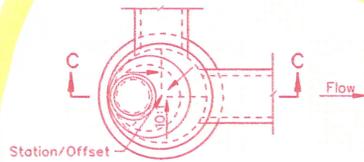
- FOR CAST IN PLACE CONCRETE BASE ALL REINFORCING STEEL TO BE NO. 4 BARS AT 18" CENTERS TIGHTLY WOUND AT ALL INTERSECTIONS AND EMBEDDED IN CONCRETE AT LEAST 2" AND BAR ENDS MUST CLEAR CONCRETE SURFACES BY 1/2". PRECAST CONCRETE BASE MAY BE USED IN LIEU OF CAST-IN PLACE BASE.
- ALL CONCRETE SHALL BE CLASS A OR AA.
- INFLOW PIPE INVERT ELEVATIONS SHALL BE $\geq 0.1'$ ABOVE OUTFLOW PIPE ELEVATION.
- FOR VALUES OF "H" SEE PLANS. "H" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUTFLOW PIPE INVERT ELEVATION AND THE TOP OF MANHOLE ELEVATION AT STREET GRADE.
- DO NOT PLACE PIPES IN TAPERED SECTION.
- MANHOLE COVER SHALL BEAR ENTITY IDENTIFICATION AND SYSTEM FUNCTION (IF APPLICABLE).
- PRECAST CONCRETE PIPE SECTIONS, TAPERED SECTIONS, LIDS, GRADE RINGS, BASES AND STEPS SHALL CONFORM TO AASHTO M 199 (ASTM C-478).
- SHAPE FLOW LINE IN MANHOLE TO OUTLET PIPE, AND PROVIDE A 10:1 MINIMUM SLOPE FROM ALL DIRECTIONS TOWARD FLOW LINE.
- T = MANHOLE PIPE WALL THICKNESS.
- ROTATE PRECAST LID OR ECCENTRIC RCP TAPERED SECTION TO LOCATE LADDER AWAY FROM PIPE OPENINGS AND TO KEEP MANHOLE COVER OUT OF THE WHEEL PATH OR OTHER UNDESIRABLE LOCATIONS AS DIRECTED BY THE ENGINEER.
- ~~THE CLEAR DISTANCE BETWEEN ADJACENT PIPE PENETRATIONS SHALL NOT BE LESS THEN 6". A LARGER MANHOLE MAY BE NECESSARY TO MAINTAIN ADEQUATE SPACING.~~

R-53

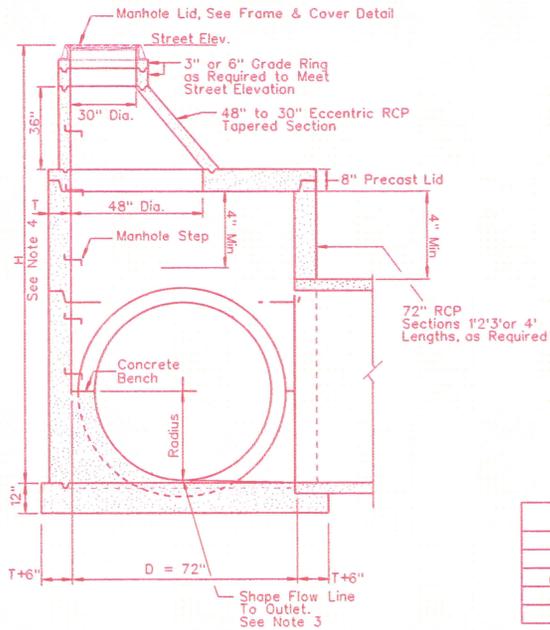
TYPE 1 MANHOLE ECCENTRIC	
Material	Pipe Size
Round RCP	15", 18", 21", 24"
Concrete Arch Pipe	11"x18" (15" Eqv), 13-1/2"x22" (18" Eqv)
Concrete Elliptical	14"x23" (18" Eqv)
HDPE	15", 18", 24"

TYPE 2 MANHOLE ECCENTRIC	
Material	Pipe Size
Round RCP	27", 30", 33", 36"
Concrete Arch Pipe	18"x28-1/2" (24" Eqv), 22-1/2"x36-1/4" (30" Eqv)
Concrete Elliptical	19"x30" (24" Eqv), 22"x34" (27" Eqv)
HDPE	30", 36"

NEVADA DEPARTMENT OF TRANSPORTATION		
TYPE 1 & 2 AND TYPE 1 & 2 MODIFIED MANHOLES		
Signed Original On File	R-4.3.1	(609)
CHIEF HYDRAULICS ENGINEER	ADOPTED XX/XX	REVISION XX/XX



PLAN

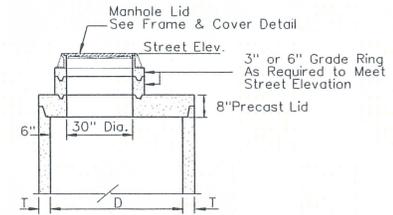


SECTION C-C

TYPE 3 MANHOLE ECCENTRIC



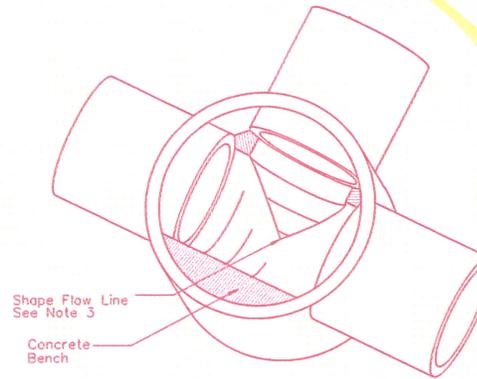
PLAN



SECTION D-D

TYPE 3 MANHOLE MODIFIED

For Use in Minimum Cover Situation Where Tapered Section Will Not Fit.



TYPE 3 MANHOLE ECCENTRIC	
Material	Pipe Size
Round RCP	39", 42"
Concrete Arch Pipe	26-5/8"x43-3/4" (36" Eqv)
Concrete Elliptical	24"x38" (30" Eqv), 27"x42" (33" Eqv), 29"x45" (36" Eqv), 32"x49" (39" Eqv)
HDPE	42", 48"

D = 72" - Max Pipe Penetration O.D. = 58"
See Note 11

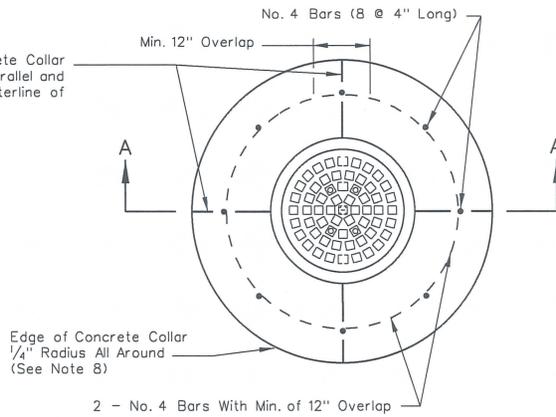
NOTES:

- FOR CAST IN PLACE CONCRETE BASE ALL REINFORCING STEEL TO BE NO. 4 BARS AT 18" CENTERS TIGHTLY WOUND AT ALL INTERSECTIONS AND EMBEDDED IN CONCRETE AT LEAST 2" AND BAR ENDS MUST CLEAR CONCRETE SURFACES BY 1/2". PRECAST CONCRETE BASE MAY BE USED IN LIEU OF CAST-IN PLACE BASE.
- ALL CONCRETE SHALL BE CLASS A OR AA.
- INFLOW PIPE INVERT ELEVATIONS SHALL BE $\geq 0.1'$ ABOVE OUTFLOW PIPE ELEVATION.
- FOR VALUES OF "H" SEE PLANS. "H" IS THE DIFFERENCE IN ELEVATION BETWEEN THE OUTFLOW PIPE INVERT ELEVATION AND THE TOP OF MANHOLE ELEVATION AT STREET GRADE.
- DO NOT PLACE PIPES IN TAPERED SECTION.
- MANHOLE COVER SHALL BEAR ENTITY IDENTIFICATION AND SYSTEM FUNCTION (IF APPLICABLE).
- PRECAST CONCRETE PIPE SECTIONS, TAPERED SECTIONS, LIDS, GRADE RINGS, BASES, AND STEPS SHALL CONFORM TO AASHTO M 199 (ASTM C-478).
- SHAPE FLOW LINE IN MANHOLE TO OUTFLOW PIPE, AND PROVIDE A 10:1 MINIMUM SLOPE FROM ALL DIRECTIONS TOWARD FLOW LINE.
- T = MANHOLE PIPE WALL THICKNESS.
- ROTATE PRECAST LID OR ECCENTRIC RCP TAPERED SECTION TO LOCATE LADDER AWAY FROM PIPE OPENINGS AND TO KEEP MANHOLE COVER OUT OF THE WHEEL PATH OR OTHER UNDESIRABLE LOCATIONS AS DIRECTED BY THE ENGINEER.
- THE CLEAR DISTANCE BETWEEN ADJACENT PIPE PENETRATIONS SHALL NOT BE LESS THEN 6". A LARGER MANHOLE MAY BE NECESSARY TO MAINTAIN ADEQUATE SPACING.

R-53

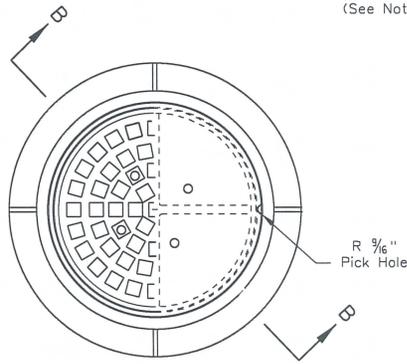
NEVADA DEPARTMENT OF TRANSPORTATION		
TYPE 3 AND TYPE 3 MODIFIED MANHOLES		
Signed Original On File	R-4.3.1.1	(609)
CHIEF HYDRAULICS ENGINEER	ADOPTED XX/XX	REVISION X/XX

4 Lines on Top of Concrete Collar Scored 1/2" Deep. Two Parallel and Two Perpendicular to Centerline of Roadway

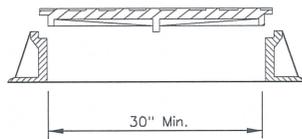


See Note 10

CONCRETE COLLAR PLAN



PLAN

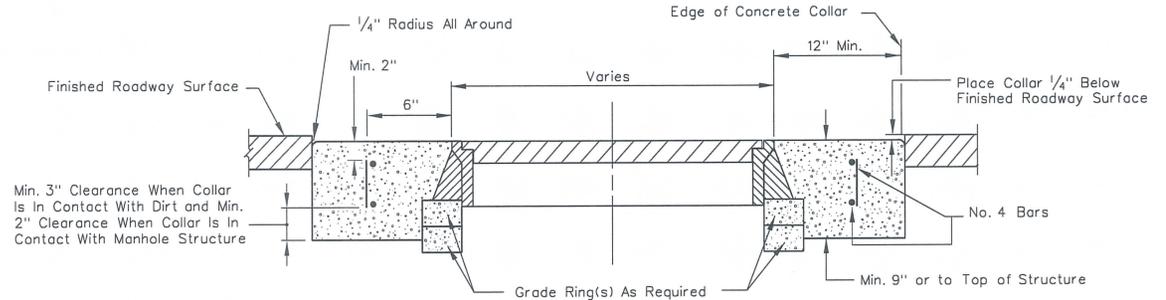


SECTION B-B

TRAFFIC-STRENGTH
MANHOLE FRAME AND COVER

NOTES:

1. The weight of frame shall be 250 lbs minimum and the weight of cover shall be 300 lbs minimum. Traffic-strength manhole frame and cover shall comply with AASHTO M306 H-20 wheel loads. Equivalent manhole frames and covers other than shown may be used upon approval by the engineer.
2. The frame seat and cover edge shall be machined to a true bearing surface all around. The frame and cover shall be compatible to the manufacturers specifications.
3. The surface shown is for illustration only. Any surface design, other than smooth, may be used upon approval.
4. Frames and covers shall conform to ASTM A48, Class 40 for gray iron castings.
5. A cast-in-place concrete collar shall be placed around a manhole frame unless otherwise directed.
6. Manhole cover shall bear name of entity and system function (if applicable).
7. Concrete shall be class A or AA.
8. Concrete collars may be poured round, or any other appropriate shape when approved by the engineer.
9. Commercial prefabricated grade rings for manholes shall conform to AASHTO M 199 (ASTM C-478).
10. Manhole cover and frame shown. Other shapes may apply to utility and valve covers and frames.



See Note 10

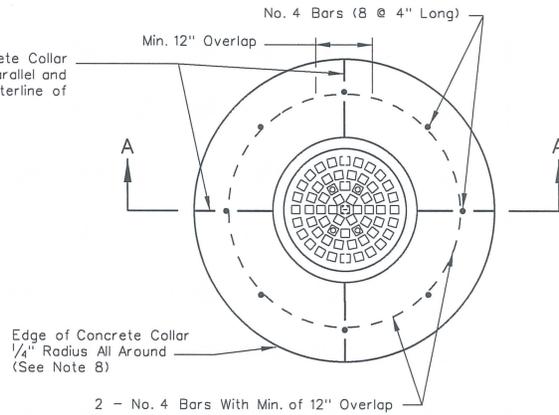
SECTION A-A

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

MANHOLE COVER, FRAME,
AND CONCRETE COLLAR

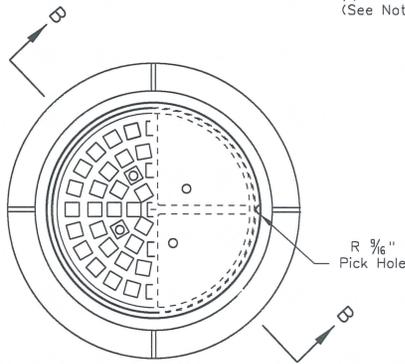
R-4.3.3		(609)	Signed Original On File
ADOPTED	REVISED		CHIEF HYDRAULICS ENGR.
8/69	5/09		

4 Lines on Top of Concrete Collar Scored $\frac{1}{2}$ " Deep. Two Parallel and Two Perpendicular to Centerline of Roadway

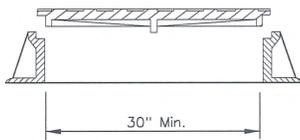


See Note 10

CONCRETE COLLAR PLAN



PLAN

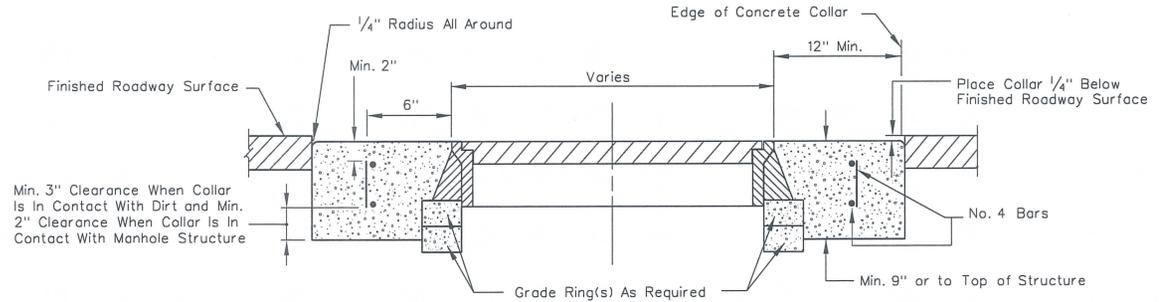


SECTION B-B

TRAFFIC-STRENGTH
MANHOLE FRAME AND COVER

NOTES:

1. The weight of frame shall be 250 lbs. minimum and the weight of cover shall be 300 lbs. minimum. Traffic-strength manhole frame and cover shall comply with AASHTO M306 H-20 wheel loads. Equivalent manhole frames and covers other than shown may be used upon approval by the engineer.
2. The frame seat and cover edge shall be machined to a true bearing surface all around. The frame and cover shall be compatible to the manufacturers specifications.
3. The surface shown is for illustration only. Any surface design, other than smooth, may be used upon approval.
4. Frames and covers shall conform to ASTM A48, Class 40 for gray iron castings.
5. A cast-in-place concrete collar shall be placed around a manhole frame unless otherwise directed.
6. Manhole cover shall bear name of entity and system function (if applicable).
7. Concrete shall be class A or AA.
8. Concrete collars may be poured round, or any other appropriate shape when approved by the engineer.
9. Commercial prefabricated grade rings for manholes shall conform to AASHTO M 199 (ASTM C-478).
10. Manhole cover and frame shown. Other shapes may apply to utility and valve covers and frames.



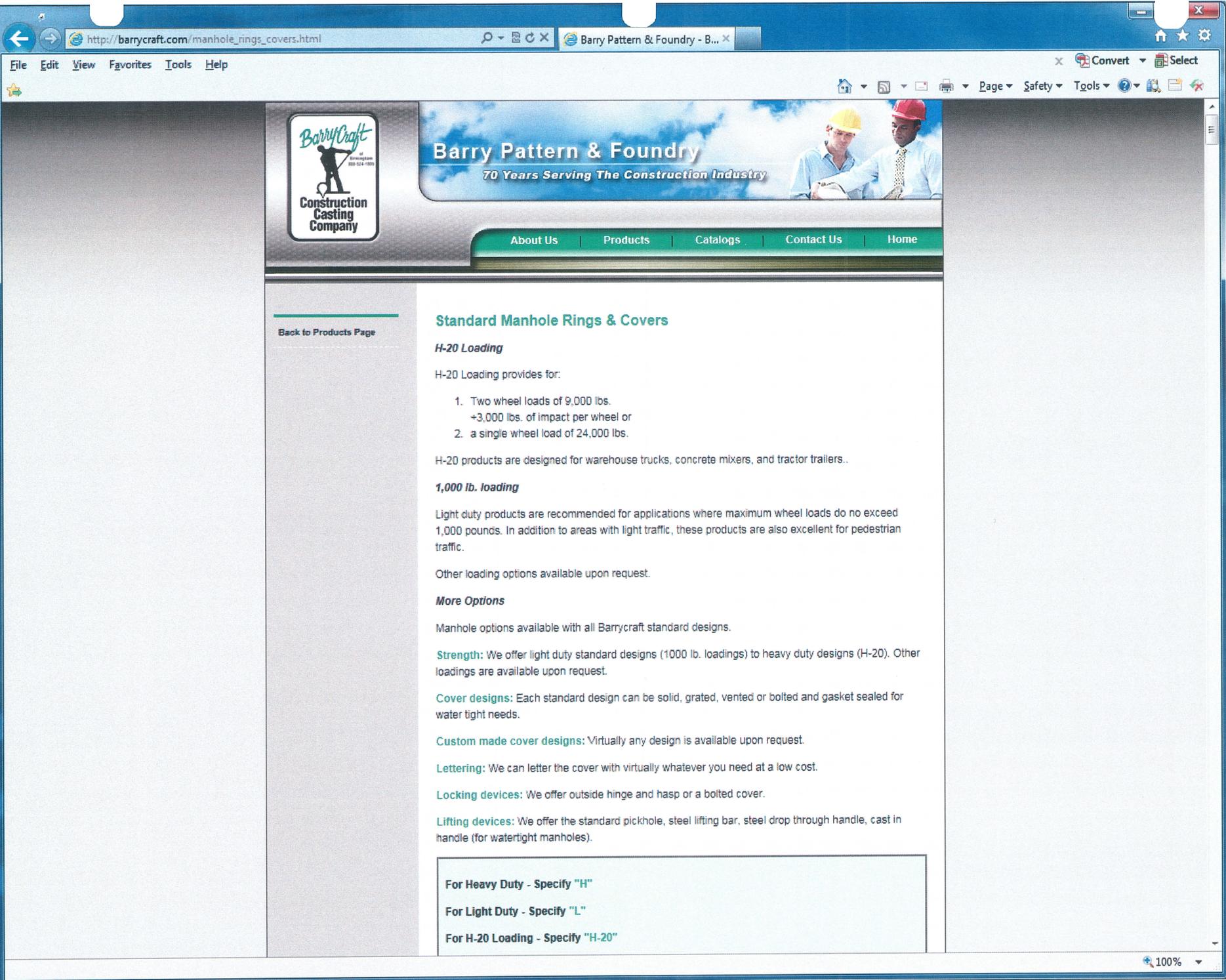
See Note 10

SECTION A-A

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

MANHOLE COVER, FRAME,
AND CONCRETE COLLAR

R-4.3.3 (609)		Signed Original On File
ADOPTED 8/69	REVISED 5/09	CHIEF HYDRAULICS ENGR.



Barry Pattern & Foundry

70 Years Serving The Construction Industry



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Standard Manhole Rings & Covers

H-20 Loading

H-20 Loading provides for:

- Two wheel loads of 9,000 lbs. +3,000 lbs. of impact per wheel or
- a single wheel load of 24,000 lbs.

H-20 products are designed for warehouse trucks, concrete mixers, and tractor trailers..

1,000 lb. loading

Light duty products are recommended for applications where maximum wheel loads do no exceed 1,000 pounds. In addition to areas with light traffic, these products are also excellent for pedestrian traffic.

Other loading options available upon request.

More Options

Manhole options available with all Barrycraft standard designs.

Strength: We offer light duty standard designs (1000 lb. loadings) to heavy duty designs (H-20). Other loadings are available upon request.

Cover designs: Each standard design can be solid, grated, vented or bolted and gasket sealed for water tight needs.

Custom made cover designs: Virtually any design is available upon request.

Lettering: We can letter the cover with virtually whatever you need at a low cost.

Locking devices: We offer outside hinge and hasp or a bolted cover.

Lifting devices: We offer the standard pickhole, steel lifting bar, steel drop through handle, cast in handle (for watertight manholes).

- For Heavy Duty - Specify "H"
- For Light Duty - Specify "L"
- For H-20 Loading - Specify "H-20"

http://barrycraft.com/manhole_rings_covers.html Barry Pattern & Foundry - B...

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C - the height the manhole is to be raised.

Large Manhole Covers

B-1600 and **B-1602** are our most popular manhole series, with standard seven inch deep frames. **B-1602** have light duty solid covers or grates.

Round B1600 Series - Bottom Flange

[CAD](#) [Get DWG Viewer](#)

H-20 Loading - For Heavy Loads

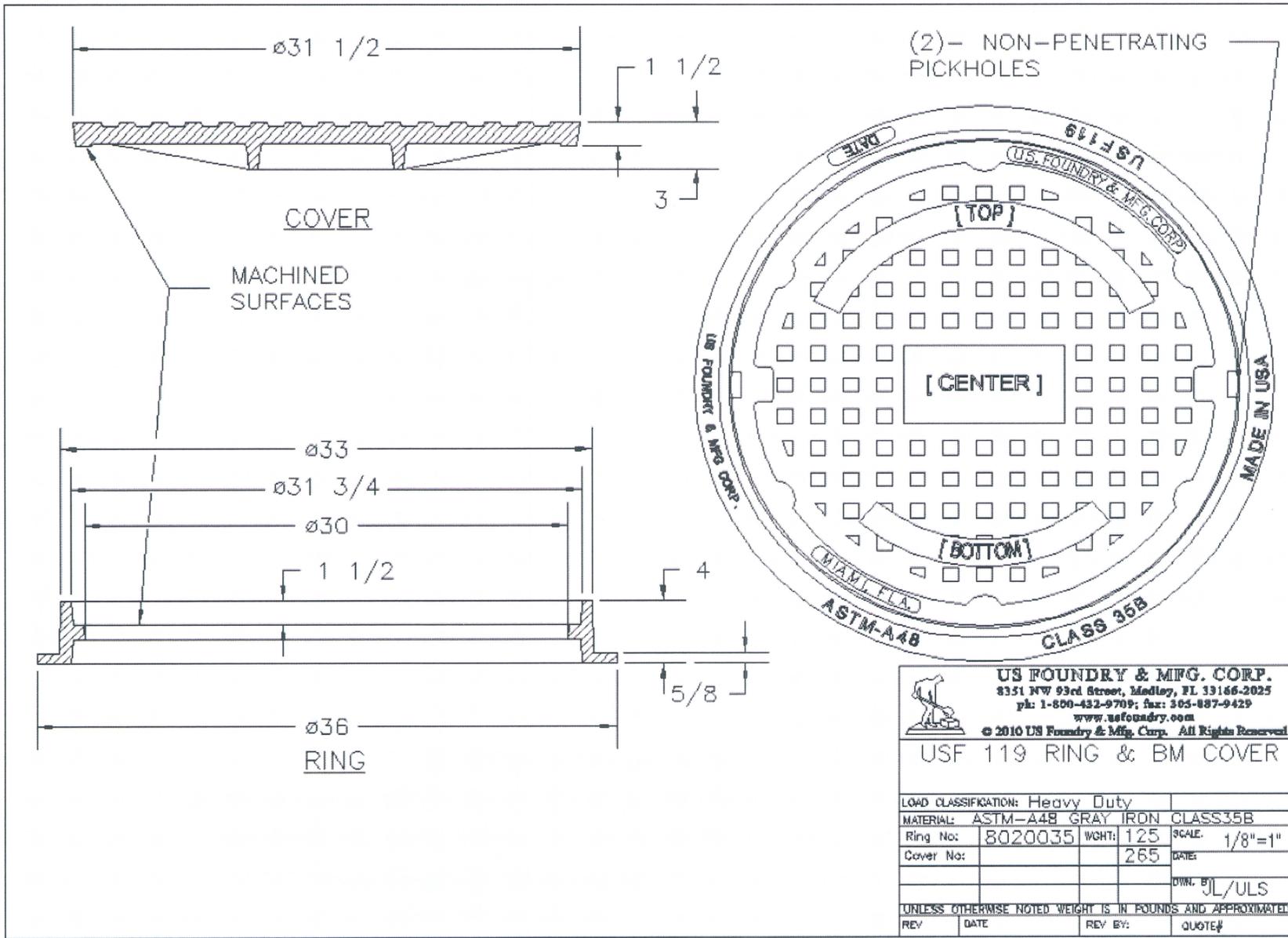
Table Dimensions in Inches

Manhole Style	Cover Diameter "A"	Cover Thickness "B"	Clearing Opening "C"	Ring Overall "E"
B-1600-A	20	1-3/4	18	30
B-1600-B	22	1-3/4	20	32
B-1600-C	24	1-3/4	22	34
B-1600-D	26	1-3/4	24	36
B-1600-E	29	1-3/4	27	39
B-1600-F	32	1-3/4	30	42
B-1600-G	38	1-3/4	36	48

100%

B-1600-F 550LBS Total Cover 300LBS Frame 250LBS

Called 10/8/14



[CONTACT US](#)



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: R-5.2.1 thru R-5.2.4 Page No.: R-58 thru R-61 Note: A separate form is required for each change.

Description of requested modification or correction: Replace old sheets with
UPDATED ONES

(Please attach supporting information).

Reason for request: _____

Requestor Information: Name: ERIC DIMIT Phone: 7523

For Standards/Manuals Personnel Only: Approved Denied

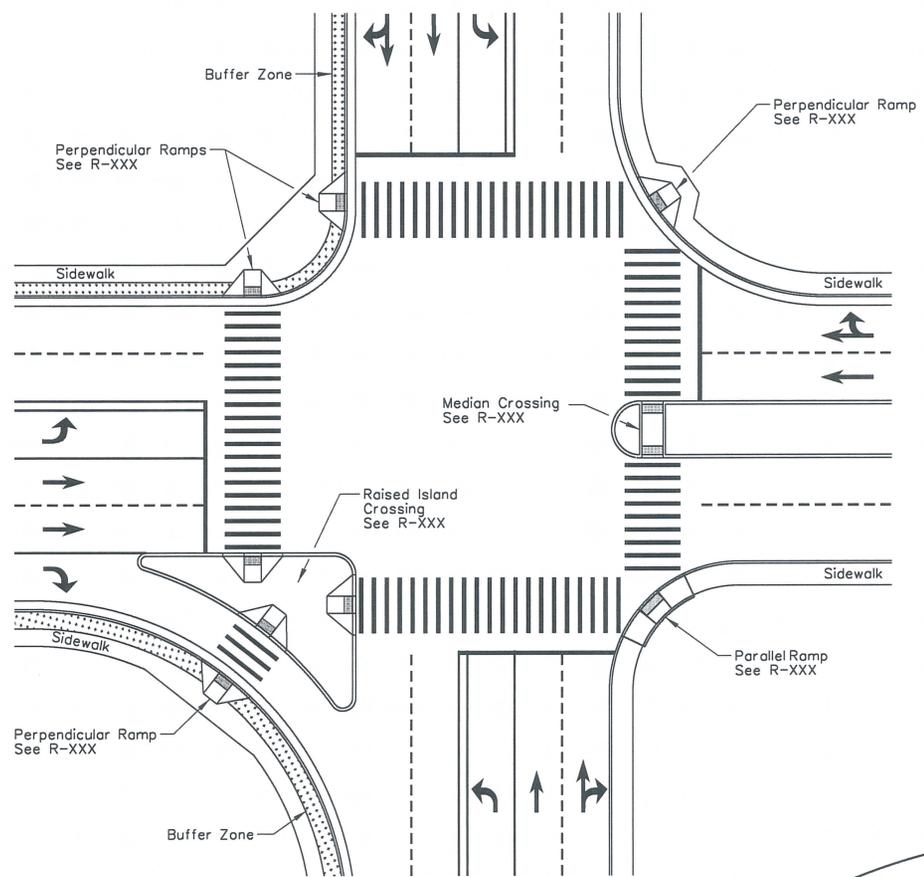
Revised by: Signature: _____ Date: _____

Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

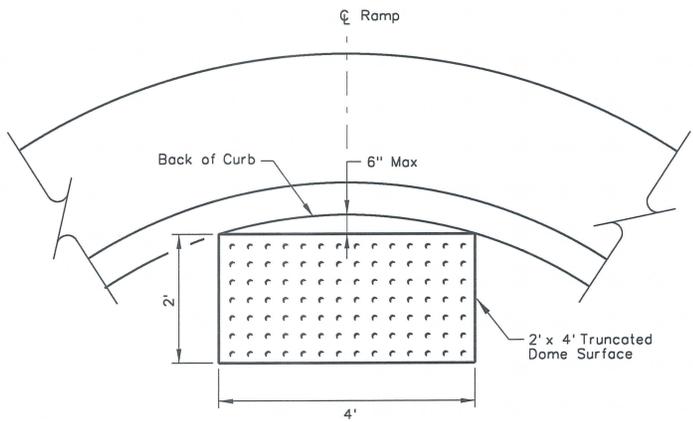
Reviewed by: Signature: _____ Date: _____

Notes: _____

XX.IHS



PLAN VIEW

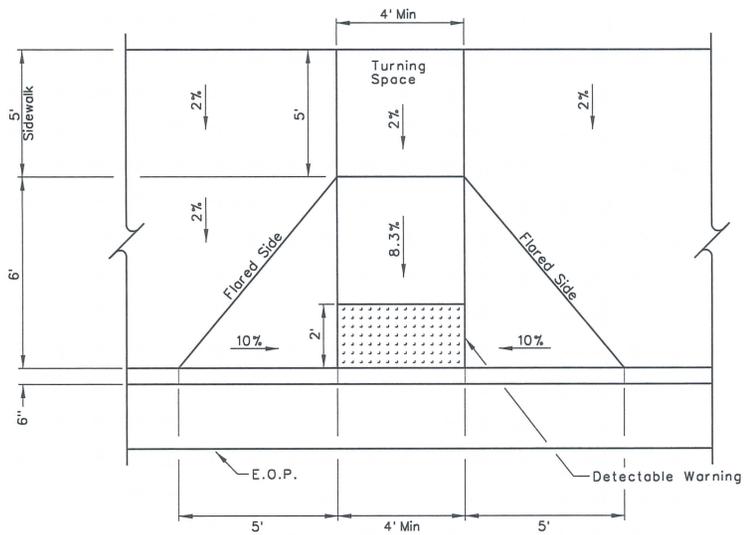


DETAIL OF TRUNCATED DOME SURFACE IN RADIUS

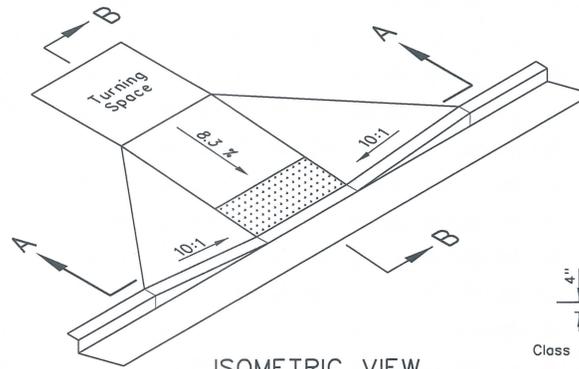
NOTES:

1. The detectable warning should extend the fullwidth of the curb ramp (exclusive of flared sides).
2. Sidewalk cross slope is 2% maximum, desirable slope is 1.5%.
3. Grates for storm drains shall not be placed in the crosswalk or in front of the curb ramp.
4. Transitions from ramps to gutters or roadway surface shall be flush and free of abrupt changes.
5. Plantmix bituminous open-graded surface shall be flush with the edge of the gutter pan in the area of the curb ramp, and feathered at 8.3% in line with the crosswalk.
6. Rough broom texture on curb ramps and wings. Texture shall provide a visual contrast to the sidewalk.
7. Curb ramp wings do not have to be within crosswalk however, the ramp itself has to be inside crosswalk.
8. All ramps shall be 8.3% or flatter, 15 foot maximum length, engineer should be notified for assesment if the curb ramp exceed 15 foot in length due to the longitudinal roadway grade.
9. All slope rates are relative to level.
10. Concrete shall be class A or AA.
11. Raise gutter flowline 2 inch maximum, when required to prevent ponding at the ramp and maintain positive drainage.
12. Detectable warnings shall be selected from NDOT "Quality Product List" (QPL) and installed per manufacturers guidelines.
13. If there are R/W restrictions then the sidewalk width can be reduced to no less than 4 foot with approval of the Assistant Chief Road Design Engineer. If the sidewalk width is less than 5 foot then 5 foot by 5 foot passing zones are required at 200 foot intervals.
14. No direct payment for neat line saw cut. An additional 1 foot of pavement may be required. If electing to remove an additional 1 foot match existing structural section with patch; no adjustment to the plan quantities for removal and patching.
15. Share use path ramps shall be as wide as the share use path.

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
CURB RAMP AND TRUNCATED DOME SURFACE DETAIL		
DET. *	(000)	Signed Original On File
ADOPTED	REVISD	CHIEF ROAD DESIGN ENGR.



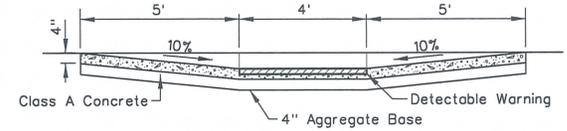
PLAN VIEW



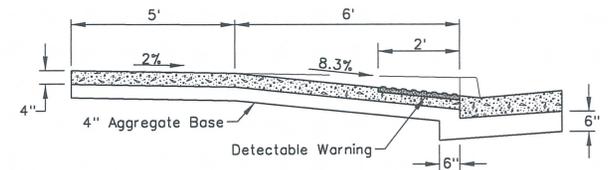
ISOMETRIC VIEW

NOTES

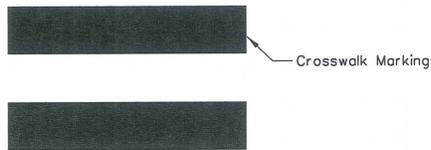
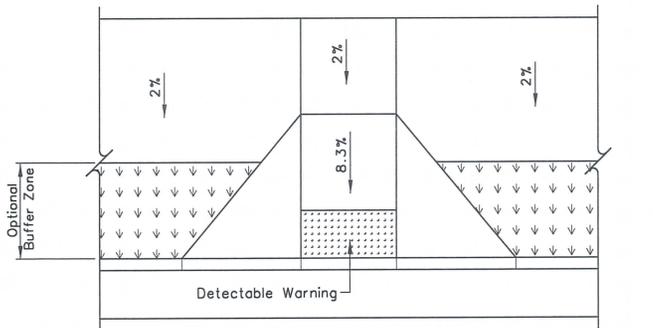
1. If buffer zone is wider than 6 feet, the side flares may be omitted and a returned curb option may be used.
2. For additional notes see sheet R-XXX



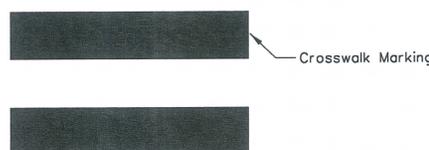
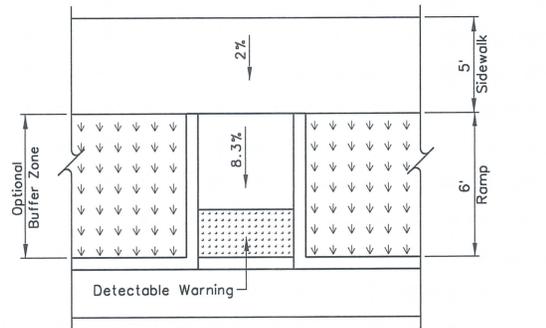
SECTION A-A



SECTION B-B



CURB RAMP WITH SIDE FLARES



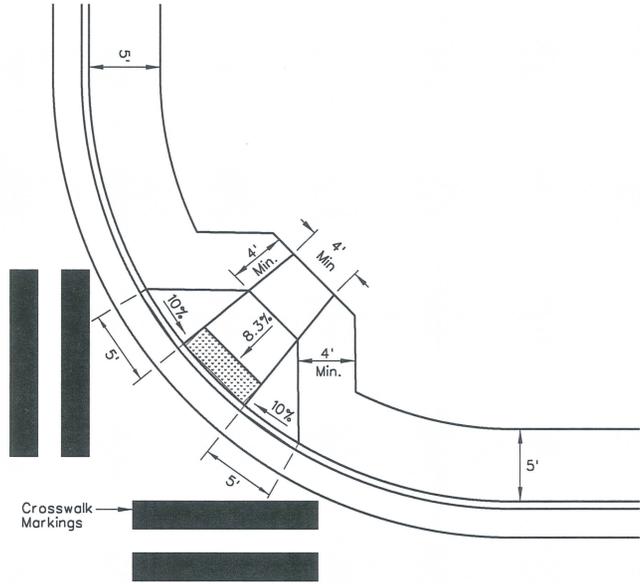
CURB RAMP WITH RETURN CURB

SHEET 1 OF 2

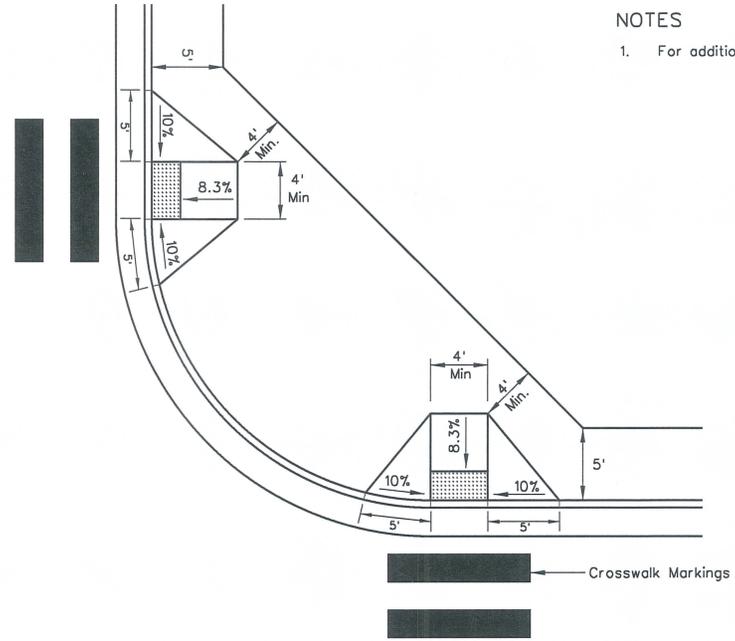
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

PERPENDICULAR
CURB RAMP
DETAIL

DET. •	(000)	Signed Original On File
ADOPTED	REVIS	CHIEF ROAD DESIGN ENGR.



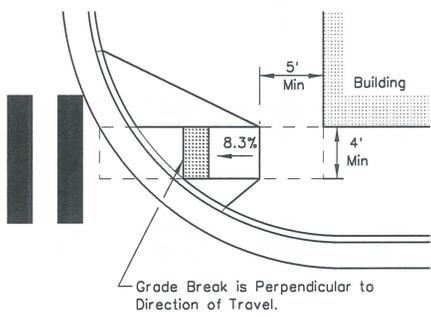
CURB RAMP WITHIN RADIUS



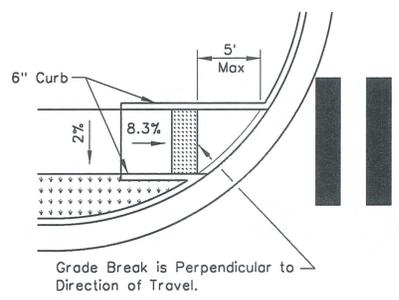
CURB RAMP OUTSIDE RADIUS

NOTES

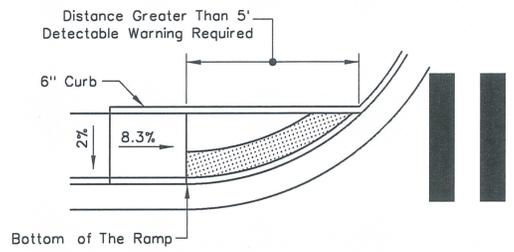
- 1. For additional notes see sheet R-XXX



CONSTRAINED TURNING SPACE



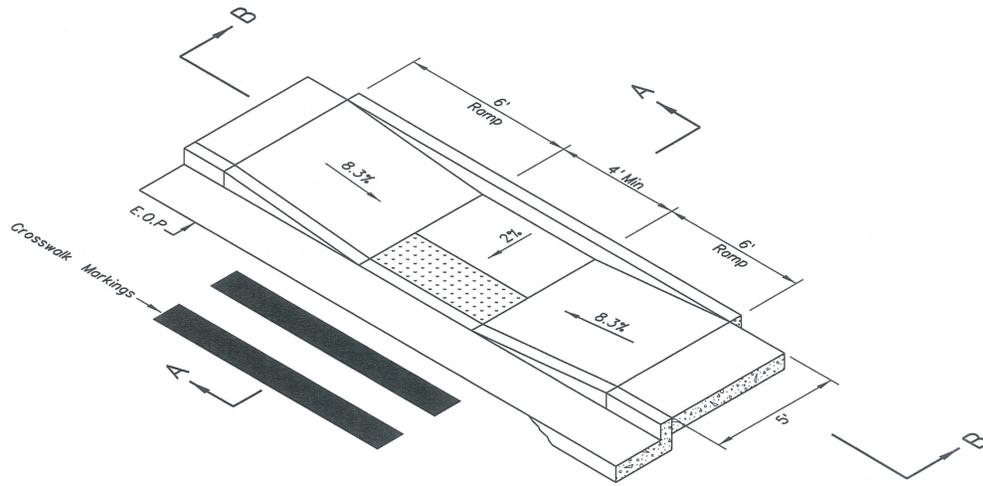
DETECTABLE WARNING PLACEMENT



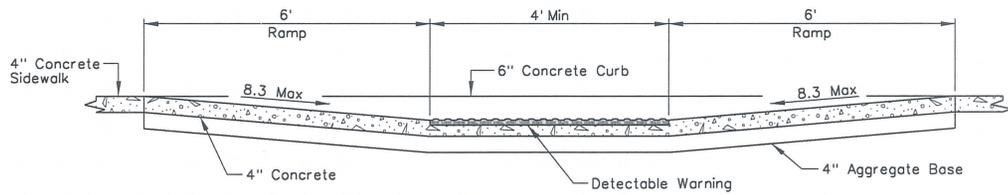
PERPENDICULAR
CURB RAMP

DET. •	(000)	Signed Original On File
ADOPTED	REVIS	CHIEF ROAD DESIGN ENGR.

XXLHS



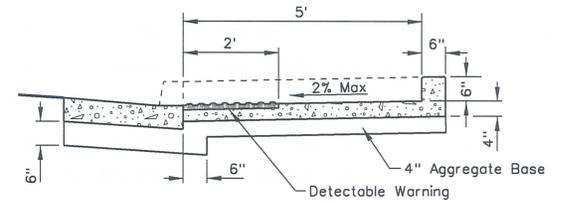
PARALLEL CURB RAMP DETAIL



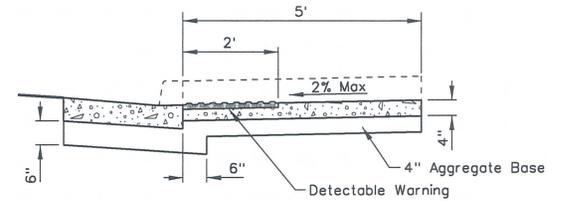
SECTION B-B

NOTES

- For additional notes see sheet R-XXX



SECTION A-A
(With Back Curb)



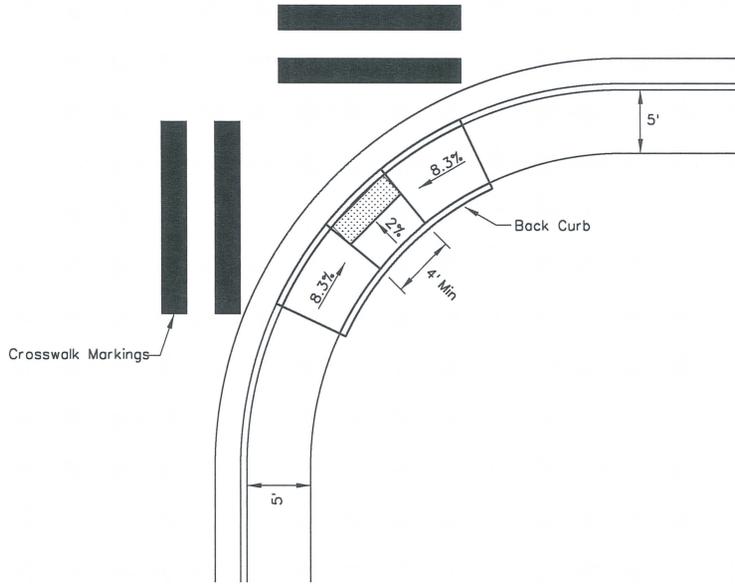
SECTION A-A (ALTERNATE)
(Without Back Curb)

SHEET 1 OF 2

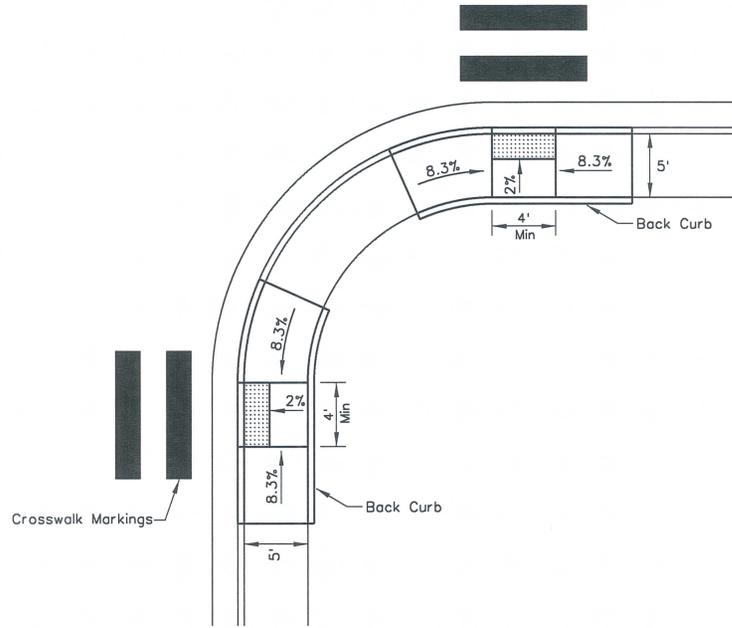
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

PARALLEL CURB RAMP
DETAIL

DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF ROAD DESIGN ENGR.
•/••	•/••	



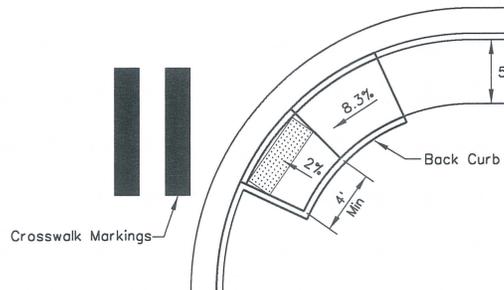
CURB RAMP WITHIN RADIUS



CURB RAMP OUTSIDE RADIUS

NOTES:

1. For additional notes see sheet R-XXX
2. 5 foot sidewalk width shall not include 6 inch back curb.



MODIFIED CURB RAMP WITHIN RADIUS

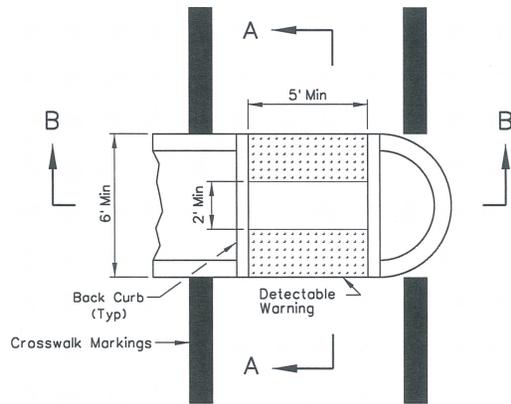
SHEET 2 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

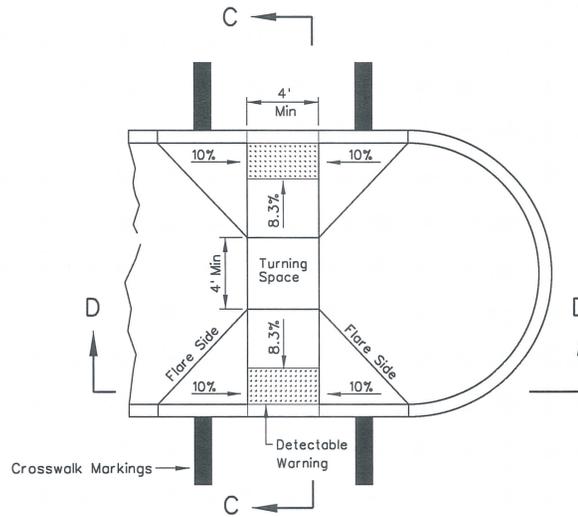
PARALLEL CURB
RAMP

DET. •	(000)	Signed Original On File
ADOPTED	REVIS	CHIEF ROAD DESIGN ENGR.
•/••	•/••	

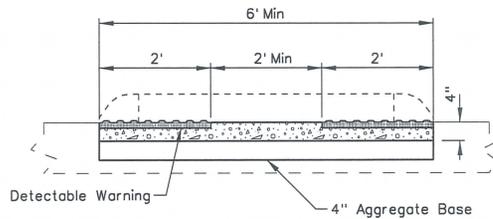
XXLHLS



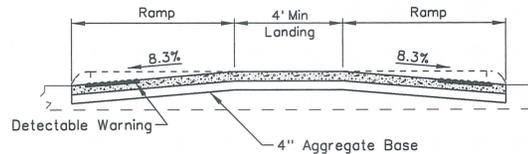
MEDIAN CROSSING PLAN VIEW
(CUT-THROUGH)



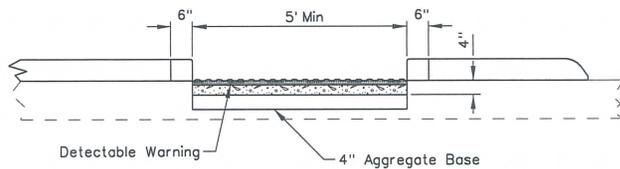
MEDIAN CROSSING PLAN VIEW
(PERPENDICULAR RAMP)



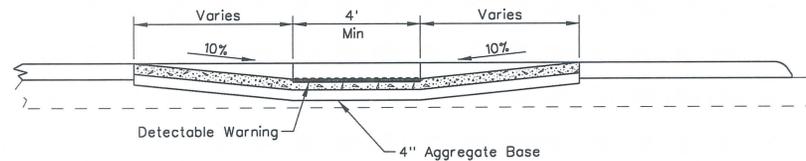
SECTION A-A



SECTION C-C



SECTION B-B



SECTION D-D

NOTES

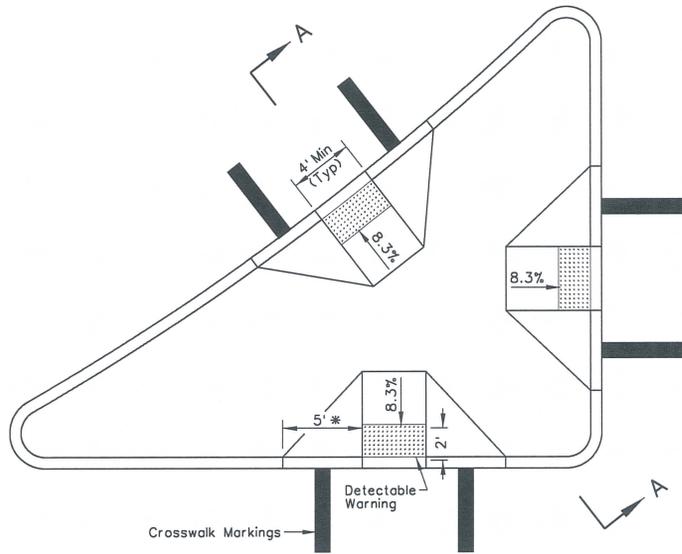
1. All curb ramps shall be 8.3% or flatter. All slope rates are relative to level.
2. Grates, manholes, valve covers or similar appurtenances shall not be located in area at the base of the curb ramp or landing area.
3. Transitions from ramps to gutters or roadway surface shall be flush and free of abrupt changes.
4. Plantmix bituminous open-graded surface shall be flush with the edge of the gutter pan in the area of the curb ramp.
5. Rough broom texture on curb ramps and wings. Texture shall provide a visual contrast to the median island.
6. Concrete shall be class A or AA.
7. Avoid drainage pockets in crosswalk areas.
8. Detectable warnings shall be installed per manufacturers guidelines and conform to PROWAG (R305.1.3) "Contrast" and (R305.2) "Placement".
9. A 4 foot by 4 foot turning space shall be provided and conform to PROWAG (R302.7) "Surface".
10. See plans for location of curb ramps.
11. 15 foot maximum to accommodate 8.3% or flatter concrete ramp.

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
MEDIAN CROSSING		
DET. •	(000)	Signed Original On File
ADOPTED	REVISID	CHIEF ROAD DESIGN ENGR.

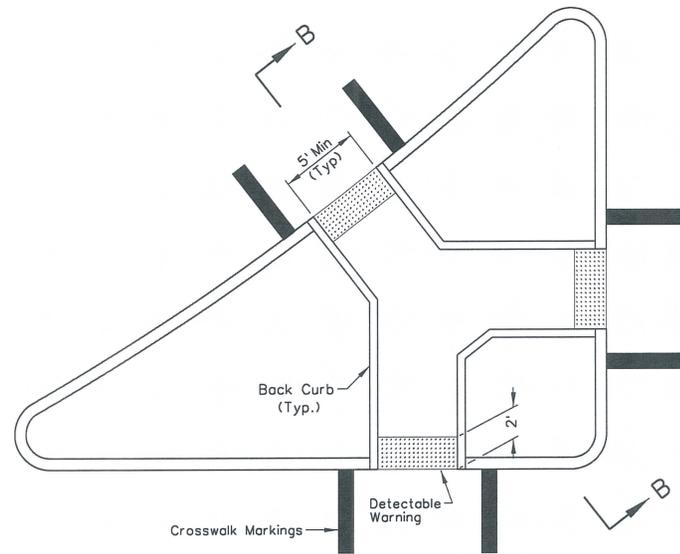
XX.LHS

NOTES

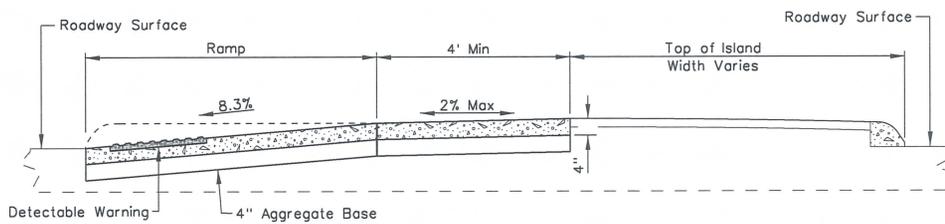
1. For additional notes see sheet R-XXX



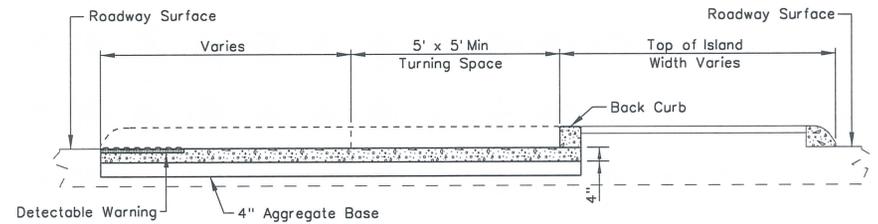
CHANNELIZATION ISLAND
(PERPENDICULAR RAMP)



CHANNELIZATION ISLAND
(CUT-THROUGH)



SECTION A-A

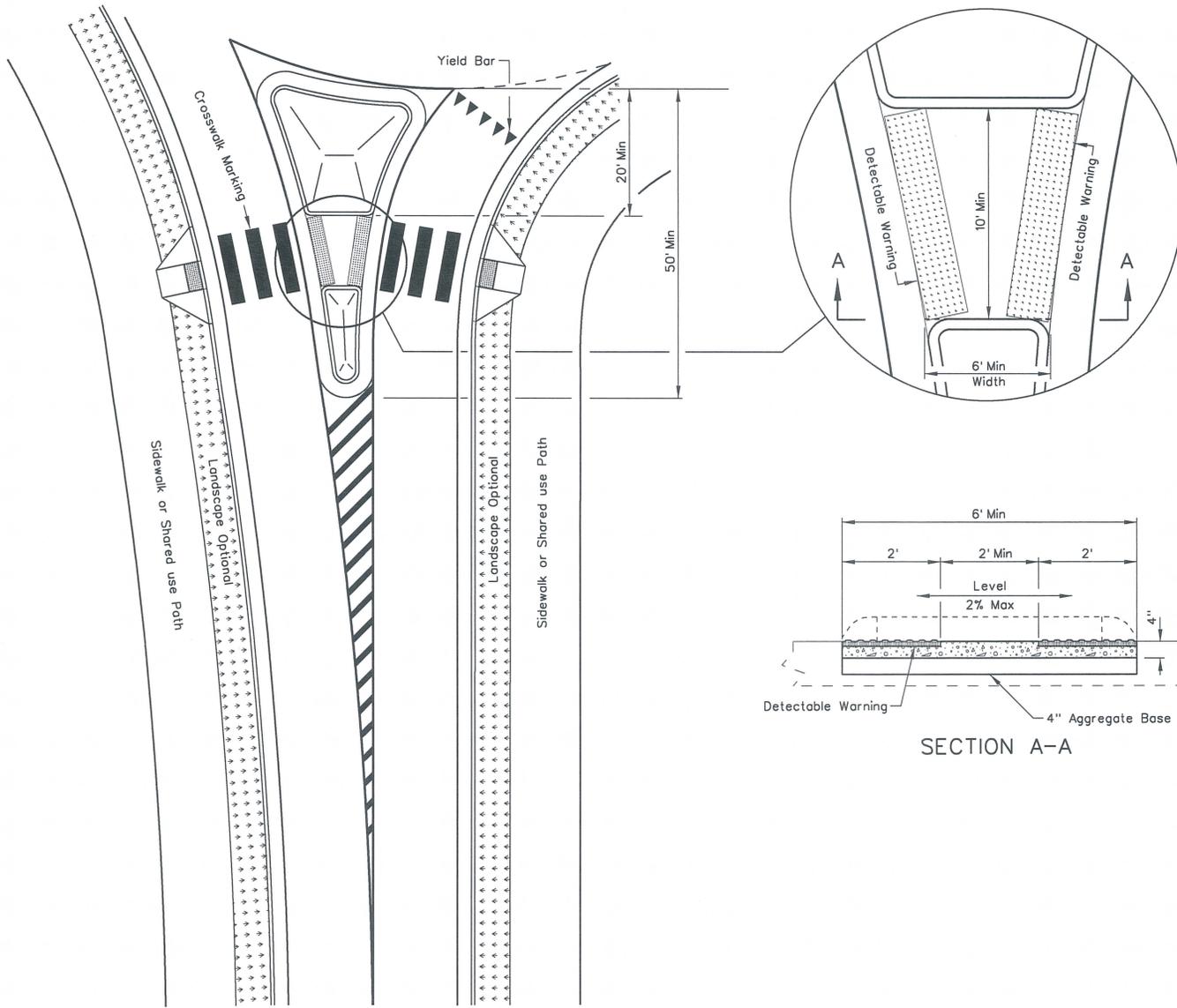


SECTION B-B

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CHANNELIZATION ISLAND
CROSSING

DET. •	(000)	Signed Original On File
ADOPTED	REVIS	CHIEF ROAD DESIGN ENGR.

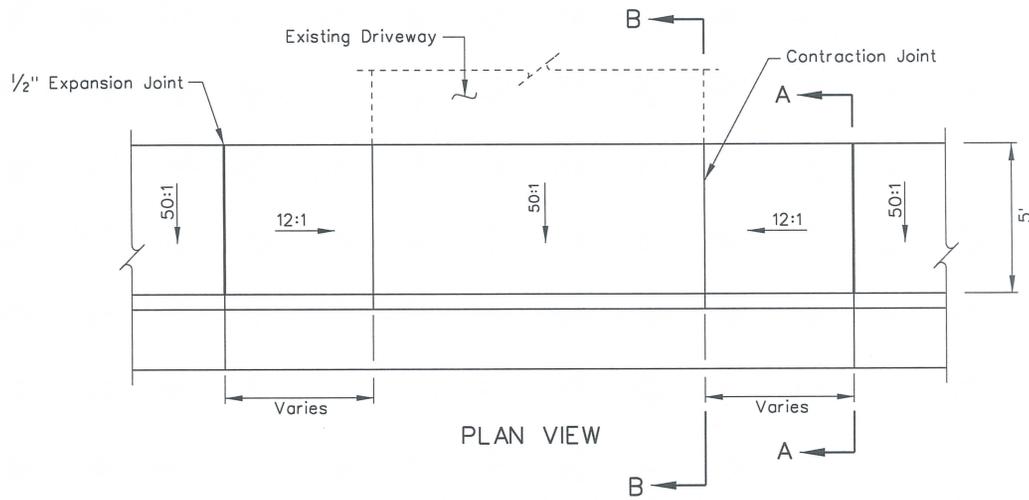


SPLITTER ISLAND CROSSING

NOTES

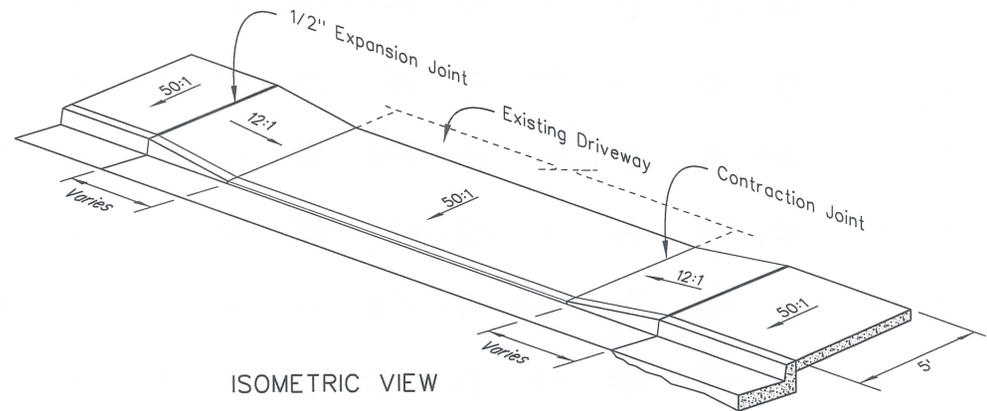
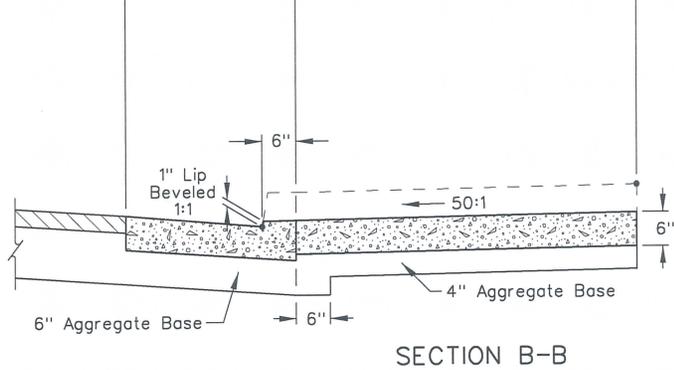
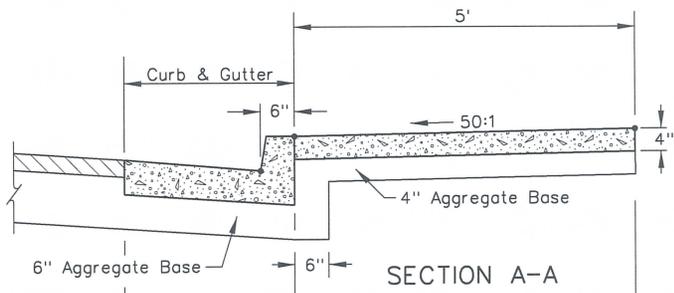
1. 4 inch sloping concrete combined curb and gutter should be used between circulatory roadway and truck apron unless otherwise noted. Curb and gutter should be used between the truck apron and central island.
2. The cross slope of the landing area shall not exceed 2% in the sidewalk area.
3. Splitter island size and shape will be determined by the roadway deflection.
4. Splitter island should be a raised median with concrete hardscaping (preferred). Splitter island should extend a minimum of 50 feet from the yield line.
5. Splitter island should be a raised median with concrete hardscaping (preferred). Splitter island should extend a minimum of 50 feet from the yield line.
6. Detectable warning surface shall be installed at both sides of the splitter island pedestrian refuge area.
7. When circulatory roadway is concrete, the transverse contraction joints should line up with contraction joints in the truck apron. The joints in the truck apron should not be doweled. The combined curb and gutter should be tied to the roadway concrete.
8. For additional details of types of curbs and gutters, see standard drawing R-XXX.

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
SPLITTER ISLAND CROSSING		
DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF ROAD DESIGN ENGR.
•/••	•/••	



NOTES:

1. For additional notes see sheet R-XXX



SHEET 2 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

RESIDENTIAL DRIVEWAY

DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.



2014 Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

R-89, 92, 93, 94, 101, 102, 105, 108

Standard Sheet No.: _____ Page No.: _____ Note: A separate form is required for each change.

Description of requested modification or correction: Remove shy distance reference
from these sheets

(Please attach supporting information).

Reason for request: shy distance is defined in the
roadside design guide

Requestor Information: Name: John Eiche Phone: 7598

For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

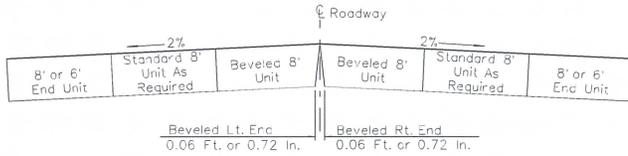
Policy Review:

CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes: _____

TYPICAL CATTLE GUARD INSTALLATION ON CROWNED ROADWAYS

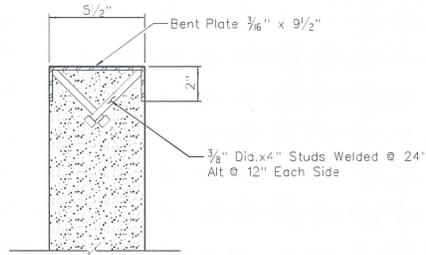


Install Using an Even Number of Units as Shown
Above and Indicated in the Table Below

UNITS FOR ROADWAY CROWNED AT					
WIDTH OF ROADWAY	LENGTH OF END UNITS	8 FT. UNITS BEVELED	8 FT. UNITS STANDARD	LENGTH SUPPLIED	LENGTH BEYOND SHOULDER
24'	2 @ 6'	2		28'	2'
26'	2 @ 6'	2		28'	1'
28'	2 @ 6'	2		28'	0'
30'	2 @ 8'	1		32'	1'
32'	2 @ 8'	2		32'	0'
34'	2 @ 6'	2		44'	5'
36'	2 @ 6'	2	2	44'	4'
38'	2 @ 6'	2	2	44'	3'
40'	2 @ 6'	2	2	44'	2'
42'	2 @ 6'	2	2	44'	1'
44'	2 @ 6'	2	2	44'	0'
46'	2 @ 8'	2	2	48'	1'
48'	2 @ 8'	2	2	48'	0'
50'	2 @ 6'	2	4	60'	5'
52'	2 @ 6'	2	4	60'	4'
54'	2 @ 6'	2	4	60'	3'
56'	2 @ 6'	2	4	60'	2'
58'	2 @ 6'	2	4	60'	1'
60'	2 @ 6'	2	4	60'	0'

NOTES:

1. PRECAST CONCRETE SHALL REACH Fc' = 4500 PSI AT 28 DAYS. ALL OTHER CONCRETE SHALL BE CLASS A OR AA.
2. MATERIAL LIST IS FOR INFORMATION ONLY.



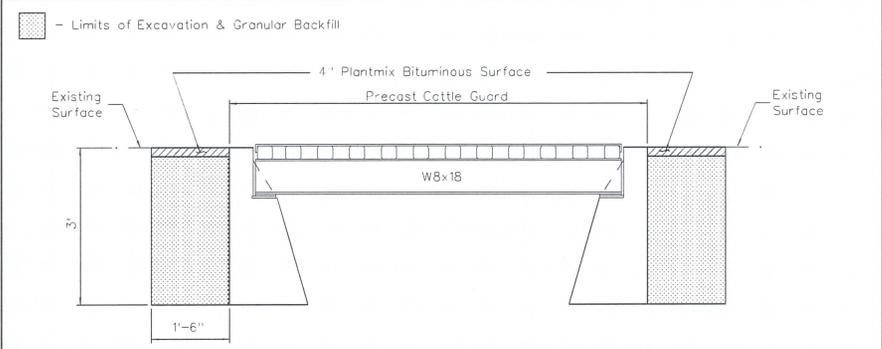
ALTERNATE ARMOR DETAIL
This Detail May be Substituted for The 2' x 2' x 1/4" Armor Angles at The Contractors Option.

STRUCTURAL STEEL				
UNIT	ITEM	REQ'D	LENGTH	WT. LBS.
SHORT END	TS3" x 3" x 3/16"	12	5'-6"	678
	W8 x18	4	7'	504
	L 2" x 2" x 1/4"	2	0'-5 1/2"	3
	L 2" x 2" x 1/4"	2	6'	38
	L 2" x 2" x 1/4"	2	5'-6 1/2"	35
	3/8" DIA. STUD ANCHOR ASSY.	12	0'-4"	2
	3/8" x 4" PLATE	8	-----	90
		2	7'-1 3/4"	73
				1423
INTERMEDIATE	TS3" x 3" x 3/16"	12	7'-11 3/4"	984
	W8 x18	5	7'	630
	L 2" x 2" x 1/4"	4	0'-5 1/2"	6
	L 2" x 2" x 1/4"	4	8'	102
	3/8" DIA. STUD ANCHOR ASSY.	14	0'-4"	2
	3/8" x 4" PLATE	10	-----	113
		2	7'-1 3/4"	73
				1910
STANDARD END	TS3" x 3" x 3/16"	12	7'-5"	925
	W8 x18	5	7'	630
	L 2" x 2" x 1/4"	2	0'-5 1/2"	3
	L 2" x 2" x 1/4"	2	8'	51
	L 2" x 2" x 1/4"	2	7'-8 1/2"	48
	3/8" DIA. STUD ANCHOR ASSY.	14	0'-4"	2
	3/8" x 4" PLATE	10	-----	113
	2	7'-1 3/4"	73	
				1845

REINFORCING STEEL AND CONCRETE				
UNIT	NO. REQ'D	BAR MARK	WT. LBS.	CONCRETE
SHORT END	7	4078	36	1.68 C.Y.
	10	4058	38	
	8	4014	7	
	6	C3022	5	
	12	C40510	47	
	6	C4030	12	
			145	
INTERMEDIATE	18	4078	92	1.76 C.Y.
	12	C3022	10	
	8	C4030	16	
			180	
STANDARD END	17	4078	87	2.11 C.Y.
	8	4014	7	
	6	C3022	5	
	16	C40510	62	
	6	C4030	12	

HARDWARE				
LOCATION	ITEM	NO. REQ'D	SIZE	LENGTH
WINGS	BOLTS	4	1/2"	8"
	BOLTS	6	1/2"	4"
PER UNIT	BOLTS	8	1/2"	5"
	WASHERS	36	1/32"	-
CONNECTION	NUTS	18	1/2"	-
	BOLTS	2	3/4"	1'-8"
	WASHERS	4	1/16"	-
	NUTS	2	3/4"	-

MATERIAL LIST FOR WINGS				
ITEM	REQ'D	SIZE	LENGTH	WT. LBS.
FLAT CROSSARMS	2	1 3/4" x 3/16"	1'-10 3/4"	4
FLAT CROSSARMS	2	1 3/4" x 3/16"	2'-9 1/2"	6
FLAT CROSSARMS	2	1 3/4" x 3/16"	3'-8 1/2"	8
BRACES	2	2" x 2" x 10 GA	1'-3 3/4"	11
BRACES	2	2" x 2" x 10 GA	2'-7 1/4"	23
BRACES	2	2" x 2" x 10 GA	3'-11"	38
BRACES	2	2" x 2" x 10 GA	5'-2 1/2"	45
END BARRIER	4	2" x 2" x 10 GA	6'-2 3/4"	107
BARRIER PLATES	2	2 1/2" x 2 1/2" x 1/4"	0'-5"	1
BARRIER ANGLES	4	2 1/2" x 2 1/2" x 1/4"	0'-10"	14
UPRIGHT POSTS	2	3" x 3" x 3/8"	7'	96



METHOD OF PATCHING AT PRECAST CATTLE GUARDS

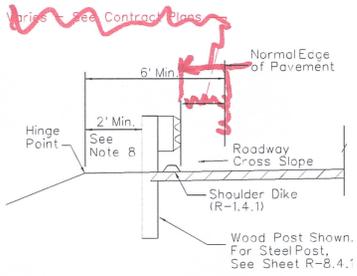
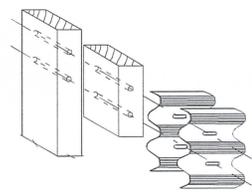
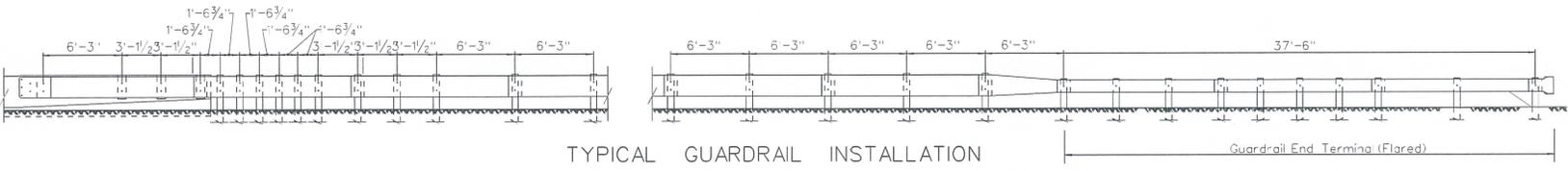
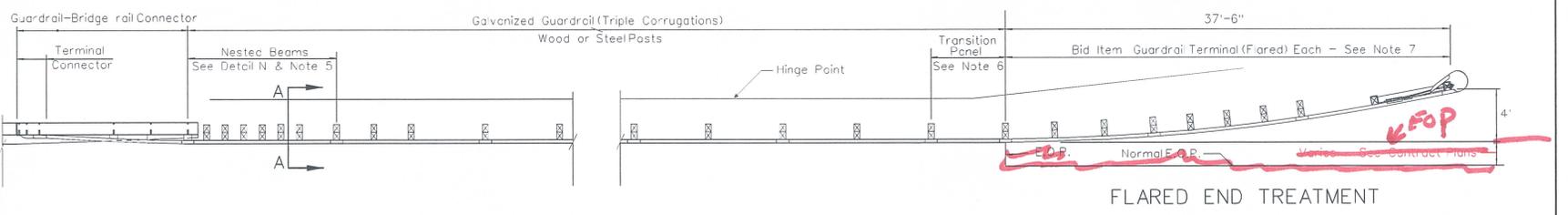
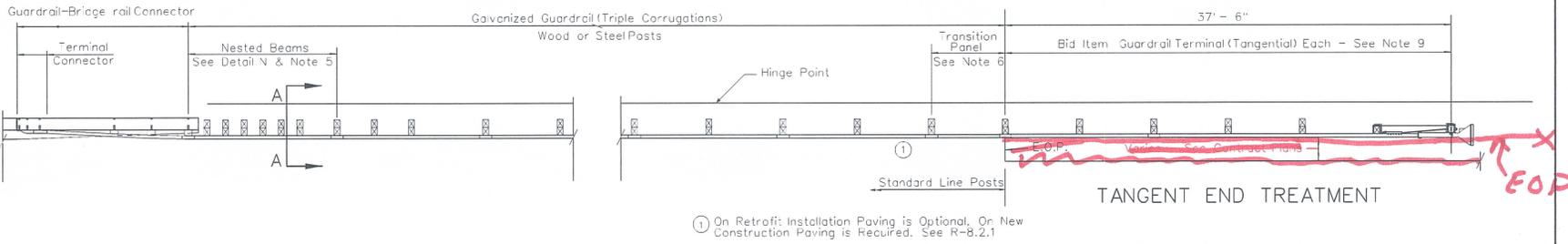
SHEET 4 OF 4

NEVADA DEPARTMENT OF TRANSPORTATION

PRECAST CATTLE GUARD

Signed Original On File	R-7.1.6.3 (617)
CHIEF ROAD DESIGN ENGR.	ADOPTED 11/88 REVISION 5/09

R-89

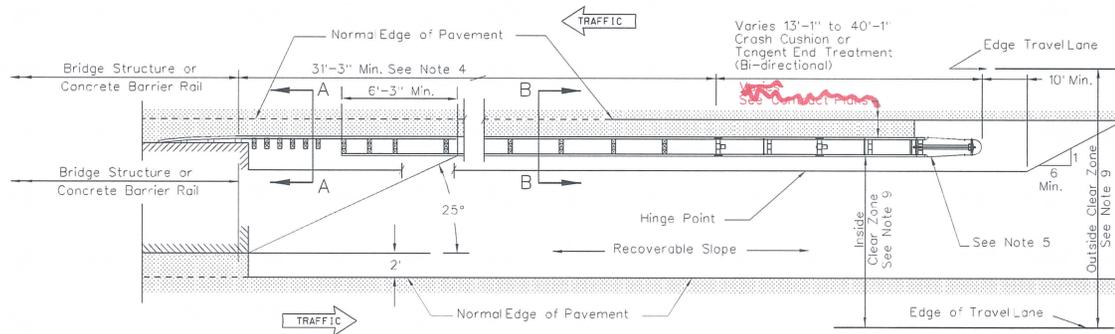


NOTES:

- FOR DETAILS AND DIMENSIONS NOT SHOWN SEE SHEETS R-8.1.2 THRU R-8.4.3.
- SEE SHEET T-35.3.1 FOR SPECIAL GUARDRAIL TERMINAL END FOR RAILROAD CROSSING.
- SEE SHEET R-8.2.2 FOR TRAILING END ANCHOR.
- MINIMUM INSTALLATION:

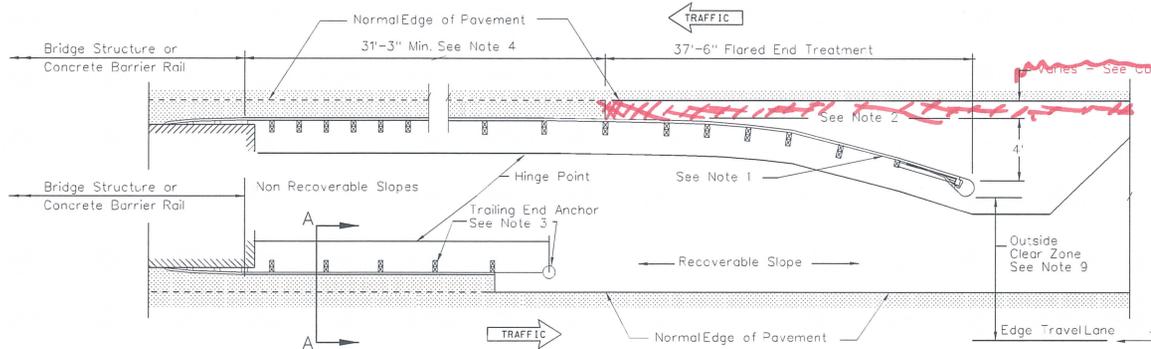
GUARDRAIL-BRIDGE RAIL CONNECTOR	- 14'-4 3/4"
NESTED BEAM SECTION	- 12'-6"
THRE BEAM SECTION	- 6'-3"
TRANSITION PANEL	- 37'-6"
APPROVED "350" TERMINAL	- 83'-1 3/4"
- ANY OTHER VARIATION THAT REDUCES THE MINIMUM LENGTH SHALL REQUIRE APPROVAL OF THE CHIEF ROAD DESIGN ENGINEER.
- NO DIRECT PAYMENT FOR THE ADDITIONAL GUARDRAIL PANEL.
- THE LENGTH OF THE TRANSITION PANEL (6'-3") SHALL BE ADDED TO THE ESTIMATED LENGTH OF THE THRE BEAM GUARDRAIL, SEE SHEET R-8.4.1.
- FOR GRADING DETAILS NOT SHOWN, SEE SHEET R-8.2.1. FOR OTHER APPROVED "350" TERMINALS NOT SHOWN, REFER TO MANUFACTURERS DRAWINGS.
- ON RETROFIT INSTALLATIONS IF MINIMUM CANNOT BE MET AND THE DISTANCE BETWEEN BACK OF POST AND HINGE POINT IS LESS THAN 2', THE POST SHALL BE LENGTHENED 1 MIN.
- WHEN GUARDRAIL IS PLACED AT NORMAL EDGE OF PAVEMENT, THE TANGENT END TREATMENT SHALL BE FLARED @ 50:1 TAPER TO GET HEAD PIECE CLEAR OF EDGE OF PAVEMENT.
- APPROACH GUARDRAIL TERMINALS SHALL BE "NCHRP 350", FHWA, AND NDOT APPROVED.
- A REFLECTORIZED OBJECT MARKER SHALL BE INSTALLED ON THE IMPACT HEAD OF THE APPROVED "350" TERMINAL PER MANUFACTURERS RECOMMENDATIONS.
- ALL WOOD/STEEL POSTS SHALL BE STAMPED WITH THE LENGTH ON OR NEAR THE TOP SURFACE IN A CONSPICUOUS PLACE. THE STAMPED LETTERING SHALL BE 1/2" HIGH AND 1/4" DEEP FOR WOOD AND 1/4" TO 3/8" IN HEIGHT FOR STEEL. IF THE LETTERING IS DISTURBING DURING INSTALLATION IT SHALL BE RE-STAMPED.

NEVADA DEPARTMENT OF TRANSPORTATION		
TYPICAL GUARDRAIL INSTALLATION		
Signed Original On File	R-8.1.1	(618)
CHIEF ROAD DESIGN ENGR.	ADOPTED 1/88	REVISION 8/09



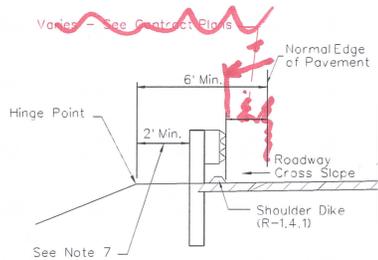
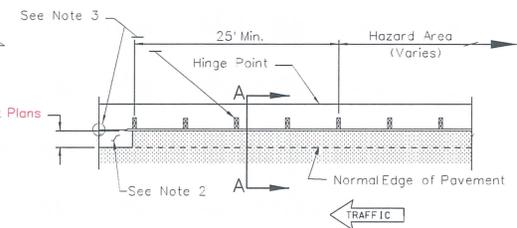
NOTES:

1. FOR END TREATMENTS NOT SHOWN, REFER TO MANUFACTURER'S DRAWINGS.
2. SHOULDER DIKES, DOWN DRAIN, AND CURBS ARE NOT TO BE INSTALLED IN THESE AREAS.
3. SEE SHEET R-8.2.2 FOR DETAILS NOT SHOWN.
4. GALVANIZED GUARDRAIL (TRIPLE CORRUGATIONS): SEE SHEET R-8.4.1 AND R-8.4.1.1.
5. CRASH CUSHION OR TANGENT END TREATMENT (BI-DIRECTIONAL) CAN BE FLARED AT 50:1 TAPER.
6. RECOVERABLE SLOPES REQUIRED BEHIND GATING PORTION OF END TREATMENT OR CRASH CUSHION.
7. ON RETROFIT INSTALLATIONS WHEN DISTANCE BETWEEN BACK OF POST AND HINGE POINT IS LESS THAN 2', THE POST SHALL BE LENGTHENED 1' MINIMUM.
8. GUARDRAIL HEIGHTS ON STAGE CONSTRUCTION PROJECTS SHALL BE GOVERNED BY FINAL SURFACING HEIGHT.
9. REFERENCE: AASHTO ROADSIDE DESIGN GUIDE, CURRENT EDITION.
10. CLEAR ZONE SHOULD BE BASED ON DESIGN YEAR TRAFFIC VOLUMES.
11. RECOVERABLE SLOPES ARE 4:1 OR FLATTER.

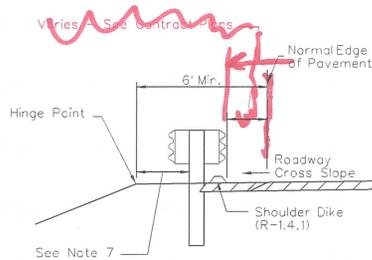


LEGEND:

- PAVED AREAS



SECTION A-A



SECTION B-B

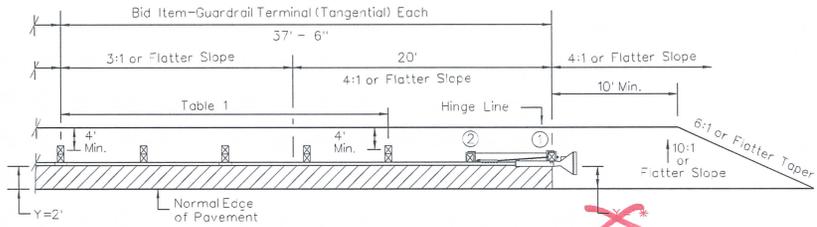
Design Speed (MPH)	Flare Rate
75	16:1
70	15:1
60	13:1
50	11:1
40	9:1
30	7:1

GUARDRAIL FLARE RATES

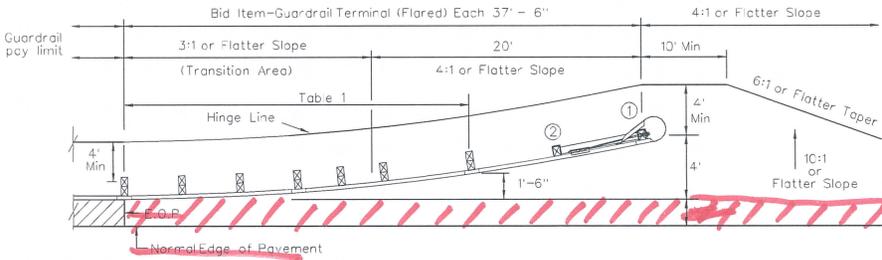
NEVADA DEPARTMENT OF TRANSPORTATION

TYPICAL GUARDRAIL INSTALLATION

Signed Original On File	R-8.1.2 (618)
CHIEF ROAD DESIGN ENGR.	ADOPTED 7/98 REVISION 8/09

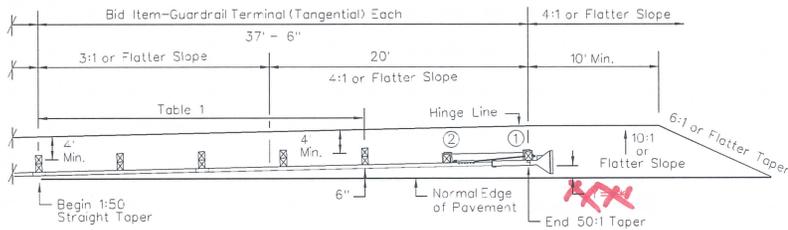


METHOD A
GUARDRAIL TERMINAL (TANGENTIAL)

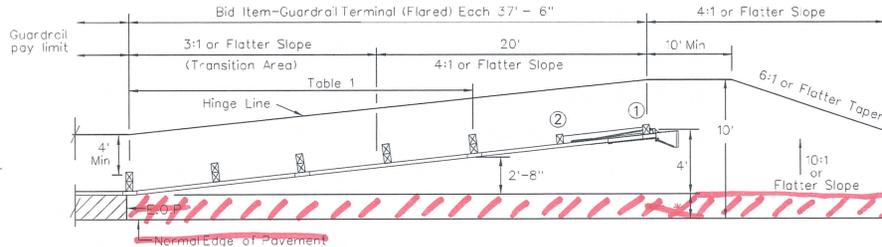


METHOD C
GUARDRAIL TERMINAL (FLARED) (PARABOLIC)

EOP



METHOD B
Terminal at 50:1 Straight Taper
GUARDRAIL TERMINAL (TANGENTIAL)



METHOD D
GUARDRAIL TERMINAL (FLARED) (STRAIGHT)

EOP

R-94

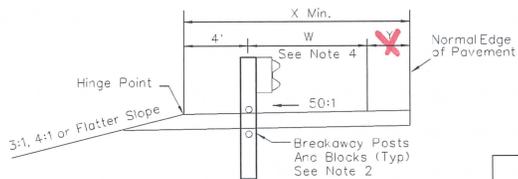


TABLE 1 SECTION

Terminal Ends	W (Flare)	X (Widening)	Y (Shy)
Method A	1'-3/4"	7'-3/4"	*
Method B	1'-3/4"	5'-3/4" to 5'-9/4"	
Method C	1'-3/4" to 2'-9/4"	7'-3/4" to 8'-9/4"	*
Method D	1'-3/4" to 3'-11/2"	7'-3/4" to 9'-11/4"	

* Varies - See Contract Plans

NOTES:

- FOR TYPICAL GUARDRAIL INSTALLATION, SEE SHEET R-8.1.1.
- FOR DETAILS NOT SHOWN, INCLUDING HEIGHTS OF POSTS FOR SOIL TUBE INSTALLATION ON POSTS ① AND ②, SEE MANUFACTURER'S DRAWINGS.
- APPROACH AND TRAILING END GUARDRAIL TERMINALS SHALL BE "NCHRP REPORT 350" TEST LEVEL 3 (TL-3), FHWA, AND NEVADA DOT APPROVED.
- "W" IS TO THE CENTER OF POST, EXCLUDING POSTS ① AND ②. USE TABLE 1 FOR BREAKAWAY POSTS WITH BLOCKS, EXCLUDING POSTS ① AND ②.

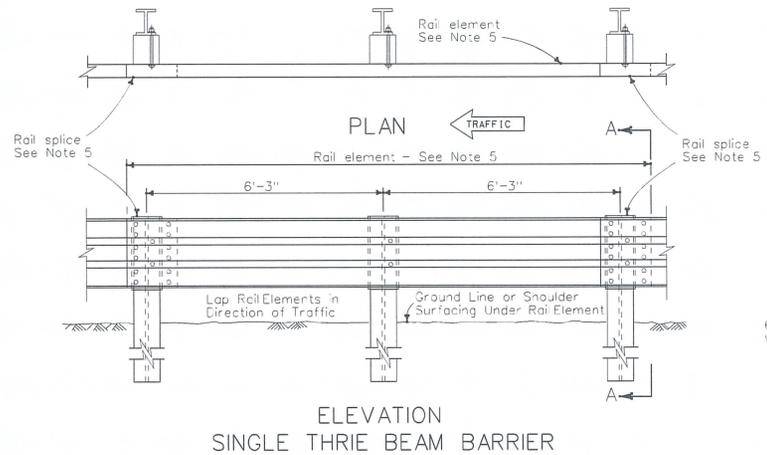
LEGEND:

PAVED AREAS

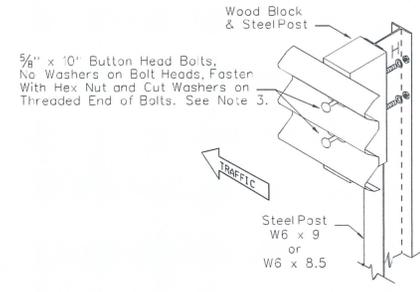
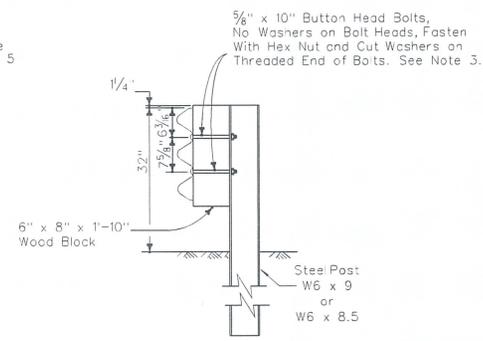
NEVADA DEPARTMENT OF TRANSPORTATION

GUARDRAIL TERMINALS
GRADING PLAN

Signed Original On File R-8.2.1 (618)
CHIEF ROAD DESIGN ENGR. ADOPTED 4/98 REVISION 5/09

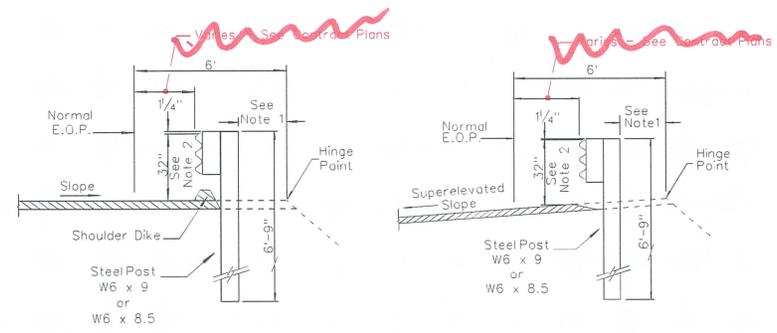


SECTION A-A
STEEL POST BOLT HARDWARE
AND WOOD BLOCK DETAIL

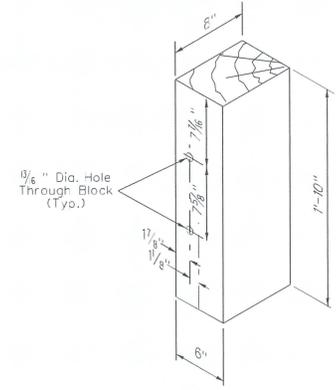


STEEL POST ASSEMBLY

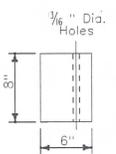
ELEVATION
SINGLE THRIE BEAM BARRIER



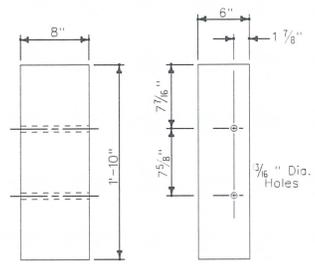
TYPICAL GUARDRAIL INSTALLATIONS



WOOD BLOCK FOR STEEL POST



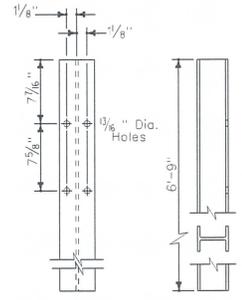
TOP



SIDE

FRONT

6" x 8" x 1'-10"
WOOD BLOCK



FRONT

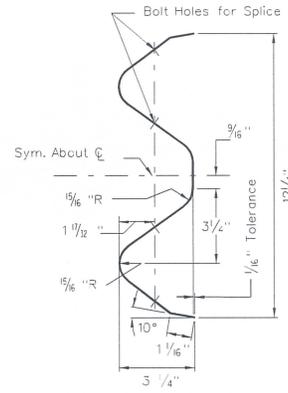
SIDE

STEEL POST
W6x 9 or W6 x 8.5

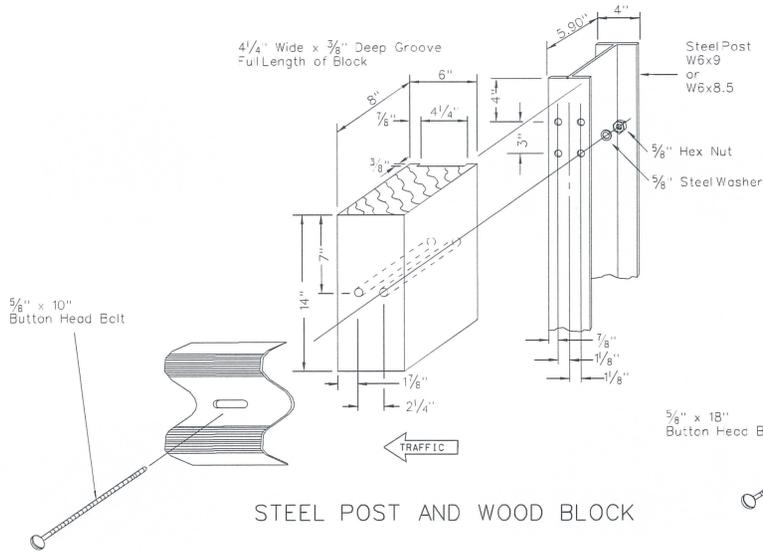
NOTES:

1. WHEN DISTANCE BETWEEN BACK OF GUARDRAIL POST AND HINGE POINT IS LESS THAN 2', THE POST SHALL BE LENGTHENED 1' MINIMUM.
2. GUARDRAIL HEIGHTS ON STAGE CONSTRUCTION PROJECTS SHALL BE GOVERNED BY FINAL SURFACING ELEVATIONS. HEIGHT MEASURED AT FACE OF RAIL ELEMENT.
3. ATTACH GUARDRAIL TO WOOD BLOCK AND STEEL POST WITH TWO BOLTS ON APPROACHING TRAFFIC SIDE OF BLOCK AND POST WEB.
4. TOP OF GUARDRAIL TO BE 32" ABOVE GROUND LINE OR SHOULDER SURFACING.
5. FOR DETAILS OF THE CROSS SECTION OF THRIE BEAM, RAIL ELEMENT, RAIL SPLICE, TRANSITION SECTION, AND BACKUP PLATE, SEE SHEET R-8.4.1.
6. ALL HARDWARE TO BE GALVANIZED.

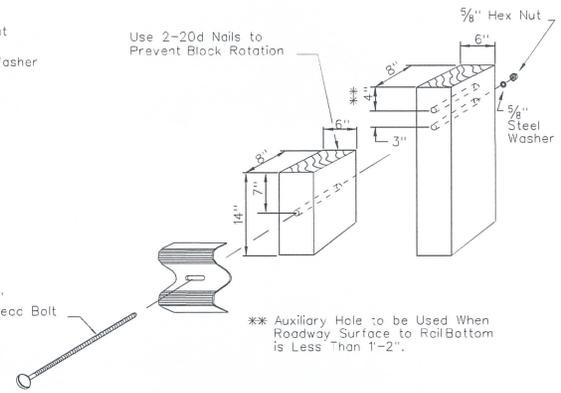
NEVADA DEPARTMENT OF TRANSPORTATION		
GALVANIZED GUARDRAIL (TRIPLE CORRUGATION) STEEL POST		
Signed Original On File	R-8.4.1.1	(618)
CHIEF ROAD DESIGN ENGR.	ADOPTED 7/96	REVISION 8/09



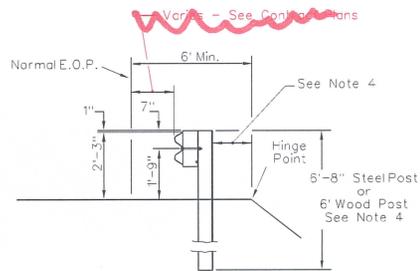
SECTION THRU RAIL ELEMENT



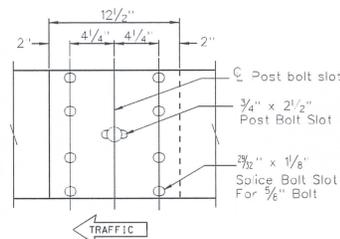
STEEL POST AND WOOD BLOCK



WOOD POST & BLOCK



TYPICAL GUARD RAIL INSTALLATION



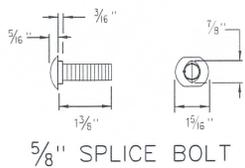
RAIL SPLICE



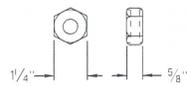
PLAN WOOD POST AND BLOCK

NOTES:

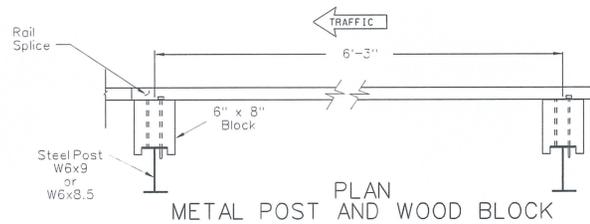
1. ALL HOLES 3/4" DIA.
2. FOR METAL POSTS - RAIL MOUNTS TO BLOCK WITH BOLT ON APPROACHING TRAFFIC SIDE OF BLOCK AND POST WEB.
3. ON RETROFIT INSTALLATIONS WHEN DISTANCE BETWEEN BACK OF GUARDRAIL POST AND HINGE POINT IS LESS THAN 2', THE POST SHALL BE LENGTHENED 1' MIN.
4. GUARDRAIL HEIGHTS ON STAGED CONSTRUCTIONS PROJECTS SHALL BE GOVERNED BY FINAL SURFACING ELEVATIONS.



5/8" SPLICE BOLT

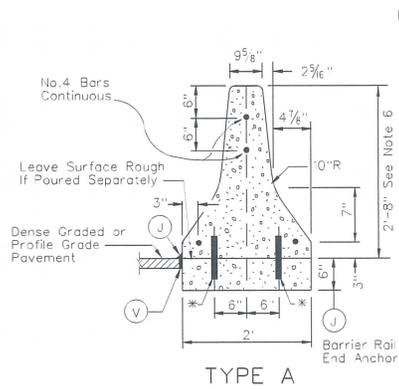


5/8" RECESSED NUT

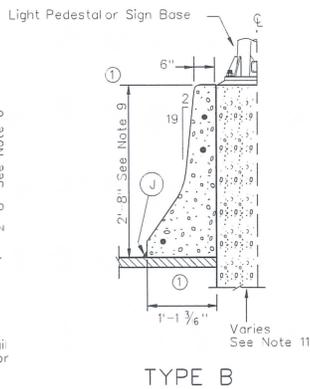


PLAN METAL POST AND WOOD BLOCK

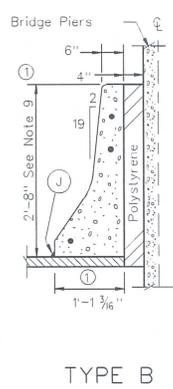
NEVADA DEPARTMENT OF TRANSPORTATION		
GALVANIZED GUARDRAIL (11"W" BEAM)		
Signed Original On File	R-8.5.1	(618)
CHIEF ROAD DESIGN ENGR.	ADOPTED 2/79	REVISION 6/09



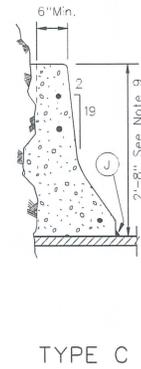
TYPE A
 CONCRETE (INFORMATION ONLY)
 0.1208 Yd.³ Per Ft., Without Base Slab
 0.1578 Yd.³ Per Ft., With Base Slab



TYPE B
 CONCRETE (INFORMATION ONLY)
 0.0702 Yd.³ Per Ft.



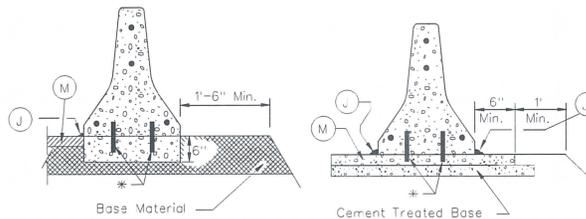
TYPE B



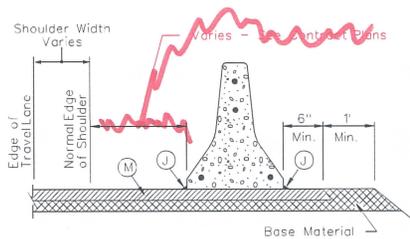
TYPE C

LEGEND:

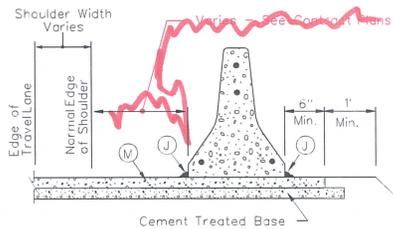
- ① Dimension Used When Barrier Is Placed Against Rock Or Solid Object Such As A Retaining Wall
- (M) Pavement (See Note 3)
- (J) Joint Sealer Typical (See Note 5)
- (V) Vertical Joint Sealer Typical (See Note 4)
- * 1" x 8" Steel Dowel @ 2' Centers (If Needed See Note 3)
- No. 4 Bars Continuous



BITUMINOUS SECTION CONCRETE SECTION
BARRIER RAIL END ANCHOR DETAIL
 First and Last 10'



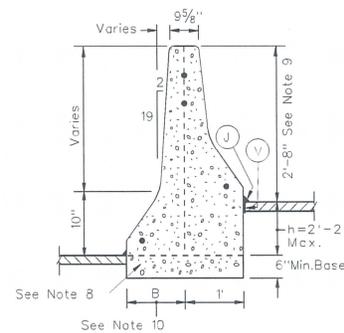
BITUMINOUS SECTION



CONCRETE SECTION

NORMAL ROADWAY DETAIL

1/2" Scored Joints @ 15'



TYPE D

Concrete Barrier Rail Lateral Flare Rates

DESIGN SPEED	FLARE RATE
75 MPH	22:1
70 MPH	20:1
60 MPH	17:1
50 MPH	14:1
40 MPH	11:1
30 MPH	8:1

NOTES:

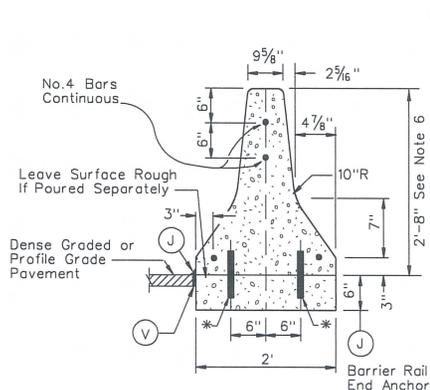
1. CONCRETE SHALL BE CLASS A OR AA. REINFORCING STEEL: USE 4-NO. 4 BARS CONTINUOUS IN TYPE A AND TYPE D, CONCRETE BARRIER RAIL. USE 3-NO. 4 BARS CONTINUOUS IN TYPE B AND TYPE C, CONCRETE BARRIER RAIL.
2. EXPANSION JOINTS AT ALL STRUCTURES. JOINTS IN BARRIER RAIL OVER A STRUCTURE SHALL BE AT THE SAME LOCATION AND OF THE SAME DIMENSIONS AS THOSE IN THE STRUCTURE. JOINT FILLER NOT REQUIRED IN EXPANSION JOINT IN BARRIER RAIL.
3. BITUMINOUS PAVING REQUIREMENTS: THE BARRIER END ANCHORS SHALL BE CONSTRUCTED IN THE FIRST AND LAST 10' OF THE BARRIER RAIL RUN. AT THE CONTRACTOR'S OPTION, 6" CONCRETE BASE AND BARRIER RAIL MAY BE PLACED MONOLITHICALLY, IN WHICH CASE DOWELS MAY BE ELIMINATED. SEE BARRIER RAIL END ANCHOR DETAILS.

CONCRETE PAVING REQUIREMENTS: DOWELS SHALL BE REQUIRED IN THE FIRST AND LAST 10' OF THE BARRIER RAIL RUN. THE SURFACE OF THE CONCRETE SHALL BE CLEAN PRIOR TO PLACEMENT OF THE BARRIER RAIL. AT THE CONTRACTOR'S OPTION, CONCRETE PAVEMENT AND BARRIER RAIL MAY BE PLACED MONOLITHICALLY, IN WHICH CASE DOWELS MAY BE ELIMINATED. SEE CONCRETE SECTION FOR DOWELS IN BARRIER RAIL END ANCHOR.
4. VERTICAL JOINTS SHALL HAVE A SINGLE COMPONENT HOT APPLIED SEALANT FULL DEPTH OF JOINT.
5. JOINT SEALER SHALL BE A SINGLE COMPONENT HOT APPLIED SEALANT 1" THICK.
6. THE HEIGHT OF THE BARRIER RAIL SHALL BE MEASURED FROM THE TOP OF THE PLANT MIX BITUMINOUS SURFACE OR THE TOP OF CONCRETE PAVEMENT.
7. FOR IMPACT ATTENUATOR ATTACHMENT DETAILS, SEE MANUFACTURER'S DRAWINGS. FOR GUARDRAIL ENERGY ABSORBING TERMINAL ATTACHMENT, SEE SHEET R.8.1.1.
8. DEPTH OF 6" BASE SHALL BE CHECKED AND INCREASED AS NEEDED FOR FOUNDATION STABILITY. WHEN BARRIER RAIL SITS ON PAVEMENT, THE BASE CAN BE ELIMINATED. BARRIER RAIL AND ANCHORS MAY BE REQUIRED.
9. FOR DETAILS NOT SHOWN, SEE TYPE A.
10. $B = 2/19 \times h + 12"$
11. SEE CONTRACT PLANS FOR EXACT DIMENSIONS.

NEVADA DEPARTMENT OF TRANSPORTATION

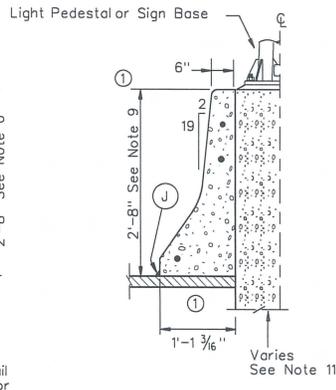
CONCRETE BARRIER RAIL

Signed Original On File	R-8.6.1	(502)
CHIEF ROAD DESIGN ENGR.	ADOPTED 11/86	REVISION 6/09



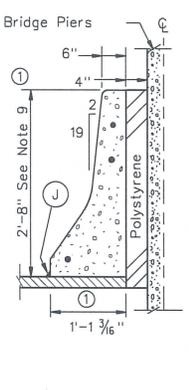
TYPE A

CONCRETE (INFORMATION ONLY)
 0.1208 Yd.³ Per Ft., Without Base Slab
 0.1578 Yd.³ Per Ft., With Base Slab

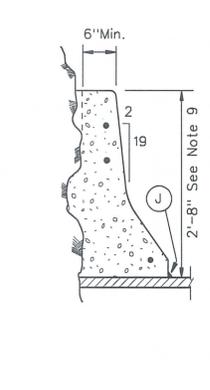


TYPE B

CONCRETE (INFORMATION ONLY)
 0.0702 Yd.³ Per Ft.



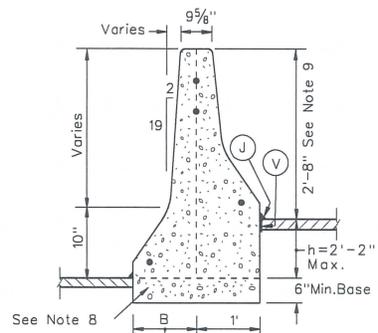
TYPE B



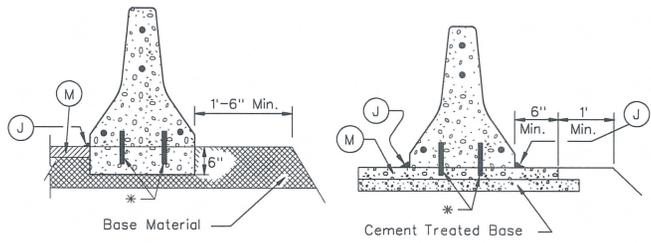
TYPE C

NOTES:

- Concrete shall be Class A or AA.
- Reinforcing Steel:** Use 4 - No. 4 bars continuous in Type A and Type D, concrete barrier rail. Use 3 - No. 4 bars continuous in Type B and Type C, concrete barrier rail.
- Expansion joints** at all structures. Joints in barrier rail over a structure shall be at the same location and of the same dimensions as those in the structure. Joint filler not required in expansion joint in barrier rail.
- Bituminous Paving Requirements:** The barrier end anchors shall be constructed in the first and last 10' of the barrier rail run. At the contractor's option, 6" concrete base and barrier rail may be placed monolithically, in which case dowels may be eliminated. See barrier rail end anchor details.
- Concrete Paving Requirements:** Dowels shall be required in the first and last 10' of the barrier rail run. The surface of the concrete shall be clean prior to placement of the barrier rail. At the contractor's option, concrete pavement and barrier rail may be placed monolithically, in which case dowels may be eliminated. See concrete section for dowels in barrier rail end anchor.
- Vertical joints shall have a single component hot applied sealant full depth of joint.
- Joint sealer shall be a single component hot applied sealant 1" thick.
- The height of the barrier rail shall be measured from the top of the plantmix bituminous surface or the top of concrete pavement.
- For impact attenuator attachment details, see manufacturer's drawings.
For guardrail energy absorbing terminal attachment, see sheet R.B.1.1.
- Depth of 6" base shall be checked and increased as needed for foundation stability. When barrier rail sits on pavement, the base can be eliminated. Barrier rail and anchors may be required.
- For details not shown, see Type A.
- $B = 2/19 \times h + 12''$
- See contract plans for exact dimensions.

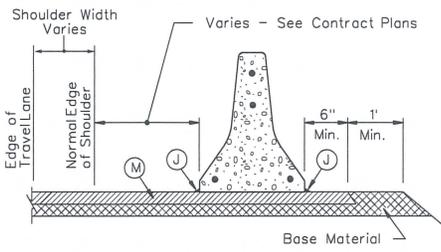


TYPE D

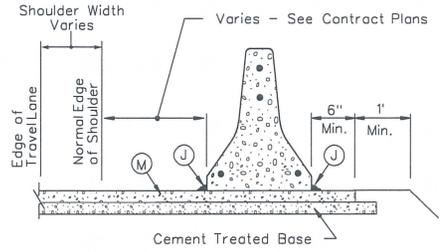


BITUMINOUS SECTION CONCRETE SECTION

**First and Last 10'
 BARRIER RAIL END ANCHOR DETAIL**



BITUMINOUS SECTION



CONCRETE SECTION

**1/4" Scored Joints @ 15'
 NORMAL ROADWAY DETAIL**

**CONCRETE BARRIER RAIL
 LATERAL FLARE RATES**

DESIGN SPEED	FLARE RATE
75 MPH	22:1
70 MPH	20:1
60 MPH	18:1
50 MPH	14:1
40 MPH	10:1
30 MPH	8:1

LEGEND:

- ① - DIMENSION USED WHEN BARRIER IS PLACED AGAINST ROCK OR SOLID OBJECT SUCH AS A RETAINING WALL
- (M) - PAVEMENT (SEE NOTE 3)
- (J) - JOINT SEALER TYPICAL (SEE NOTE 5)
- (V) - VERTICAL JOINT SEALER TYPICAL (SEE NOTE 4)
- * - 1" X 8" STEEL DOWEL @ 2' CENTERS (IF NEEDED SEE NOTE 3)
- - NO. 4 BARS CONTINUOUS

STATE OF NEVADA
 DEPARTMENT OF TRANSPORTATION

CONCRETE BARRIER RAIL

R-8.6.1	(502)	Signed Original On File
ADOPTED 11/86	REVISED 6/09	CHIEF ROAD DESIGN ENGR.

Dimit, Eric S

From: Eiche, John R
Sent: Wednesday, October 08, 2014 2:53 PM
To: Dimit, Eric S
Cc: Connor, Casey J; Hein, Scott B
Subject: RE: Shy distance and Barrier Rail Flare Rates

Eric,
Please make the changes to our Standard Plans according to page 5-48 of the 2011 Roadside Design Guide.

Thank you,

R-108

From: Hein, Scott B
Sent: Tuesday, August 19, 2014 3:40 PM
To: Eiche, John R
Cc: Connor, Casey J
Subject: Shy distance and Barrier Rail Flare Rates

Heads up:

The new Roadside Design guide (pg 5-48) has barrier rail flare rates different than our Standard Plan flare rates on 8.6.1. Also, they have shy distance (pg 5-40) based on design speed, not sure we want to follow that or use the 2' we have been. Discuss amongst yourselves.....

Scott Hein, P.E.
Principal Roadway Design Engineer
Nevada Dept. of Transportation
(775) 888-7386

In summary, roadside barriers perform most effectively when they are installed on slopes of 1V:10H or flatter. Caution should be taken when considering installations on slopes as steep as 1V:6H and any such installation should be offset so that an errant vehicle is in its normal attitude at the moment of impact. Depending on actual encroachment conditions, the distance from the traveled way at which a barrier can be installed and expected to perform adequately will vary, but in general, the placement recommendations shown in Figure 5-38 should be considered.

A rounded slope reduces the chances of an errant vehicle becoming airborne and affords the driver more control over the vehicle. Typically 1.2 m to 1.8 m [4 ft to 6 ft] is used for slope rounding. This rounding is generally obtained as part of the slope grading and vegetation establishment.

5.6.3 Flare Rate

A roadside barrier is considered flared when it is not parallel to the edge of the traveled way. Flare is normally used to locate the barrier terminal farther from the roadway; to minimize a driver’s reaction to an obstacle near the road by gradually introducing a parallel barrier installation; to transition a roadside barrier to an obstacle nearer the roadway such as a bridge parapet or railing; or to reduce the total length of guardrail needed. The use of a flared barrier also reduces the number of barrier and terminal impacts as well as provides additional roadside space for an errant motorist to recover.

One concern with flaring a section of roadside barrier is that the greater the flare rate, the higher the angle at which the barrier can be hit. As the angle of impact increases, the severity of the crashes increases, particularly for rigid and semi-rigid barrier systems. A second disadvantage to flaring a barrier installation is the increased likelihood that a vehicle will be redirected back into or across the roadway following an impact. This situation is especially undesirable on two-way roadways where the impacting vehicle could be redirected into oncoming traffic. Testing of a flared MGS installation has shown an improvement over conventional strong-post W-beam guardrail that was crash tested in a parallel installation. The vehicles impacting the MGS system remained relatively close to the rail. The MGS passed crash testing at NCHRP Report 350 TL-3 with a 5:1 flare rate (12). Terminals used with the MGS system should follow the manufacturer’s recommended flare rates.

As shown in Table 5-9, the maximum recommended flare rates are a function of highway design speed and barrier type (21, 22). Flatter flare rates may be used and often are, particularly where extensive grading would be required to obtain a flat approach to the barrier from the traveled way. This is often the case on existing facilities having relatively steep embankment slopes where slope flattening is not practical. It should also be noted that a flatter flare rate is suggested when a barrier is located within the shy-line offset distance. This is more applicable where the approach roadway is wider than the roadway near the obstacle and has an offset less than the suggested shy line offset. For example, if an approach roadway is wider than a bridge roadway, the use of flatter flare rates based on inside the recommend shy line values should be used.

Table 5-9. Suggested Flare Rates for Barrier Design

Design Speed		Flare Rate for Barrier Inside Shy Line	Flare Rate for Barrier at or Beyond Shy Line	
km/h	[mph]		A	B
110	[70]	30:1	20:1	15:1
100	[60]	26:1	18:1	14:1
90	[55]	24:1	16:1	12:1
80	[50]	21:1	14:1	11:1
70	[45]	18:1	12:1	10:1
60	[40]	16:1	10:1	8:1
50	[30]	13:1	8:1	7:1

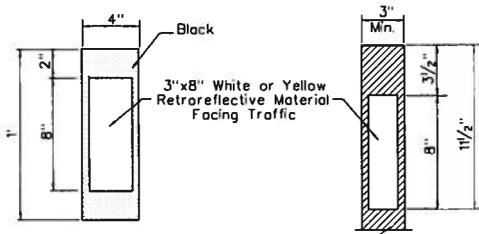
Notes:

A = Suggested maximum flare rate for rigid barrier system.

B = Suggested maximum flare rate for semi-rigid barrier system.

The MGS has been tested in accordance with NCHRP Report 350 TL-3 at 5:1 flare.

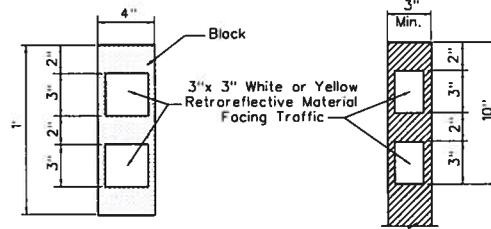
Flatter flare rates for the MGS installations also are acceptable. The MGS should be installed using the flare rates shown or flatter for semi-rigid barriers beyond the shy line when installed in rock formations.



RIGID POST

FLEXIBLE POST

ROADWAY - RAMPS
TYPE 1 REFLECTORS

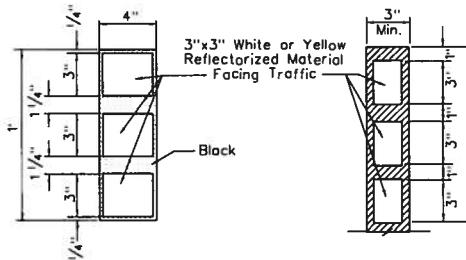


RIGID POST

FLEXIBLE POST

APPROACHES, ACCELERATION/DECELERATION LANES
TYPE 2 REFLECTORS

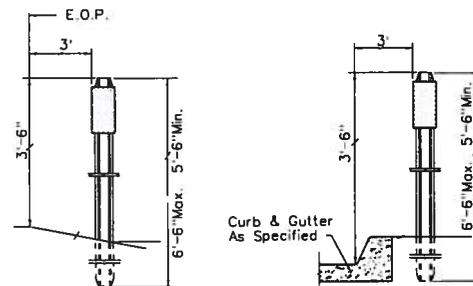
All Approaches Shall Be Delineated With White Type 2 Guideposts at the Beginning and Ending Limits of the Approaches. Type 4 & 5 Approaches Will Have an Additional Guidepost at Each Taper Setback.



RIGID POST

FLEXIBLE POST

ISLANDS, CURBS, SHOULDER DIKES
TYPE 3 REFLECTORS



RIGID POST/REFLECTOR
WITHOUT CURB AND GUTTER

RIGID POST/REFLECTOR
WITH CURB AND GUTTER

TYPICAL INSTALLATIONS

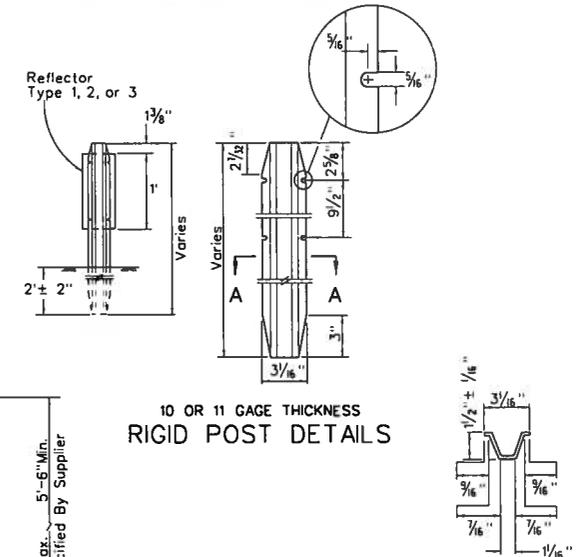
NOTES:

- Guidepost reflector color shall conform to the color of adjacent striped edge line.
 - Guidepost Spacing:
 - Tangent sections and curves with radii greater than 10,000 feet: spacing shall be 400 feet both sides of roadway.
 - Curves with radii of 10,000 feet or less: spacing 20 foot minimum - 300 foot maximum. Distance shall be measured along centerline of roadway and projected perpendicularly across to inside and outside of curve.
 - Guidepost shall be placed at beginning and end of curve, with spacing transitioned within the tangent as shown in table 1. "1st" indicates guidepost nearest curve, "3rd" is furthest away.
 - Spacing within curve as shown in table 1.
 - Acceleration/deceleration lanes and ramps: spacing 100 foot maximum for tangents and curves.
 - Truck escape ramps: spacing 50 feet.
 - Guardrail and barrier rail sections: see sheet R-9.2.2.
 - Islands, curbs and shoulder dikes: spacing 20 foot minimum - 50 foot maximum.
 - If normal spacing is interrupted by features such as driveways, approaches, etc., the guideposts may be moved a maximum of 1/4 of normal spacing. Guideposts falling within such features shall be eliminated.
3. Guideposts installed on exit ramps shall have red reflective sheeting installed on the back of guide post and conform to Type XI as specified in ASTM D4956.

TABLE 1

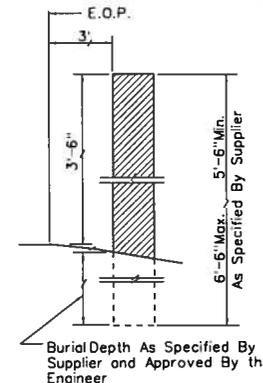
Maximum Spacing For Guideposts On Horizontal Curves Less Than Or Equal To 10,000'				
All Distances Shown in Feet and Rounded To The Nearest 5'				
RADIUS OF CURVE (R)	SPACING ON CURVE (S)	SPACING IN ADVANCE OF AND BEYOND CURVE		
		1ST	2ND	3RD
50	20	40	60	120
150	30	60	90	180
200	35	70	105	210
250	40	80	120	240
300	50	100	150	300
400	55	110	165	300
500	65	130	195	300
600	70	140	210	300
700	75	150	225	300
800	80	160	240	300
900	85	170	255	300
1,000	90	180	270	300
1,200	100	200	300	300
1,400	110	220	300	300
1,600	120	240	300	300
1,800	125	250	300	300
2,000	130	260	300	300
2,500	150	300	300	300
3,000	165	300	300	300
5,000	210	300	300	300
10,000	300	300	300	300

SPACING FOR SPECIFIC RADI NOT SHOWN MAY BE INTERPOLATED FROM TABLE 1 OR COMPUTED FROM THE FORMULA $S = 3\sqrt{R-50}$. S REFERS TO THE DELINEATOR SPACING AND R REFERS TO THE RADIUS OF THE CURVE. THE MINIMUM SPACING SHOULD BE 20 FEET THE MAXIMUM SPACING ON CURVES SHOULD NOT EXCEED 300 FEET. IN ADVANCE OF & BEYOND A CURVE, AND MEASURED PROCEEDING AWAY FROM THE END POINT OF THE CURVE. THE SPACING OF THE FIRST DELINEATOR IS 2S. THE SECOND IS 3S, AND THE THIRD 6S; BUT IN NO CASE TO EXCEED 300 FEET.



10 OR 11 GAGE THICKNESS
RIGID POST DETAILS

SECTION A-A



Burial Depth As Specified By Supplier and Approved By the Engineer

For Tubular Post, Wraparound Reflectors Are Acceptable (See Types For Vertical Dimensions)

FLEXIBLE POST

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
GUIDE POSTS		
R-9.1.1	(619)	Signed Original On File
ADOPTED 8/69	REVISED 11/06	CHIEF ROAD DESIGN ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30.1.2 Page No.: T-1 Note: A separate form is required for each change.

Description of requested modification or correction: MOVE TO NEW SHEET
NUMBER T-2 AND ADD CHANGE NOTE 1
TO READ (SEE ATTACHED). ALL SUBSEQUENT
SHEET NUMBERING TO CHANGE.

(Please attach supporting information).

Reason for request: ADD SHEET T-1 SIGNAL LIGHTING
AND ITS SYMBOLS

Requestor Information: Name: Thomas H. [Signature] Phone: 7566

For Standards/Manuals Personnel Only: Approved Denied

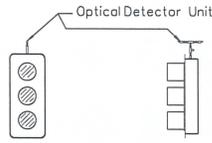
Revised by: Signature: _____ Date: _____

Policy Review:

CADD Standards ASTM AASHTO Design Manual Specifications

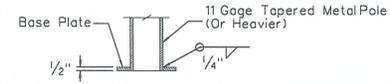
Reviewed by: Signature: _____ Date: _____

Notes: _____

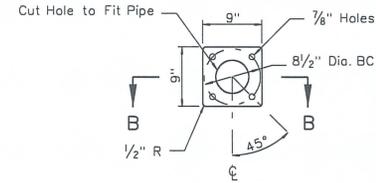


FRONT VIEW SIDE VIEW

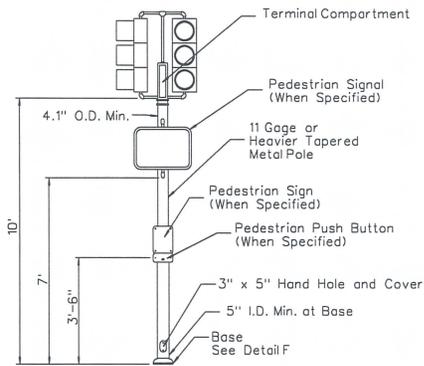
MOUNTING DETAIL
OPTICAL DETECTOR



SECTION B-B WITH PIPE

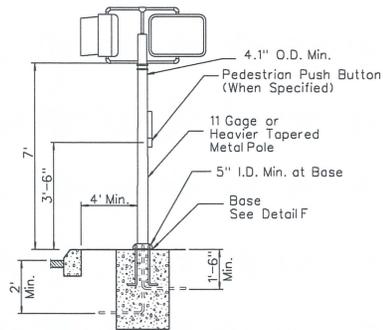


DETAIL F

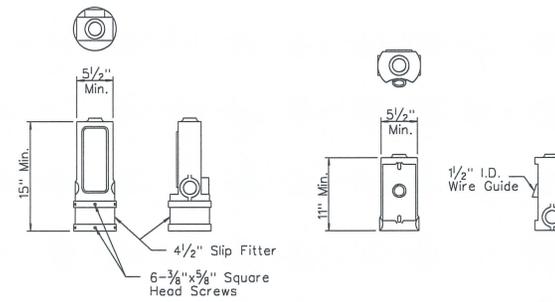


TYPE 1-A

Foundation Same as Type 1-B



TYPE 1-B



POST TOP MOUNTED SIDE BRACKET MOUNTED

TERMINAL COMPARTMENTS

NOTES:

1. For Pedestrian Push Button and Sign See Sheet T-30.1.3.1.
2. For Foundation Details See Sheet T-30.1.16.
3. Mounting Heights of Signal and Pedestrian Heads and Pedestrian Push Buttons Shall Be Applicable to Installations on Pole Types 28, 30 & 35.

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
TYPE 1A AND 1B POLES, OPTICAL MOUNT AND TERMINAL COMPARTMENTS		
DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30.12.1 Page No.: T-2 Note: A separate form is required for each change.

Description of requested modification or correction: CHANGE NOTE 14 FROM
SUB SECTION 706.03.03 TO NEW FULL SHEET
FOR SAND BEDDING (DRY UTILITIES ONLY)
PER SPECIFICATIONS UPDATE,
CHANGE NOTE 13 TO READ (SEE ATTACHED)
ADD TRENCHING WITH BACKFILL (Please attach supporting information).

Reason for request: BRING UP TO INDUSTRY STANDARD.

Requestor Information: Name: [Signature] Phone: 7566

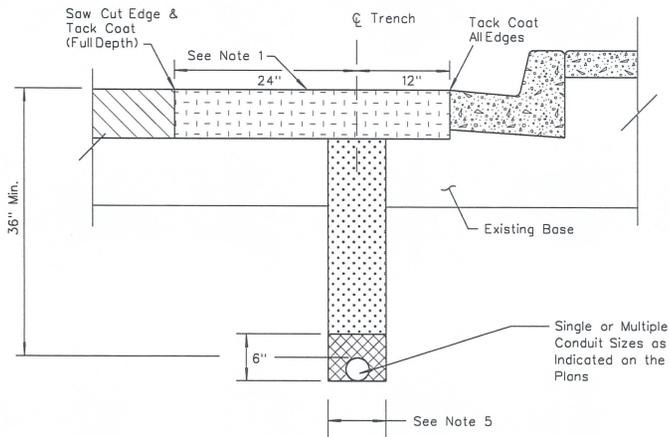
For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

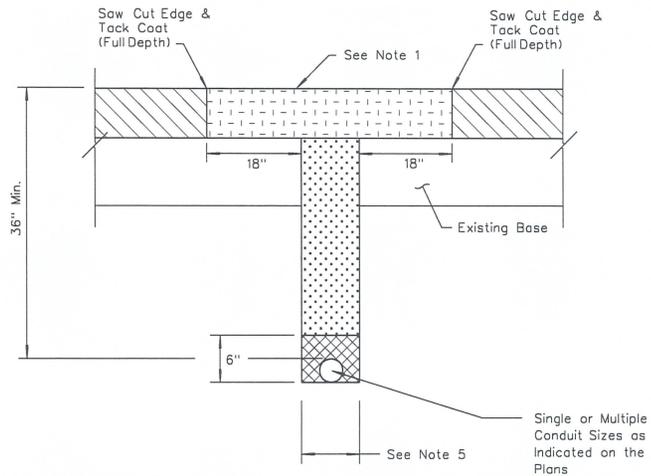
Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes: _____



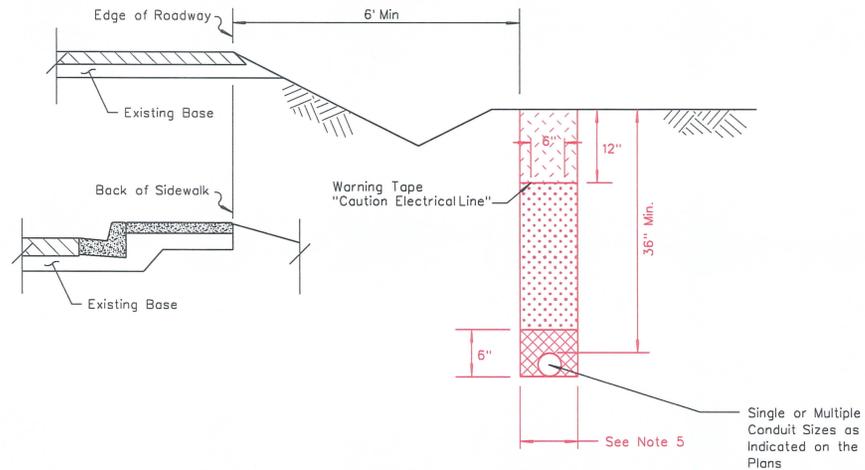
LONGITUDINAL



TRANSVERSE
TRENCHING IN PAVEMENT

LEGEND:

- Existing Pavement
- Limits of Removal & Repair of Pavement
- Sand Bedding (See Note 14)
- Class A Slurry Cement Backfill
- Backfill



TRENCHING IN NATIVE SOIL (CLASS A SLURRY)

NOTES:

1. REMOVE EXISTING PAVEMENT AND REPLACE WITH NEW APPROVED MATERIAL OF SAME TYPE. MATCH EXISTING PAVEMENT DEPTH BUT NOT LESS THAN 6", AND SEAL NEW SURFACE AS DIRECTED BY THE ENGINEER.
2. RECOMPACT EXISTING BASE MATERIAL AROUND TRENCH TO MEET COMPACTION REQUIREMENTS FOR THAT MATERIAL TYPE AND LOCATION.
3. NEW ASPHALT AND CONCRETE PAVEMENT MATERIAL MUST BE APPROVED BY THE ENGINEER AND OBTAINED FROM AN APPROVED SOURCE.
4. UNLESS OTHERWISE PROVIDED FOR IN THE BASE AND SURFACE SUMMARIES NEW PAVEMENT MATERIAL AND TRENCHING SHALL NOT BE PAID FOR DIRECTLY BUT INCLUDED IN THE PRICE FOR THE CONDUIT.
5. TOTAL TRENCH WIDTH SHALL BE 6" WIDER THAN THE OUTSIDE EDGES OF CONDUIT(S) INSTALLED. USE CONDUIT SPACERS TO SEPARATE MULTIPLE CONDUITS IN TRENCH BY AT LEAST 1". PLACE SPACERS AT INTERVALS OF 5' MAXIMUM. CONDUITS SHALL BE CENTERED IN TRENCH.
6. FOR TRENCHING IN A NON-NDOT-OWNED FACILITY USE THE OWNER'S STANDARDS FOR TRENCHING, COMPACTION, AND PATCHING.
7. LONGITUDINAL TRENCHING IN SHOULDER: IF SHOULDER IS 4' WIDE OR LESS, REMOVE ALL SURFACE MATERIAL FROM EDGE OF OIL TO SHOULDER STRIPE AND REPLACE.
8. ENGINEER MAY FOR GOOD CAUSE, REQUIRE WIDER PATCH SECTIONS OR OTHERWISE ALTER THE REQUIREMENTS.
9. IF SAW CUT IS WITHIN 2' OF AN EXISTING PAVEMENT EDGE OR EXISTING PAVEMENT PATCH, REMOVE EXISTING PAVEMENT TO THAT EDGE AND REPLACE ENTIRE SECTION
10. IF SAWCUT EDGES FOR TRENCH FALL WITHIN A WHEEL PATH, SAWCUT SHALL BE EXTENDED TO, AND REMOVAL MADE TO, EDGE OF THE TRAVEL LANE. OPTIONALLY THE ENTIRE TRAVEL LANE CAN BE ROTOMILLED TO A DEPTH OF 2" AND OVERLAYED WITH 2" OF BITUMINOUS PLANTMIX AS DIRECTED BY THE ENGINEER.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACEMENT OF LOOP DETECTORS, ADJUSTMENTS OF UTILITIES AND SURVEY MONUMENTS TO GRADE AND INSTALLATION OF TEMPORARY PAVEMENT MARKINGS.
12. PERMANENT RESURFACING SHALL NOT BE PLACED ON TRENCHES BACKFILLED WITH CONCRETE SLURRY FOR A MINIMUM OF 7 DAYS AFTER PLACEMENT OF THE CONCRETE SLURRY OR SIMILAR MATERIAL. PROVIDE TEMPORARY COVER OR BACKFILL AS DIRECTED BY THE ENGINEER.
13. USE OF ROCK WHEEL TRENCHING MACHINES OR SIMILAR EQUIPMENT MAY BE PERMITTED WITHIN PAVED AREAS OR WITHIN 1' OF THE EDGE OF PAVING, AS DIRECTED BY THE ENGINEER.
14. SAND BEDDING SHALL CONFORM TO GRADATION REQUIREMENTS IN SUBSECTION 706.03.03 FINE AGGREGATES.
15. IF INSTALLING UNDERGROUND ELECTRICAL FACILITIES OR SUPPLIES REFER TO NAC 408.447 AND 408.453.
16. BACKFILL IN ACCORDANCE WITH SECTION 207 IF WITHIN THE ROADSIDE SLOPE OR DITCHES. OTHERWISE THE BACKFILL MAY BE ACCOMPLISHED WITH NATIVE MATERIAL COMPACTED TO 90% OR AS DIRECTED BY THE ENGINEER.

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

TRAFFIC CONDUIT
TRENCHING DETAIL

DET. #	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.

X-1

TRENCH EXCAVATION AND BACKFILL

208

- 2. **Method B:** The use of aggregate materials as described in this section as associated with either Rigid or Flexible designed pipe shall be as specified in this subsection below.
- C. Prior to construction, the materials and method type shall be submitted and approved by the Engineer.

208.02.02 SELECTED BACKFILL

- A. This material shall be similar to that removed from the trench excavation or may be imported material as specified in Subsection 207.02.01, "Selected Backfill," or as otherwise shown on the Drawings.

208.02.03 GRANULAR BACKFILL

- A. Granular backfill shall be as specified in Subsection 207.02.02, "Granular Backfill."

208.02.04 SAND BACKFILL (DRY UTILITIES ONLY)

- A. Sand backfill shall consist of natural sand or a mixture of sand with gravel or stone. In addition thereto, the material shall conform to the following gradation requirements:

Table 2 - Sand Backfill Gradation

Sieve Sizes	Percentage of Weight Passing
3/8 inch	100
No. 4	80-100
No. 200	5-20

- B. The plasticity index of the material shall be as specified in Subsection 704.03.01, "Plastic Limits." The soluble sulfate content shall not exceed 0.3 percent by dry weight of soil.

208.02.05 TYPE II AGGREGATE BASE BACKFILL

- A. Type II aggregate base backfill shall be as specified in Subsection 704.03.04, "Type II Aggregate Base." The total available water soluble sulfate content shall not exceed 0.3 percent by dry weight of soil.

208.02.06 DRAIN BACKFILL

- A. Drain backfill shall be as specified in Subsection 704.03.02, "Drain Backfill." The type shall be as shown on the plans or approved by the Engineer.

208.02.07 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

- A. Backfill shall be as specified in Subsection 704.03.07, "Controlled Low Strength Material."

208.02.08 CRUSHED ROCK

- A. The materials properties shall conform to Subsection 704.03.06, "Crushed Rock."

208.02.09 TYPE III AGGREGATE

- A. Aggregate properties and gradation shall conform to Type III as specified in Subsection 704.03.05, "Type III Aggregate," or as approved by the Engineer.

5. POWER TRENCH SAND

A. Power Trench Sand shall conform to Clark County (CC) Specification 208:

208.02.03 Sand Backfill: Shall consist of natural sand or a mixture of sand with gravel or stone. In addition, the material shall conform to the following gradation requirements:

SIEVE SIZES	PERCENTAGE BY WEIGHT PASSING
3/8"	100
No. 4	80-100
No. 16	40 - 80 (*)
No. 200	2 - 20 (*)

(*) NPC requirements to minimize the void ratio for thermal conductivity. Uniformly graded material, such as pea gravel (high void ratio), is not acceptable. The soluble sulfate content shall not exceed 0.3% by dry weight of soil.

B. The plasticity index of the material shall conform to Clark County (CC) Specification 704.

704.02.03 Plastic Limits: When specified, aggregates shall conform to the applicable requirements of the following table:

PERCENTAGE BY WEIGHT PASSING 200 SIEVE	PLASTICITY INDEX MAXIMUM
0.1 to 3.0	15
3.1 to 4.0	12
4.1 to 5.0	9
5.1 to 8.0	6
8.1 to 11.0	4
11.1 to 15.0	3
15.1 to 20.0	3

6. APPROVED TRENCH SAND SUPPLIER

- A. Refer to RT-2 for a current list of Approved Trench Sand Suppliers and sources (also available at www.nevadapower.com).
- B. Approval of a sand source and supplier is effective for a period of 3 years and is contingent upon continued compliance with NPC and Clark County (CC) standards. If at anytime the sand does not meet NPC/CC standards, the sand will be rejected and the supplier may have to requalify the source of the non-conforming sand.

T&D STANDARDS NEVADA POWER COMPANY ELECTRIC SERVICE REQUIREMENTS	
RT-1 Power Trench Sand and Backfill Requirements	
DI: ESRNPC-RT001-REV01	SHEET 2 OF 4
SCALE: NONE	INITIAL ISSUE DATE: 06/11/2007

old spec

706.03.03 Fine Aggregate. This aggregate shall conform to the following requirements:

Sieve Size	Percent Passing by Mass
9.5 mm (3/8 in.)	100
4.75 mm (No. 4)	95-100
1.18 mm (No. 16)	45-80
300 µm (No. 50)	10-35
150 µm (No. 100)	2-12
75 µm (No. 200)	0-5

PROJECT CONTROL TEST	TEST METHOD	REQUIREMENTS
Sieve Analysis	Nev. T206	Above
Sampling Aggregate	Nev. T200	—
Sand Equivalent	Nev. T227	71 Min.
Clay Lumps	AASHTO T112	1% Max.

SOURCE REQUIREMENT TEST	TEST METHOD	REQUIREMENTS
Soundness (5 cycles, Sodium Sulfate)	AASHTO T104	10% Max. Loss
Lightweight Pieces in Aggregate with less than 1.95 Sp. Gr.	Nev. T487	1% Max.
Organic Impurities	AASHTO T21	Satisfactory (a)
Mortar Making Properties	ASTM C87	95% Min. (b)
Potential Reactivity of Aggregates**	ASTM C289	Innocuous (c)

**This test is required only if specified in the Special Provisions.

(a) Aggregates tested and showing color darker than the standard shall be rejected unless they pass the "Mortar Making Properties" test (ASTM C87).

(b) This test shall only be required should samples of fine aggregate fail to pass the organic impurities test. Fine aggregate failing in the test for organic impurities (AASHTO T21) may be used provided that when tested for effect of organic impurities on strength of mortar, the relative strength at 7 and 28 days calculated according to ASTM C87 is not less than 95%.

(c) If the material from a proposed source fails this test requirement, the material may still be used for concrete aggregate provided that it is incorporated in an approved mix design with an approved Type F or Type N Pozzolan, or with a Type IP cement.

If a pozzolan is used for this purpose, use 1 part pozzolan to 4 parts of cement by mass. The pozzolan quantity shall be considered as cement in meeting the required minimum cement content. The limitation on replacement of cement with pozzolans at a maximum of 17% in Subsection 501.02.03 is hereby waived to meet this requirement. If a Type IP cement is used for this purpose, the use of pozzolan is not required.

Submit samples of aggregates to be tested by ASTM C289 at least 30 working days before anticipated use.

706.03.04 Grout and Mortar Aggregate. Aggregate for grout and mortar shall conform to either of the following requirements:

Sieve Size	Percentage Passing by Mass
9.5 mm (3/8 in.)	100
4.75 mm (No. 4)	95-100
1.18 mm (No. 16)	45-80
300 µm (No. 50)	10-35
150 µm (No. 100)	2-12
75 µm (No. 200)	0-5

or

706.03.05 *Branch 503*

New Spec

706.03.03 Fine Aggregate. This aggregate shall conform to the following requirements:

Sieve Size	Percent Passing by Mass
9.5 mm (3/8 in.)	100
4.75 mm (No. 4)	95-100
2.36 mm (No. 8)	80-100
1.18 mm (No. 16)	50-85
600 µm (No. 30)	25-60
300 µm (No. 50)	5-30
150 µm (No. 100)	0-10
75 µm (No. 200)	0-5

PROJECT CONTROL TEST	TEST METHOD	REQUIREMENTS
Sieve Analysis	Nev. T206	Above
Sampling Aggregate	Nev. T200	—
Sand Equivalent	Nev. T227	71 Min.
Clay Lumps	AASHTO T112	1% Max.

SOURCE REQUIREMENT TEST	TEST METHOD	REQUIREMENTS
Soundness (5 cycles, Sodium Sulfate)	AASHTO T104	10% Max. Loss
Lightweight Pieces in Aggregate with less than 1.95 Sp. Gr.	AASHTO T113	1% Max.
Organic Impurities	AASHTO T21	Satisfactory (a)
Mortar Making Properties	ASTM C87	95% Min. (b)
Fineness Modulus	AASHTO T27 and AASHTO T11	2.30 – 3.10

(a) Aggregates tested and showing color darker than the standard shall be rejected unless they pass the "Mortar Making Properties" test (ASTM C87).

(b) This test shall only be required should samples of fine aggregate fail to pass the organic impurities test. Fine aggregate failing in the test for organic impurities (AASHTO T21) may be used provided that when tested for effect of organic impurities on strength of mortar, the relative strength at 7 and 28 days calculated according to ASTM C87 is not less than 95%.

706.03.04 Grout and Mortar Aggregate. Aggregate for grout and mortar shall conform to either of the following requirements:

Sieve Size	Percent Passing by Mass
9.5 mm (3/8 in.)	100
4.75 mm (No. 4)	95-100
1.18 mm (No. 16)	45-80
300 µm (No. 50)	10-35
150 µm (No. 100)	2-12
75 µm (No. 200)	0-5

Sieve Size	Percent Passing by Mass*
4.75 mm (No. 4)	100
2.36 mm (No. 8)	95-100
1.18 mm (No. 16)	70-100
600 µm (No. 30)	40-75
300 µm (No. 50)	20-50
150 µm (No. 100)	10-25
75 µm (No. 200)	0-10

*When lightweight, natural, or manufactured aggregate fails the gradation limits specified above, it may be used provided the mortar can be prepared to comply with the aggregate ratio, water retention, and compressive strength requirements of the property specification of ASTM C270 for mortar for unit masonry.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30.1.3 Page No.: T-3 Note: A separate form is required for each change.

Description of requested modification or correction: ADD SPECIAL FOR
4-SECTION HEADS. REMOVE 5-SECTION HEADS.
MODIFY AND MOVE BACKPLATE DETAIL TO
NEW BACKPLATE DETAIL SHEET.

(Please attach supporting information).

Reason for request: 4 SECTION HEADS AND RETROFLECTIVE
TAPE DETAIL

Requestor Information: Name: Fleming Phone: 7566

For Standards/Manuals Personnel Only: Approved Denied

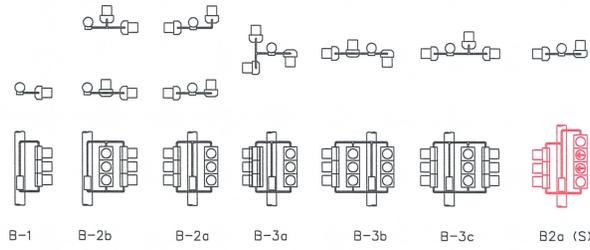
Revised by: Signature: _____ Date: _____

Policy Review:

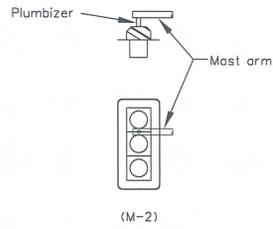
CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

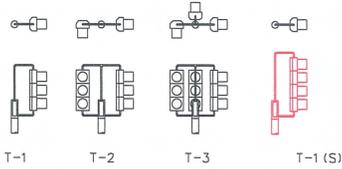
Notes: _____



SIDE BRACKET MOUNTINGS
(S) Special 3-Section with Combo



MAST ARM MOUNTINGS

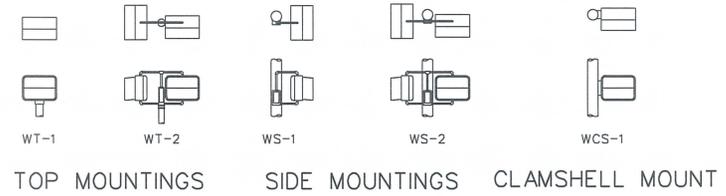


TOP MOUNTINGS
(S) Special

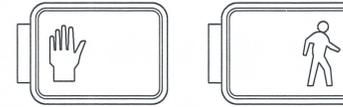


MAST ARM MOUNT
M-2 Mount

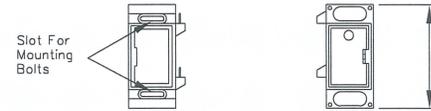
VEHICULAR SIGNALS AND MOUNTINGS



TOP MOUNTINGS SIDE MOUNTINGS CLAMSHELL MOUNT



PEDESTRIAN SIGNAL-INTERNATIONAL SYMBOL
To Be Used Unless Otherwise Specified

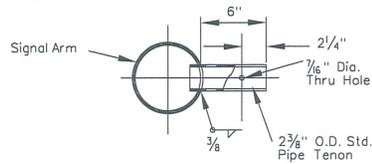


POLE PLATE TERMINAL COMPARTMENT

CLAMSHELL MOUNTING HARDWARE (CS)
PEDESTRIAN SIGNALS AND MOUNTINGS
To Be Used Only When Specified

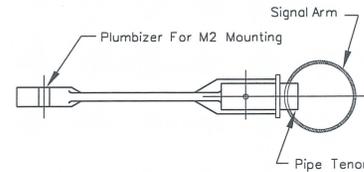
NOTES:

1. ALL SIGNAL HEADS SHALL HAVE BACKPLATES.
2. ALL SIGNAL HEADS SHALL HAVE HOODS. HOODS SHALL BE TUNNEL TYPE, OPEN AT THE BOTTOM.
3. T=THICKNESS.



M-2 SIDE MOUNT

See Detail For Mounting Signal Head
On Standard Plan T-30.1.15



SPECIAL DETAIL FOR MOUNTING SIGNAL HEAD

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

**SIGNAL MOUNTING
PEDESTRIAN SIGNALS**

DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30.1.3.1 Page No.: T-4 Note: A separate form is required for each change.

Description of requested modification or correction: MODIFICATIONS TO THE PPB
DETAILS

(Please attach supporting information).

Reason for request: TO MEET ALREADY REQUIREMENTS AND
UPDATES TO PPB SIGNS

Requestor Information: Name: Thomas H. Meese Phone: 7566

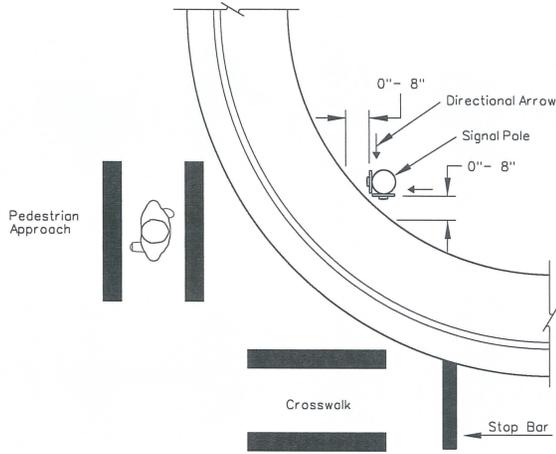
For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

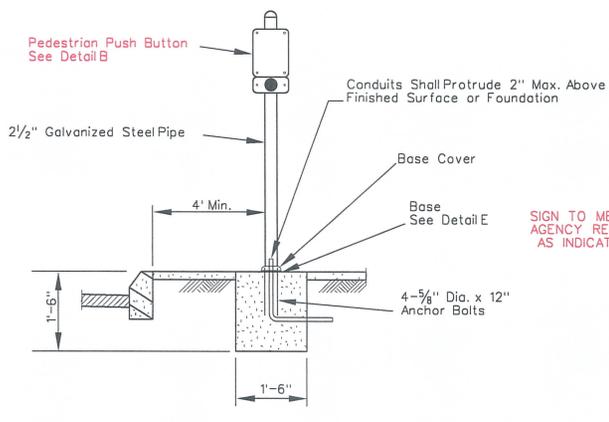
Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

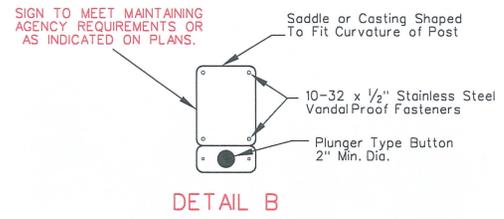
Notes: _____



Pedestrian Push Buttons Shall Be Installed on the Crosswalk Side of the Signal Pole, With the Proper Directional Arrow Positioned Correctly.



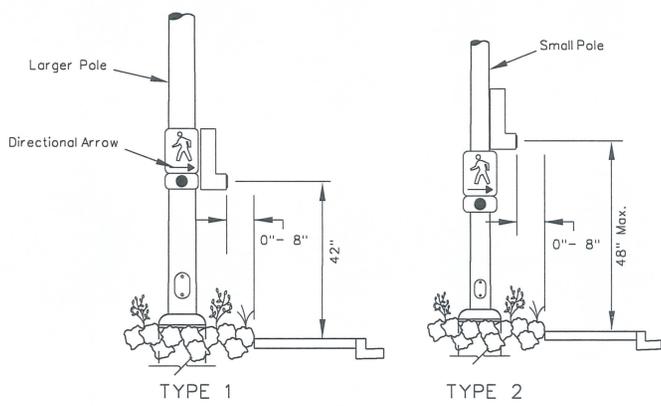
PEDESTRIAN PUSH BUTTON POST



DETAIL B

NOTES:

1. ARROW TO BE LEFT OR RIGHT OR BOTH AS REQUIRED.
2. PER PLANS AND MAINTAINING AGENCY, 5" x 7" OR 9" x 12" SIGN, BLACK SYMBOLS ON WHITE BACKGROUND.

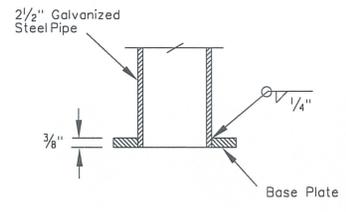


TYPE 1 TYPE 2

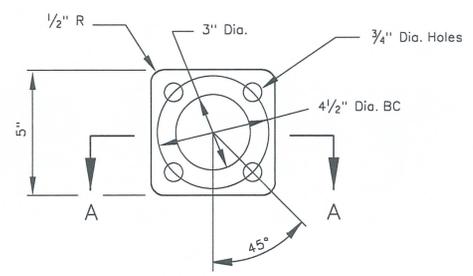
- TYPE 1- Position Pedestrian Push Buttons on Signal Pole When the Width of the Pole Allows (2) Pedestrian Buttons to Be Mounted At the Same Height.
- TYPE 2- Position Pedestrian Push Buttons on Signal Pole When the Width of the Pole Does Not Allow (2) Pedestrian Buttons to Be Mounted At the Same Height. Mount Lower Push Button as High as Possible.

PUSH BUTTON POSITIONING DETAIL

NOTE: CONTRACTOR IS RESPONSIBLE FOR VERIFYING POLE SIZE FOR CORRECT PPB INSTALLATION.



SECTION A-A WITH PIPE



DETAIL E

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
PEDESTRIAN PUSH BUTTON DETAILS		
DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30.13.2 Page No.: T-5 Note: A separate form is required for each change.

Description of requested modification or correction: REMOVE FLUORESCENT LAMP
DETAIL AND NOTES 3 + 4 REMOVED

(Please attach supporting information).

Reason for request: LED LIGHTING CHANGE

Requestor Information: Name: Thomas Mene Phone: 7566

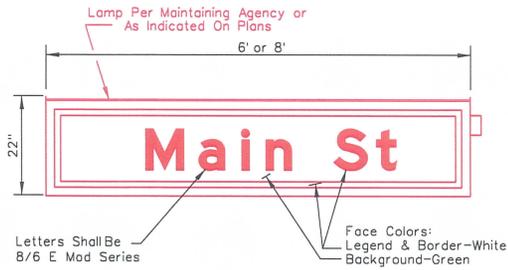
For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

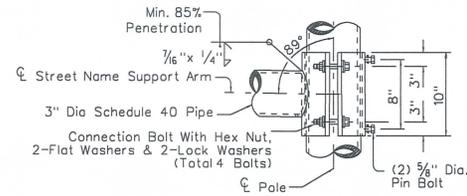
Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

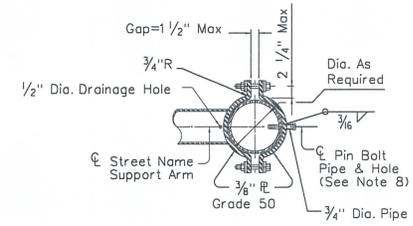
Notes: _____



*May Have Maintaining Agency Logo As Indicated On Plans.

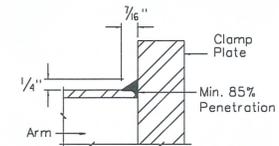


ELEVATION

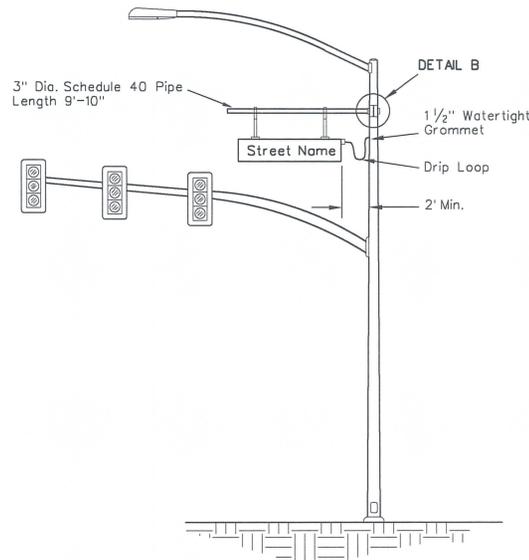


SECTION

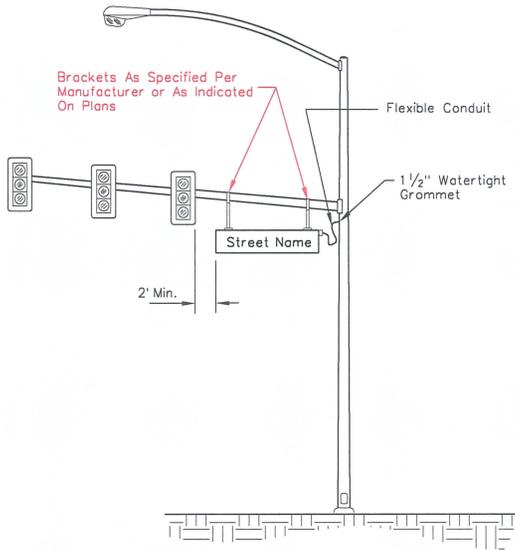
DETAIL B
CLAMP-ON CONNECTION
See Note 7



DETAIL A
ARM BASE WELD



INSTALLATION METHOD 2



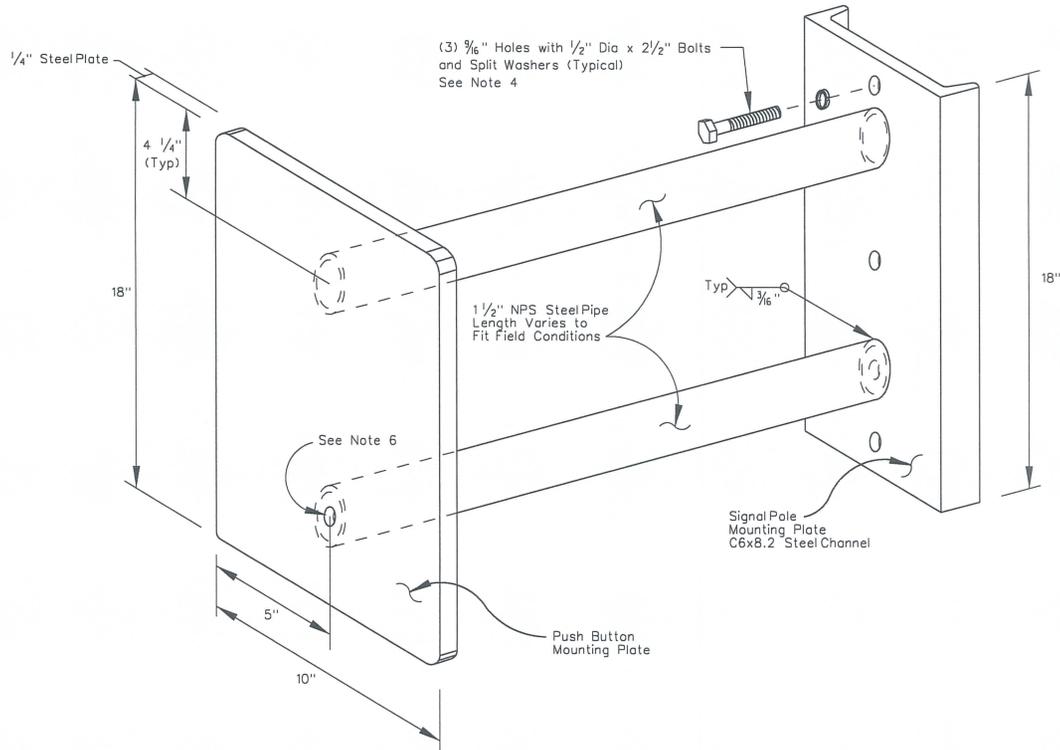
INSTALLATION METHOD 1

NOTES:

1. ALL FASTENERS AND ASSOCIATED HARDWARE SHALL BE STAINLESS STEEL.
2. TWO(2) NO. 12 AWG CONDUCTORS SHALL BE INSTALLED BETWEEN THE INTERNALLY ILLUMINATED STREET NAME SIGN AND THE POLE LUMINAIRE. THE PHOTO ELECTRIC (PE) CONTROL FOR THE LUMINAIRE OR ELECTRICAL SERVICE WILL OPERATE THE INTERNALLY ILLUMINATED SIGN.
3. WIRE CONNECTIONS WILL BE MADE WITH INSULATED COMPRESSION WIRE NUTS.
4. STREET NAME SIGN WIRING TO RUN THROUGH TWO(2) WATER-TIGHT 90° FITTINGS WITH FLEXIBLE CONDUIT. USE A DRIP LOOP SUFFICIENT ENOUGH TO ALLOW SIGN MOVEMENT. USE WATERTIGHT RUBBER GROMMET OR BUSHING AT POLE ENTRY.
5. CLAMP-ON DETAILS SHALL BE USED FOR INTERNALLY ILLUMINATED STREET NAME SIGN SUPPORT ARM ASSEMBLY.
6. PIN BOLTS SHALL BE A325 WITH THREADS EXCLUDED FROM THE SHEAR PLANE. PIN BOLT AND 3/2" DIAMETER PIPE SHALL HAVE 3/16" DIAMETER HOLES FOR A 1/8" DIAMETER GALVANIZED COTTER PIN. BACK CLAMP PLATE SHALL BE FURNISHED WITH A 3/4" DIAMETER HOLE FOR EACH PIN BOLT. AN 1/8" DIAMETER HOLE FOR EACH PIN BOLT SHALL BE FIELD DRILLED THROUGH THE POLE AFTER ARM ORIENTATION HAS BEEN APPROVED BY THE ENGINEER.

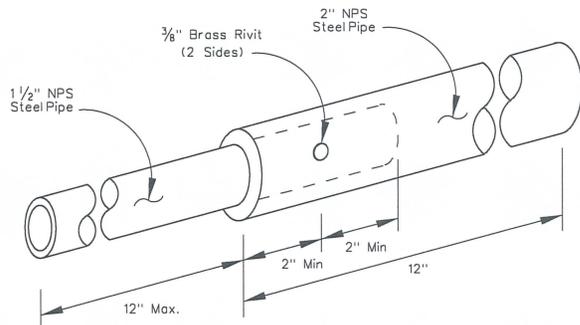
66.LHS

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
INTERNALLY ILLUMINATED STREET NAME SIGNS		
DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.

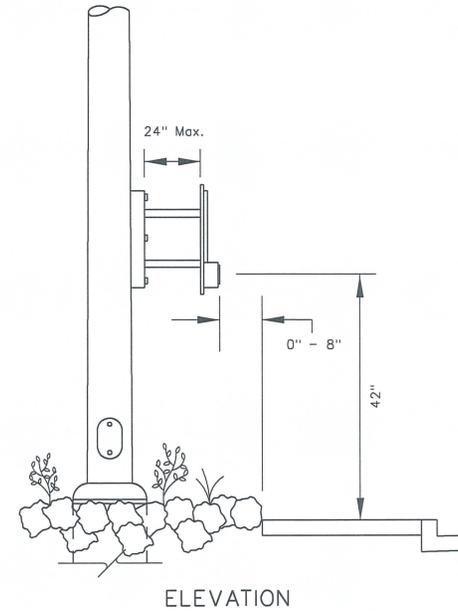
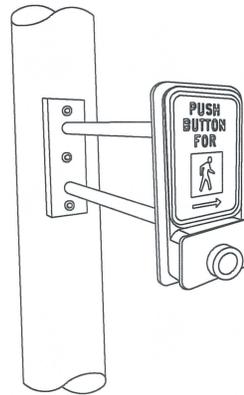


NOTES:

1. 1/2" RADIUS ON ALL CORNERS. SMOOTH AND NEATLY ROUND EXPOSED EDGES TO A 1/8" RADIUS.
2. ALL MATERIAL SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, UNLESS OTHERWISE SPECIFIED.
3. 1 1/2" NPS STEEL PIPE USE SCHEDULE 40 AND 2" NPS STEEL PIPE USE SCHEDULE 80. 2" NPS PIPE IS ONLY USED WITH THE ADJUSTABLE EXTENDER.
4. DRILL AND TAP HOLES 20TPI INTO SIGNAL POLE.
5. ATTACH PUSH BUTTON TO MOUNTING PLATE PER MANUFACTURES RECOMMENDATIONS.
6. DRILL 1/2" HOLES IN MOUNTING PLATES AT LOWER EXTENSION PIPE FOR CONDUCTORS. SMOOTH EDGES TO PREVENT DAMAGE TO INSULATION.



ADJUSTABLE EXTENDER (OPTIONAL)



*NO DIRECT PAYMENT. TO BE INCLUDED ON PPB WHEN REQUIRED. TO MEET ADA REQUIREMENTS.

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
PEDESTRIAN PUSH BUTTON EXTENSION		
DET. • (000)	Signed Original On File	
ADOPTED •/•/••	REVISED •/•/••	CHIEF SAFETY/TRAFFIC ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30.1.4 Page No.: T-8 Note: A separate form is required for each change.

Description of requested modification or correction: change detail notes and detail drawings to use round detector loops instead of the square loops that are currently called for.

(Please attach supporting information).

Reason for request: Less pinch points of failure using round loops.

Requestor Information: Name: [Signature] Phone: 7566

For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

Policy Review:

CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes: _____



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30.14.1 Page No.: T-9 Note: A separate form is required for each change.

Description of requested modification or correction: CHANGE NOTE 2 AND
DETAIL FOR "MODIFIED"

(Please attach supporting information).

Reason for request: PULL BOX DETAIL

Requestor Information: Name: Thomas H. Ware Phone: 7566

For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

Notes: _____



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30.1.4.2 Page No.: T-10 Note: A separate form is required for each change.

Description of requested modification or correction: SPELLING ERROR NOTE 5
SEE ATTACHED, UPDATE SHEET

(Please attach supporting information).

Reason for request: SEE ABOVE

Requestor Information: Name: [Signature] Phone: 7566

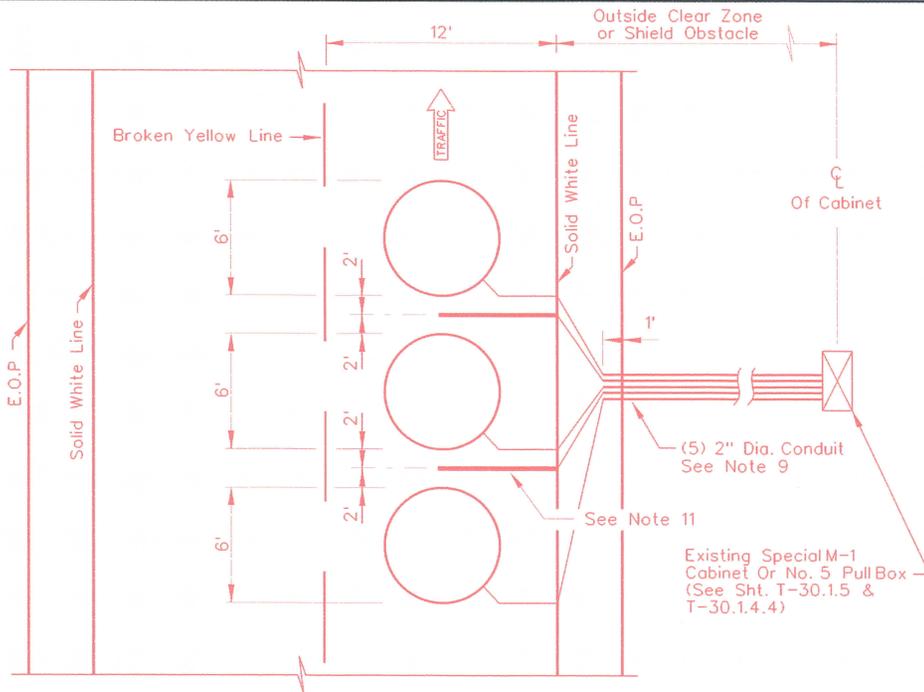
For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

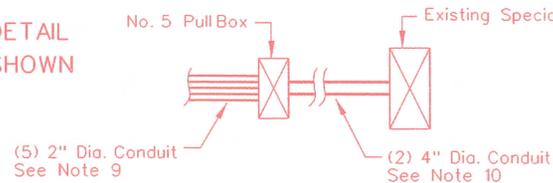
Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

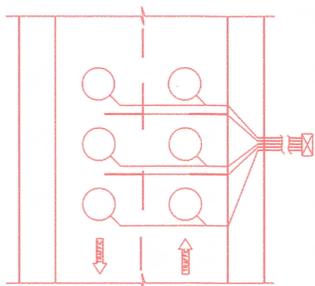
Notes: _____



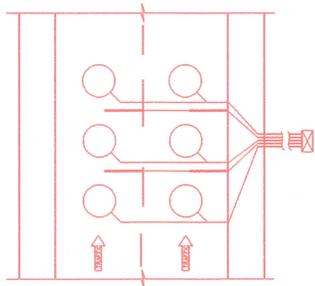
AVC DETECTOR PLACEMENT DETAIL
OPPOSITE LANE DETAIL NOT SHOWN
FOR CLARITY



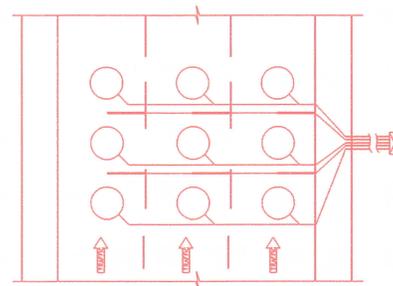
PULL BOX TO M-1 CABINET
CONNECTION DETAIL



1 LANE EACH DIRECTION
CABINET LOCATED TO THE OUTSIDE



2 LANES SAME DIRECTION
WITH CABINET
LOCATED TO THE OUTSIDE



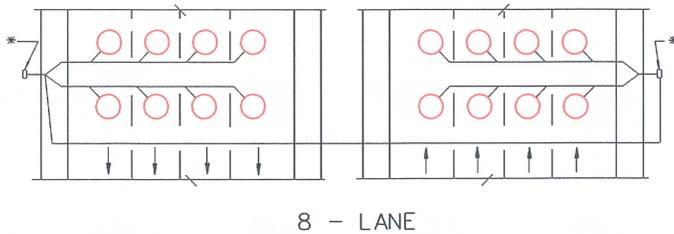
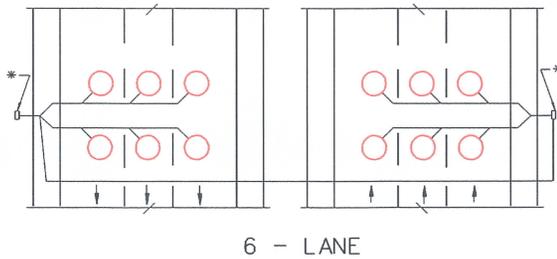
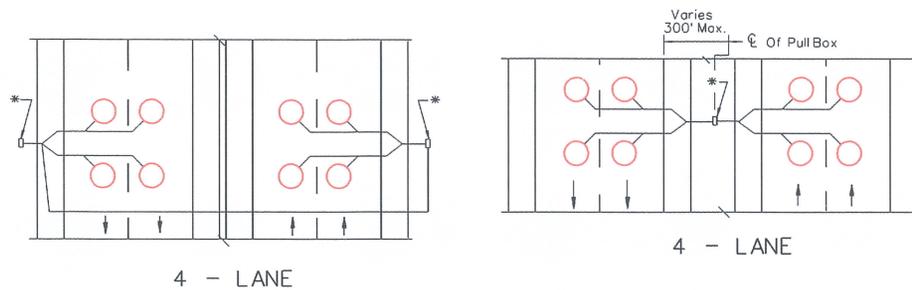
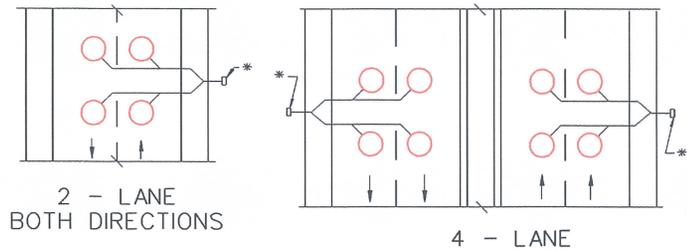
3 OR MORE LANES SAME DIRECTION
CABINET LOCATED TO THE OUTSIDE

NOTES:

- Five working days prior to placement of any and all sensors, the resident engineer shall notify the Traffic section of the planning division for assistance in establishing the exact locations. For District 1 call 702-486-7000, for Districts 2 and 3 call 775-888-7474.
- All loops shall be 6' Diameter round loops with 4 turns of wire.
- Each loop shall be a continuous run to the Special M-1 Cabinet with no splices and shall be labeled with proper lane designation and sensor placement (i.e. leading, middle, trailing sensor).
- Loop wire homerun pairs shall be twisted no less than 4 times per foot for the entire home run to No. 5 Pull Box and Special M-1 Cabinet.
- Loops shall be centered in all travel lanes and turn lanes.
- Loop cuts shall be 3/8" wide and 2-1/2" - 3" maximum depth.
- Loop wire shall be AWG-14 stranded, meeting IMSA-51-1 or higher standard.
- No more than four (4) sensors leads can occupy a single saw cut, for greater detail see standard plan sheet T-30.1.4.
- Loop wire leads and Class 1 Piezoelectric sensor cable leads shall be carried in separate 2" conduit from E.O.P. to No. 5 Pull Box and/or Special M-1 Cabinet.
- Loop wire leads and Class 1 Piezoelectric sensor cable leads shall be carried in separate 4" conduit going under pavement areas and/or from No. 5 Pull Box to Special M-1 Cabinet.
- Class 1 Piezoelectric sensor length shall be equal to half of the lane width, and installed in accordance with manufacturer's specifications unless otherwise specified here.
- Class 1 Piezoelectric sensor cable shall be a continuous run to the Special M-1 Cabinet with no splices and labeled with proper lane designation and sensor placement (i.e. leading, middle, trailing sensor).
- AVC detector shall include all conductors and saw cutting necessary for installation.
- If guardrail/barrier rails is provided, the Special M-1 Cabinet shall be placed a minimum of 24" behind rail.
- For Special M-1 Cabinet only, in accordance with the National Electric Code 250-56 when the grounding plate does not have a resistance to ground of 25 ohms or less, it shall be augmented with one additional electrode, preferably a 1/2" x 96" copper ground rod.
- Payment shall be made under the following items:

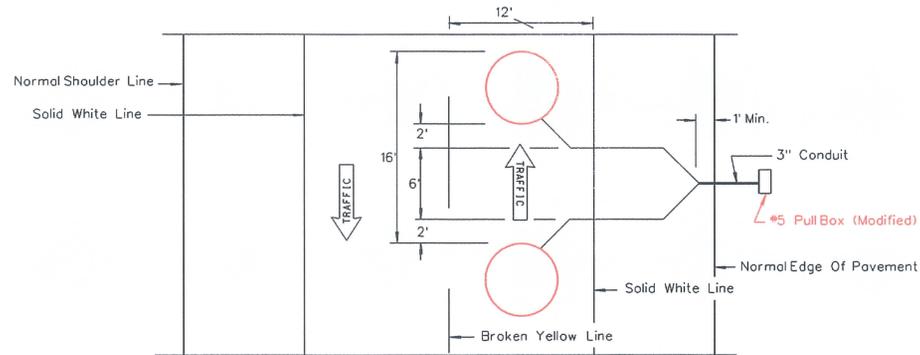
- No. 5 traffic rated Pull Box (each)
- Piezoelectric sensors (each)
- 6' Diameter loops (each)
- 4" Diameter Conduit (linft)
- 2" Diameter Conduit (linft)

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION			
AVC DETECTOR CONFIGURATION AND NOTES			
DET. *	(000)	Signed Original On File	
ADOPTED */**	REVISED */**	CHIEF SAFETY/TRAFFIC ENGR.	



NOTES:

1. ALL LOOPS SHALL BE 6' DIAMETER ROUND LOOPS WITH 4 TURNS OF WIRE.
2. LOOP WIRE PAIRS FROM LOOP PROPER TO NO. 5 PULL BOX (MODIFIED) SHALL BE TWISTED NO LESS THAN FOUR TIMES PER FOOT.
3. LOOP WIRE PAIRS SHALL BE TWISTED NO LESS THAN FOUR TIMES PER FOOT FOR THE ENTIRE HOME RUN.
4. LOOP CUTS SHALL BE 3/8" WIDE x 2 1/2"-3" MAXIMUM DEPTH.
5. LOOPS SHALL BE CENTERED IN ALL TRAVEL AND TURN LANES.
6. LOOP WIRE SHALL BE AWG 14 STRANDED IMSA-51-1.
7. EACH INDIVIDUAL CONDUCTOR SHALL BE A CONTINUOUS RUN WITH NO SPLICES AND SHALL BE LABELED AT EACH END WITH THE LANE ASSIGNMENT.
8. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO ASCERTAIN THAT THE LOOP PLACEMENT IS NOT IN CONFLICT WITH OTHER ITEMS OF WORK.
9. FIVE WORKING DAYS PRIOR TO PLACEMENT OF LOOP DETECTORS, THE RESIDENT ENGINEER SHALL NOTIFY THE TRAFFIC SECTION OF THE PLANNING DIVISION (888-7155) FOR ASSISTANCE IN ESTABLISHING THE EXACT LOCATION.
10. DETECTORS SHALL BE INSTALLED AFTER DENSE GRADE PAVING OR PROFILE GRADE IS ESTABLISHED.
11. LOOP LOCATION SHALL BE MARKED ON THE EDGE OF THE PAVEMENT BY PAINTING THE WORD "LOOP" IN WHITE.
12. SEE STANDARD SHEET T-30-1.4.1 FOR PAVEMENT JOINT DETAILS.
13. PAYMENT WILL BE MADE UNDER THE FOLLOWING ITEMS:
 NO. 5 PULL BOX (MODIFIED) (EACH)
 6' DIA. LOOPS (EACH)
 3" DIA. CONDUIT (LINF)

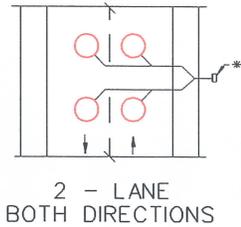


SPEED DETECTOR LOOP PLACEMENT DETAIL
(OPPOSITE LANE LOOPS NOT SHOWN FOR CLARITY)

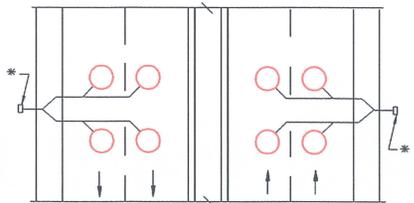
LEGEND:

* -No. 5 Pull Box (Modified)

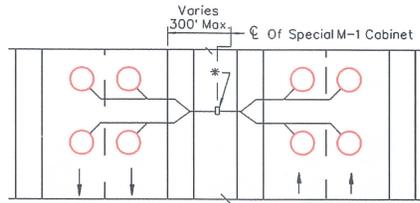
STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
SPEED DETECTOR LOOP CONFIGURATION AND NOTES		
DET. *	(000)	Signed Original On File
ADOPTED **	REVISED ***	CHIEF SAFETY/TRAFFIC ENGR.



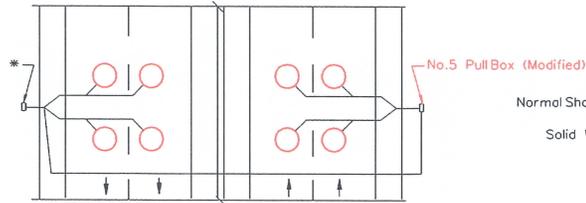
2 - LANE
BOTH DIRECTIONS



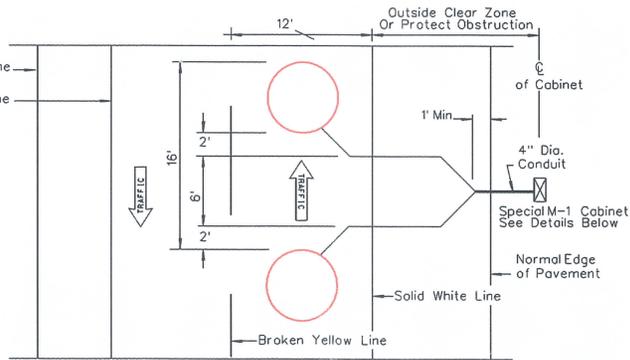
4 - LANE
WITH TWO SPECIAL M-1 CABINETS
LOCATED TO THE OUTSIDE



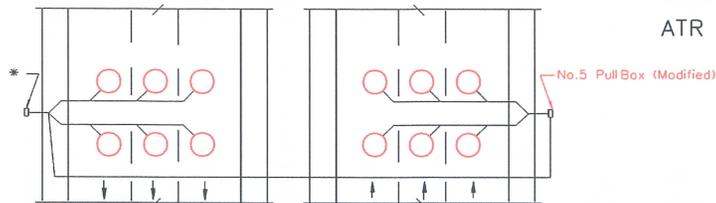
4 - LANE
WITH ONE SPECIAL M-1 CABINET
LOCATED IN MEDIAN



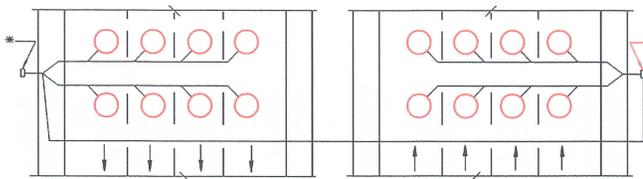
4 - LANE
WITH ONE SPECIAL M-1 CABINET
TO THE OUTSIDE



ATR DETECTOR LOOP PLACEMENT DETAIL
OPPOSITE LANE LOOPS NOT SHOWN FOR CLARITY



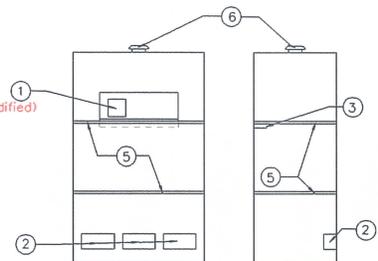
6 - LANE
WITH ONE SPECIAL M-1 CABINET
TO THE OUTSIDE



8 - LANE
WITH ONE SPECIAL M-1 CABINET
TO THE OUTSIDE

LEGEND:

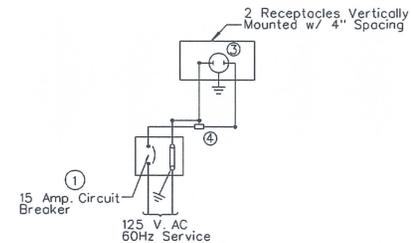
- * Special M-1 Cabinet
- ① Main Switch
- ② Field Wire Terminal Blocks
- ③ N.E.M.A. Standard Plug Receptacle With Grounding Contact
- ④ Radio Interference Suppressor
- ⑤ Shelf
- ⑥ Thermostat-Controlled Fan With T-Vent



SPECIAL M-1 CABINET
SEE SHEET T-30.1.5 FOR ADDITIONAL DETAILS

NOTES:

1. ALL LOOPS SHALL BE 6" DIAMETER ROUND LOOPS WITH 4 TURNS OF WIRE.
2. LOOP WIRE PAIRS FROM LOOP PROPER TO NO. 5 PULL BOX (MODIFIED) OR SPECIAL M-1 CABINET SHALL BE TWISTED NO LESS THAN FOUR TIMES PER FOOT.
3. LOOP WIRE PAIRS SHALL BE TWISTED NO LESS THAN FOUR TIMES PER FOOT FOR THE ENTIRE HOME RUN.
4. LOOP CUTS SHALL BE 3/8" WIDE x 2 1/2"-3" MAXIMUM DEPTH.
5. LOOPS SHALL BE CENTERED IN ALL TRAVEL AND TURN LANES.
6. LOOP WIRE SHALL BE AWG 14 STRANDED IMSA-51-1.
7. EACH INDIVIDUAL CONDUCTOR SHALL BE A CONTINUOUS RUN WITH NO SPLICES AND SHALL BE LABELED AT EACH END WITH THE LANE ASSIGNMENT.
8. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO ASCERTAIN THAT THE LOOP PLACEMENT IS NOT IN CONFLICT WITH OTHER ITEMS OF WORK.
9. FIVE WORKING DAYS PRIOR TO PLACEMENT OF LOOP DETECTORS, THE RESIDENT ENGINEER SHALL NOTIFY THE TRAFFIC SECTION OF THE PLANNING DIVISION (888-7155) FOR ASSISTANCE IN ESTABLISHING THE EXACT LOCATION.
10. DETECTORS SHALL BE INSTALLED AFTER DENSE GRADE PAVING OR PROFILE GRADE IS ESTABLISHED.
11. LOOP LOCATION SHALL BE MARKED ON THE EDGE OF THE PAVEMENT BY PAINTING THE WORD "LOOP" IN WHITE.
12. FOR SPECIAL M-1 CABINET ONLY - IN CONFORMANCE WITH NATIONAL ELECTRIC CODE 250-56, WHEN THE GROUNDING PLATE DOES NOT HAVE A RESISTANCE TO GROUND OF 25 OHMS OR LESS, IT SHALL BE AUGMENTED BY ONE ADDITIONAL ELECTRODE PREFERABLY A 1/2" X 96" COPPER GROUND ROD.
13. IF GUARDRAIL/BARRIER RAIL IS PROVIDED, THE CABINET SHALL BE PLACED A MINIMUM OF 24" BEHIND RAIL.
14. SEE STANDARD SHEET T-30-1.4.1 FOR PAVEMENT JOINT DETAILS.
15. PAYMENT WILL BE MADE UNDER THE FOLLOWING ITEMS:
SPECIAL CABINET (EACH)
SPECIAL M-1 CABINET (EACH)
NO. 5 PULL BOX (MODIFIED) (EACH)
4" DIA. CONDUIT (LINFIT)
6" DIA. LOOPS (EACH)



CABINET WIRING

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
ATR DETECTOR LOOP CONFIGURATION AND NOTES		
DET. *	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-301.5 Page No.: T-13 Note: A separate form is required for each change.

Description of requested modification or correction: REMOVE TYPE G AND
CABINET WIRING DETAIL. ADD NOTE
FOR WIRING TO AGENCY REQUIREMENTS.
ADD LANDING PAD

(Please attach supporting information).

Reason for request: OUT DATED

Requestor Information: Name: T. Thomas Moore Phone: 7566

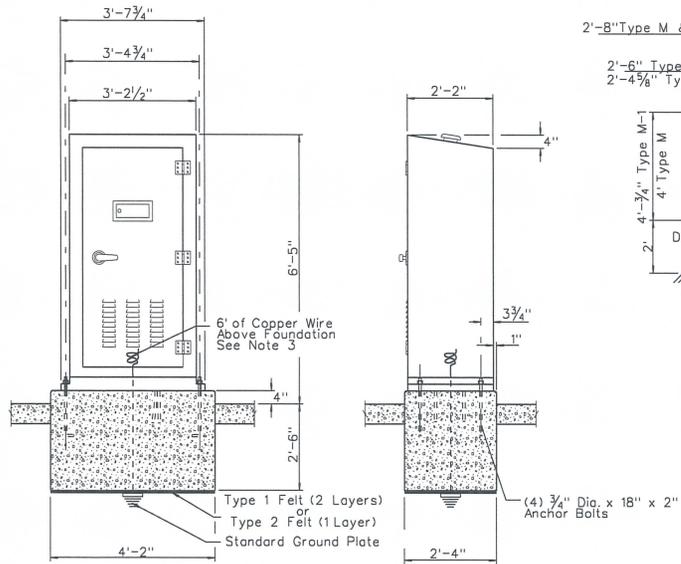
For Standards/Manuals Personnel Only: Approved Denied

Revised by: Signature: _____ Date: _____

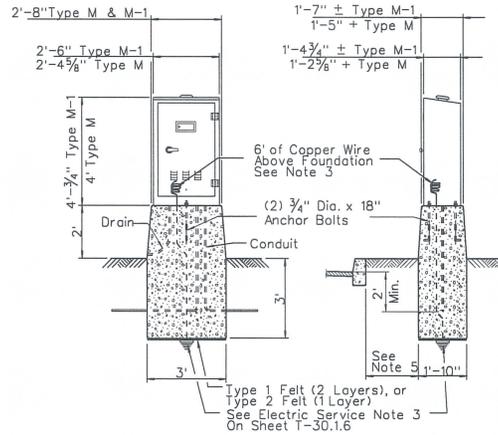
Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

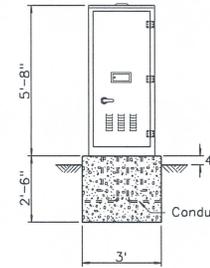
Notes: _____



TYPE R CABINET



TYPE M & M-1 CABINET



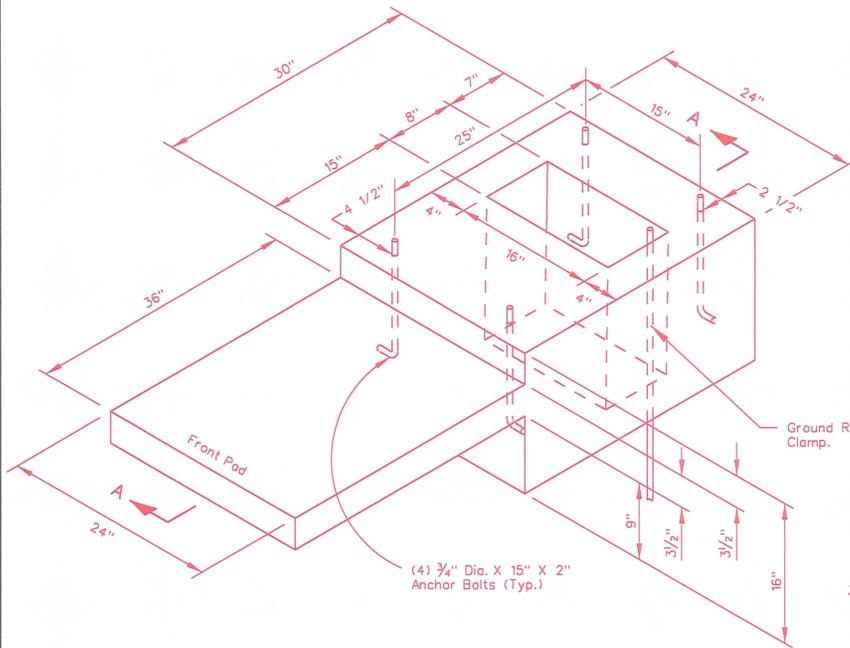
EXTENDED
TYPE M CABINET

For Details Not Shown See
Type M Cabinet

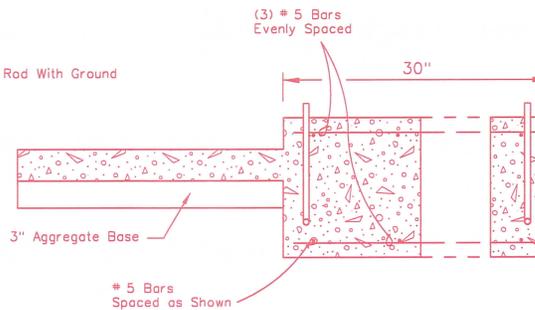
NOTES:

1. ALL CONDUITS SHALL EXTEND ABOVE FOUNDATIONS A MINIMUM OF 2".
2. ALL CABINETS SHALL BE PAINTED WHITE ON THE INSIDE AND OUTSIDE UNLESS SPECIFIED IN THE SPECIAL PROVISIONS.
3. $\frac{1}{2}$ " x 96" GROUND ROD MAY BE SUBSTITUTED IN LIEU OF COPPER WIRE.
4. CONCRETE SHALL BE CLASS A OR AA.
5. IF A CABINET IS TO BE INSTALLED IN OR NEAR A SIDEWALK AREA, THE HORIZONTAL AND VERTICAL CLEARANCE, AS SHOWN IN R-5.2.1, "TYPICAL SIDEWALK VS. OBSTRUCTION CLEARANCE DETAIL", SHALL BE MET.
6. CONCRETE SHALL BE CLASS A OR AA.
7. ROUGH BROOM TEXTURE ON FRONT AND REAR PADS.
8. INSTALL GROUND ROD WIRE CONDUIT IN ALL CABINET FOUNDATIONS. GROUND ROD WIRE CONDUIT TO BE USED WHEN AN ADDITIONAL GROUND ROD IS REQUIRED.

NOTE: WIRE CABINET PER AGENCY REQUIREMENTS OR AS INDICATED ON PLANS.



FOUNDATION

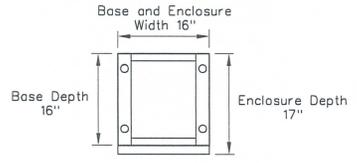
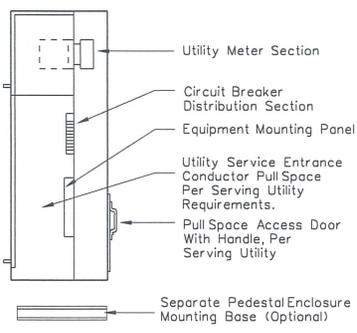
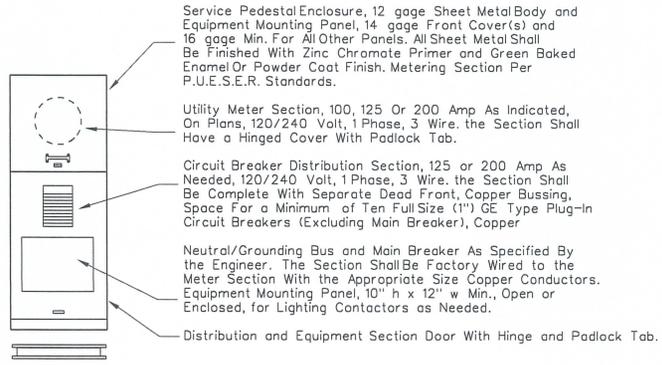


SECTION A-A

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CONTROLLER CABINETS

DET. •	(000)	Signed Original On File
ADOPTED a/jaa	REVISED a/jaa	CHIEF SAFETY/TRAFFIC ENGR.



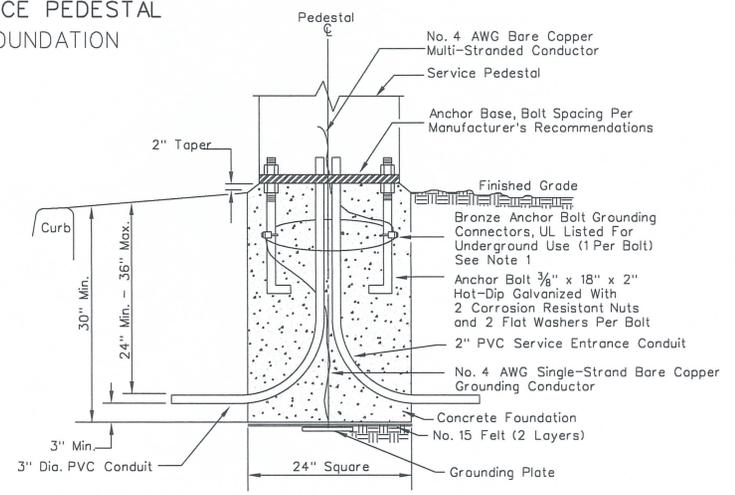
TYPICAL MOUNTING BASE DETAIL

Dimensions May Vary Depending On Manufacturer

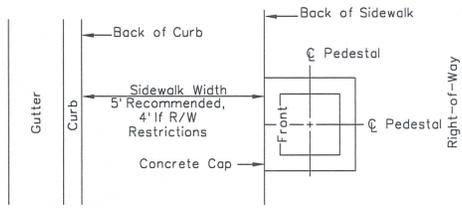
SINGLE METER SERVICE PEDESTAL

- NOTES:**
1. SUPPLY CIRCUIT BREAKER AND CONDUCTORS AS INDICATED ON PLANS (NO DIRECT PAYMENT).
 2. SUPPLY PE CELL AS REQUIRED (NO DIRECT PAYMENT).

SERVICE PEDESTAL FOUNDATION

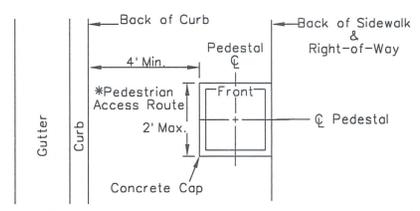


- NOTES:**
1. BARE COPPER GROUNDING CONDUCTOR SHALL BE LOOPED AROUND ANCHOR BOLTS ONE TIME AND CONNECTED TO EACH ANCHOR BOLT BEFORE CONTINUING DOWN TO THE GROUNDING PLATE.
 2. CABINET COVERS SHALL BE PARALLEL WITH CURB.
 3. IN AREAS WHERE R/W PERMITS, THE CONCRETE BASE SHALL BE PLACED AT THE BACK EDGE OF THE SIDEWALK.
 4. CABINET COVERS SHALL OPEN TOWARDS THE STREET WHEN CABINETS ARE LOCATED AT BACK OF WALK. CABINET COVERS SHALL OPEN PARALLEL TO THE SIDEWALK FACING THE DIRECTION OF TRAFFIC WHEN LOCATED WITHIN THE SIDEWALK.
 5. GROUND PLATE SHALL BE MADE OF NONFERROUS MATERIALS (TYPICALLY BRASS OR COPPER).

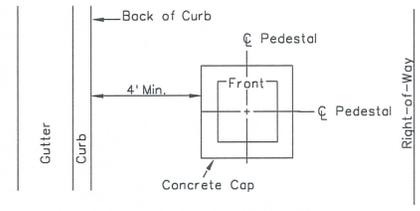


BEHIND SIDEWALK (FOR WIDTHS 5 FT. OR LESS)

SERVICE PEDESTAL SETBACK WITHIN R/W LIMITS



BACK PORTION OF SIDEWALK (FOR WIDTHS OF 5 FT. OR MORE)

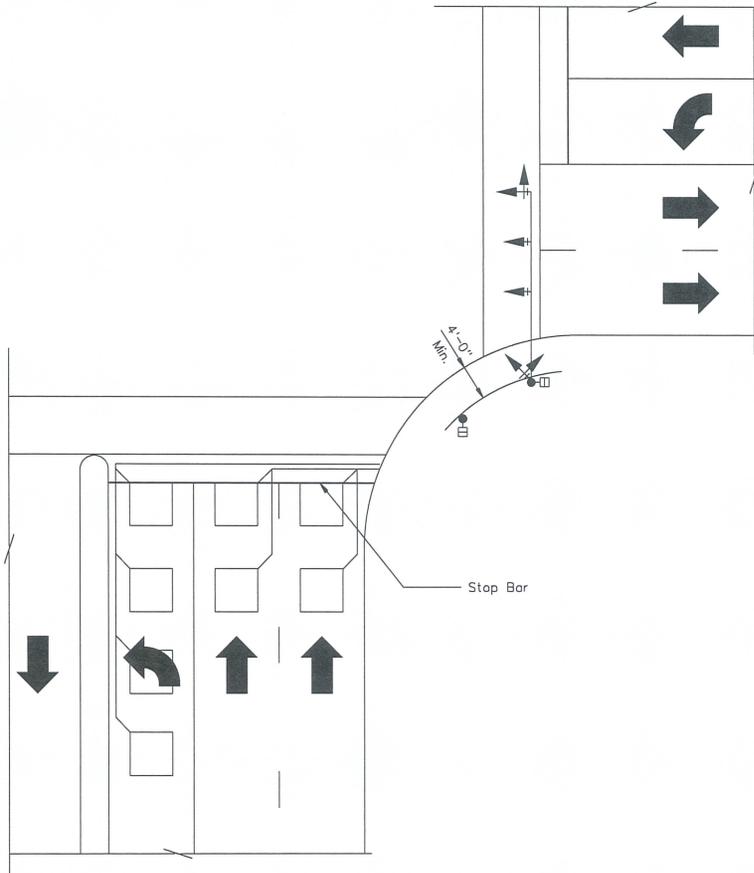


OPEN AREA

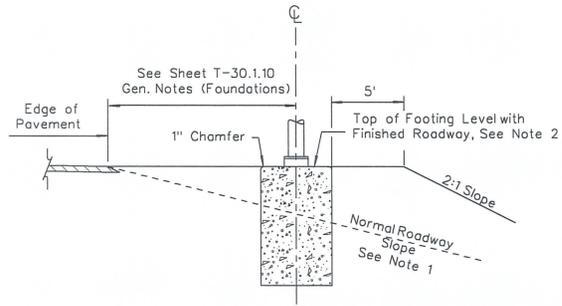
LEGEND:

* WHERE INSUFFICIENT PUBLIC RIGHT-OF-WAY IS AVAILABLE TO LOCATE STREET FIXTURES OUTSIDE THE 5' NORMAL SIDEWALK WIDTH, THE PEDESTRIAN ACCESS MAY BE REDUCED TO 4' FOR A LENGTH OF 2'.

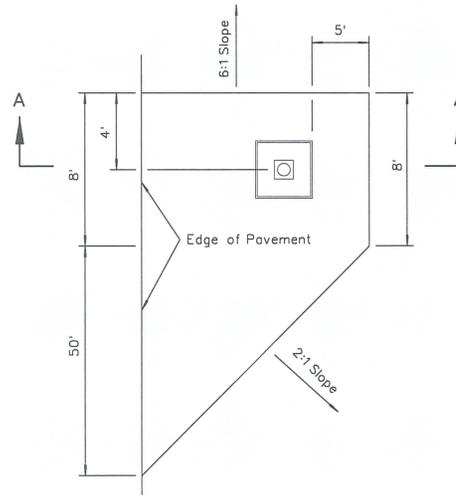
STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
100 & 200 AMP UNDERGROUND ELECTRICAL SERVICE		
DET. *	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.
././	././	



TYPICAL SIGNAL POLE AND LOOP DETECTOR LOCATIONS



SECTION A-A

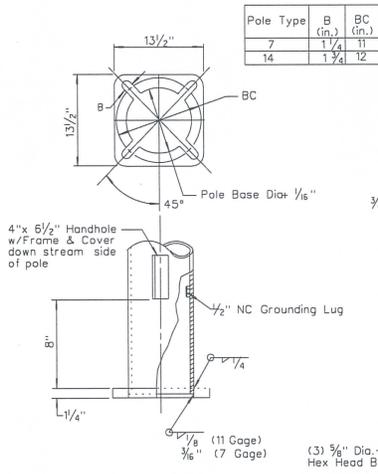


FOUNDATION ISLAND PLAN

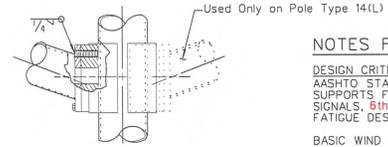
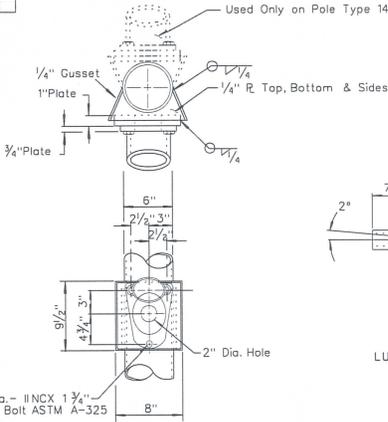
NOTES:

1. ISLANDS SHALL BE PLACED ONLY ON SLOPES GREATER THAN 10:1.
2. WHEN USING SAFETY BASES THE TOP OF THE FOUNDATION SHALL BE PLACED FLUSH WITH THE TOP OF THE FOUNDATION ISLAND.
3. CONCRETE SHALL BE CLASS A OR AA.
4. WHERE DETECTOR LOOPS ARE CUT INTO PAVEMENT, 6' ROUND LOOPS MAY BE USED IN LIEU OF 6' x 6' SQUARE LOOP DETECTORS.
5. PLACEMENT OF LOOPS PER MAINTAINING AGENCY OR AS INDICATED ON PLANS.

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
SIGNAL POLE AND LOOP DETECTOR LOCATIONS FOUNDATION ISLAND		
DET. #	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.



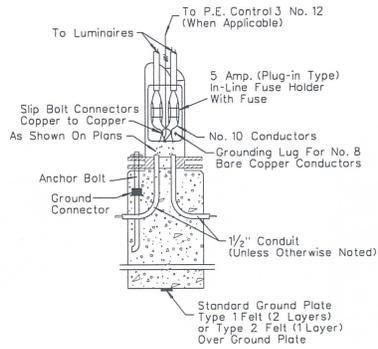
Pole Type	B (in.)	BC (in.)
7	1 1/4	11
14	1 3/4	12



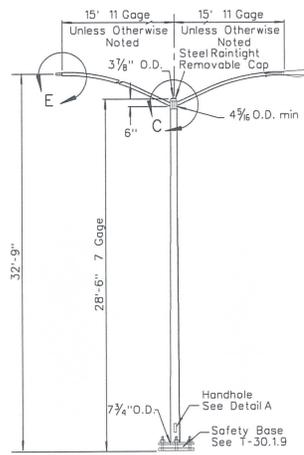
DETAIL E
LUMINAIRE TENON DETAIL

DETAIL A
BASE PLATE
(NOT APPLICABLE WHEN SAFETY BASES ARE REQ'D.)

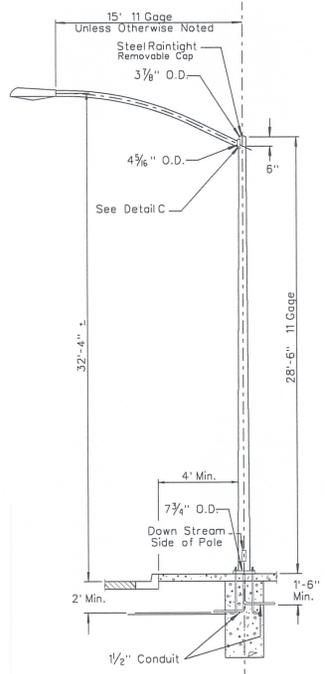
DETAIL C
LUMINAIRE ARM CONNECTION



WIRING DIAGRAM FOR
POLE TYPE 7 AND TYPE 14



POLE TYPE 14



POLE TYPE 7

NOTES FOR ALL POLE TYPES:

DESIGN CRITERIA
AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS, 6th EDITION, DATED 2013 (EXCLUDING SECTION 11: FATIGUE DESIGN).

BASIC WIND SPEED = 90 MPH.

GALVANIZING

- POLES SHALL BE GALVANIZED AS PER ASTM A-123. HARDWARE SHALL BE GALVANIZED AS PER ASTM A-153.

STEEL SIGNAL AND LUMINAIRE ARMS

- THE LAST 3' OF THE LUMINAIRE ARM SHALL BE STRAIGHT AND HORIZONTAL WITH LUMINAIRE ATTACHED.
- CONNECTION BETWEEN ARMS AND POLES SHALL BE MADE BY MEANS OF A RAIN TIGHT SOCKET OR A DESIGN PERMITTING SIMPLE REMOVAL OF THE ARMS.

ANCHOR BOLTS

- PROVIDE 4-ASTM F1554, GRADE 55, SI ANCHOR BOLTS, 8-ASTM A-563 HEAVY HEX NUTS, AND 8-ASTM F-436 HARDENED STEEL WASHERS FOR EACH POLE.
- THREADS MAY BE CUT OR ROLLED, BOLTS SHALL BE GALVANIZED OR PLATED AFTER THREADS ARE FORMED. EACH BOLT SHALL BE PROVIDED WITH 6" OF THREADS.
- WHEN USING A SAFETY BASE, ANCHOR BOLTS SHALL NOT EXTEND ABOVE THE SLIP BOLT GASKET.

STEEL POLES

- BASE COVERS ARE REQUIRED ON ALL POLES EXCEPT WHERE SAFETY BASE IS SPECIFIED.
- A REDUCED GAGE FOR SHAFT OF POLE WILL BE ACCEPTABLE ABOVE SIGNAL ARM ATTACHMENT SIMILAR TO POLE TYPE 28.

WELDS

- LONGITUDINAL WELDS BY SUBMERGED ARC OR ERW CIRCUMFERENTIAL BUTT WELDS SHALL HAVE PERMANENT BACK-UP RINGS. ALL EXPOSED BUTT WELDS SHALL BE GROUND FLUSH.
- FOR WELD SIZES NOT SHOWN, USE MINIMUM SIZE WELD AS SPECIFIED BY THE LATEST WELDING CODE.
- BREAK ALL SHARP EDGES FOR WIRE PROTECTION.

FOUNDATIONS

- AT LOCATIONS BEHIND CURB, ALL SIGNAL AND LIGHTING POLES SHALL BE LOCATED AT THE BACK EDGE OF SIDEWALK OR AT THE R/W LINE, TO OBTAIN A MINIMUM SETBACK DISTANCE OF 5' BEHIND THE BACK EDGE OF CURB TO CENTER OF POLE. (SEE SHEET T-30.1.8 FOR TYPICAL LOCATIONS.)
- AT LOCATIONS WITHOUT CURB, POLES SHALL BE PLACED A MINIMUM DISTANCE OF 6' FROM SHOULDER OR A MINIMUM OF 10' FROM TRAVEL WAY, WHICH EVER IS GREATER.
- FOR FOUNDATION DETAILS SEE SHEET T-30.1.6.
- FOR FOUNDATION ISLAND SEE SHEET T-30.1.8.
- CONCRETE SHALL BE CLASS A OR AA.

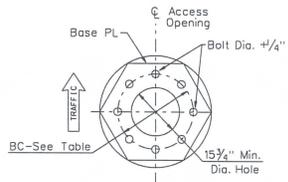
SAFETY BASES

- TYPE 7 AND TYPE 14 POLES SHALL REQUIRE SAFETY BASE ASSEMBLIES UNLESS MOUNTED ON STRUCTURE BEHIND BARRIER RAIL OR NOTED OTHERWISE ON THE PLANS, SEE SHEET T-30.1.9 FOR DETAILS.

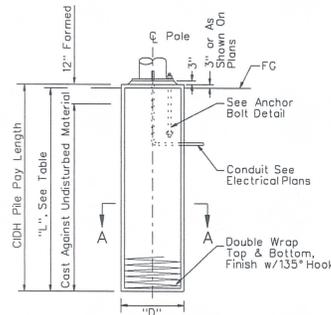
NEVADA DEPARTMENT OF TRANSPORTATION

TYPE 7 & 14 POLE LIGHTING & SIGNAL LIGHT POLES

Signed Original On File	T-30-1.10	(623)
CHIEF SAFETY/TRAFFIC ENGR.	ADOPTED 12/28	REVISION 12/14



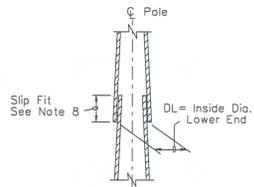
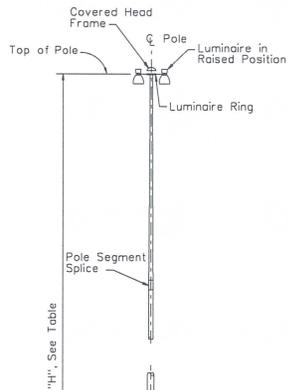
**8 BOLTS
BASE PLATE DETAILS**
See Note 9



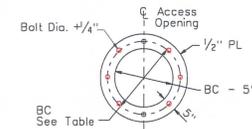
TYPICAL ELEVATION

No. 8 Pile Reinf,
Equally Spaced
See Table
No. 5 @ 6" Spiral
(Reduce Pitch to
3" Over Entire
Length of Anchor
Bolts)

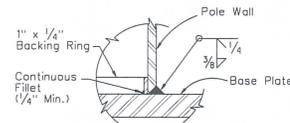
**SECTION A-A
CIDH PILE DETAILS**



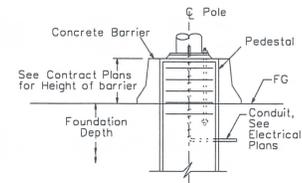
POLE SEGMENT SPLICE DETAIL



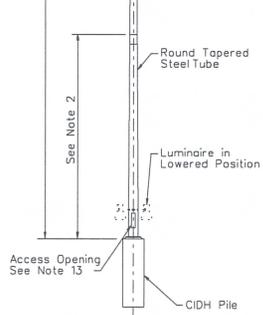
ANNULAR RING DETAIL



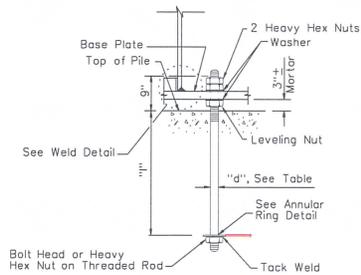
WELD DETAIL



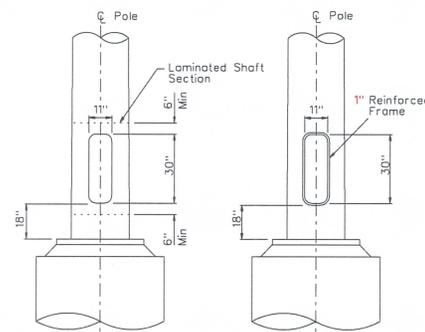
MEDIAN LOCATION



POLE DETAILS



ANCHOR BOLT DETAIL
See Note 10



**ALT 1 ALT 2
HANDHOLE DETAIL**
See Note 13

SHEET 1 OF 2

NEVADA DEPARTMENT OF TRANSPORTATION

**HIGH MAST LIGHT
POLE & FOUNDATION
DETAILS**

Signed Original On File	T-30.1.11	(623)
CHIEF BRIDGE ENGINEER	ADOPTED 12/02	REVISION 12/14

61-T

T-20

Height "H" (ft)	Min Pole Base OD (in) Note 5	Min Pole Base Wall Thickness (in)	Base Plate		Anchor Bolts				CIDH Pile Data	
			Diameter (in)	Thickness (in)	Total	Size "d" (in)	BC (in)	"I" (in)	"D" (in)	Reinforcement
70	16 3/4	1/4	30 1/2	2 1/4"	8	1 1/4	25	58	42	10-#8
100	18 3/8	3/8	30 1/2	2 1/4"	8	1 1/2	25	84	42	13-#8
120	21	3/8"	37 1/2	2 1/4"	8	1 1/2	32	84	48	20-#8

Minimum Shaft Length, "L" (ft) *			
"H" (ft)	Site Foundation Material **		
	Weak Rock	Stiff Clay, Sand, Gravel	Soft Clay
70	7	11	14
100	8	13	20
120	8	14	22

* Increase "L" By 2 Feet For All Heights, "H," and All Site Foundation Materials For Construction On or Within 3 Feet of Sloping Ground (Slopes Up to 1.5H:1V).

** Site Foundation Material Shall Be Assumed As Stiff Clay, Sand or Gravel Unless Otherwise Noted in the Contract Documents. Geotechnical Engineer Will Verify Weak Rock and Soft Clay On a Case-By-Case Basis.

NOTES:

- DESIGN SPECIFICATIONS: AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS, SIXTH EDITION, 2014.
- POLE DETAILS SHALL SUIT THE LOWERING DEVICE AND THIS FOUNDATION PLAN. POLE DETAILS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. ALL HIGH MAST LUMINAIRES ARE BOTTOM LATCHING WITH AN INTERNAL WINCH ASSEMBLY AND EXTERNAL MOTOR. POLE SHALL HAVE A MINIMUM TAPER OF 0.0117 F1/F2.
- ALL MATERIALS TO BE GALVANIZED AFTER FABRICATION.
- FOR NUMBER OF LUMINAIRES TO BE MOUNTED ON THE POLE, SEE ELECTRICAL PLANS.
- FOUNDATION, POLE, BASE PLATE, AND ANCHOR BOLT DESIGN IS BASED ON A MAXIMUM OF 8 LUMINAIRES AND A MAXIMUM EFFECTIVE PROJECTED AREA (EPA) OF 14.5 FT², AND A MAXIMUM WEIGHT OF 770 LBS (INCLUDING FIXTURES, HOOD, AND LOWERING RING). INCREASE MINIMUM POLE DIAMETER IF REQUIRED TO ACCOMMODATE LOWERING DEVICE. LIMIT THE DESIGN DEFLECTION AT THE TOP OF THE POLE TO 10% OF THE POLE HEIGHT. SEE SHEET T-30.1.16 FOR POLE GROUNDING DETAIL.
- DESIGN WIND PRESSURES ARE BASED ON A 3 - SECOND GUST SPEED OF 90 MPH AND A 50 YEAR DESIGN LIFE.
- FATIGUE DESIGN BASED ON NATURAL WIND GUST LOADS AND FATIGUE IMPORTANCE CATEGORY I
- SLIP FIT LENGTH SHALL NOT BE LESS THAN 1.5 DL.
- BASE PLATE SHAPE OPTIONAL, EITHER ROUND OR HEXAGONAL AS SHOWN.
- ANCHOR BOLTS SHALL BE MADE FROM STEEL BAR CONFORMING TO AASHTO M 314 GRADE 55 INCLUDING 51 SUPPLEMENTARY REQUIREMENTS.
- THE FOLLOWING SOIL PARAMETERS WERE USED TO DETERMINE PILE LENGTH, "L":

Site Foundation Material	Minimum Dry Unit Weight (pcf)	Internal Friction Angle (deg)	Cohesion (psf)	Subgrade Modulus (pci)	Strain ϵ_{50}
Stiff Clay	100	n/a	1000	n/a	0.01
Sand	110	30 ***	n/a	60	n/a
Gravel	125	35	n/a	175	n/a
Soft Clay	90	n/a	250	n/a	0.02

*** Increased to 35 deg for sloping ground surface condition

Site Foundation Material	Unit Weight (pcf)	Unconfined Compressive Strength (tsf)	Initial Rock Modulus E_r (tsf)	Rock Constant k_{rm}	Rock Quality Designation (%)
Weak Rock	130	18	36,000	0.0005	50

- PILE LENGTH, "L", BASED ON MAXIMUM 1/2" LATERAL DEFLECTION AT TOP OF PILE UNDER GROUP II LOADS.
- ACCESS OPENING SHALL BE 11" x 30" WITH A LOCKABLE HINGED HANDHOLE COVER PLATE THE HANDHOLE SHALL BE GASKETED TO MAKE WATERPROOF. ACCESS OPENING SHALL BE REINFORCED AS REQUIRED IN THE STANDARD SPECIFICATIONS AND SHALL SUIT THE LOWERING DEVICE. SEE SHEET T-30.1.1.2 FOR HAND HOLE ORIENTATION.

SHEET 2 OF 2

NEVADA DEPARTMENT OF TRANSPORTATION

**HIGH MAST LIGHT
POLE & FOUNDATION
DETAILS**

Signed Original On File	T-30.1.11.1	(623)
CHIEF BRIDGE ENGINEER	ADOPTED 12/02	REVISION 12/14



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30.1.11.2 Page No.: T-21 Note: A separate form is required for each change.

Description of requested modification or correction: ADD DETAIL FOR FOUNDATION HEIGHT REQUIREMENTS

(Please attach supporting information).

Reason for request: CONTRACTOR DISPUTES

Requestor Information: Name: Thomas H. Moore Phone: 7566

For Standards/Manuals Personnel Only: Approved Denied

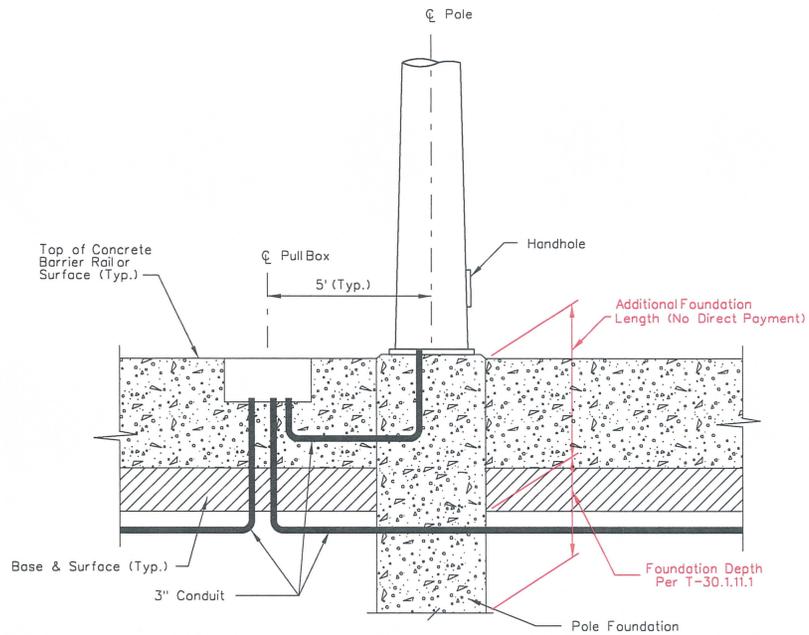
Revised by: Signature: _____ Date: _____

Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

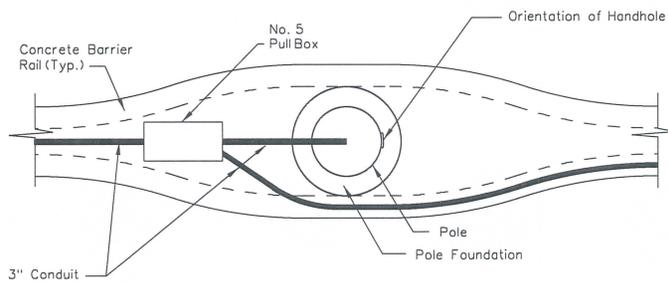
Reviewed by: Signature: _____ Date: _____

Notes: _____

66.LHS

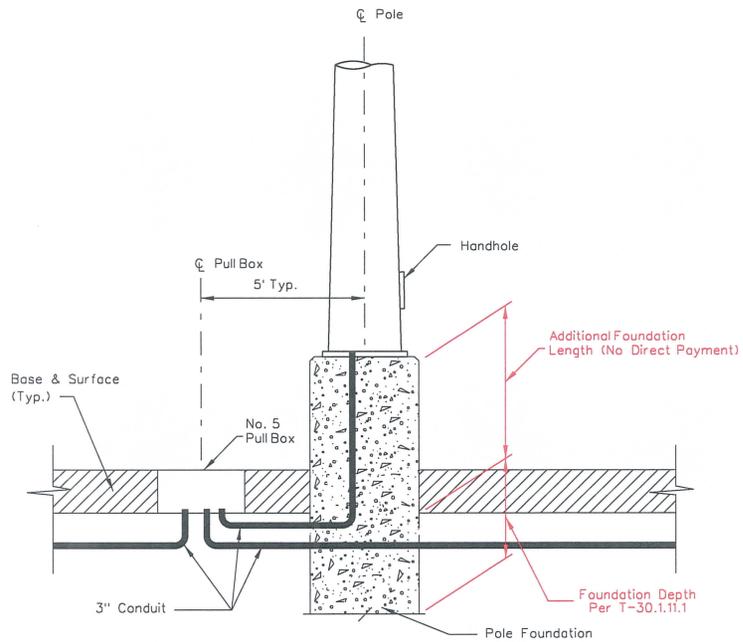


ELEVATION

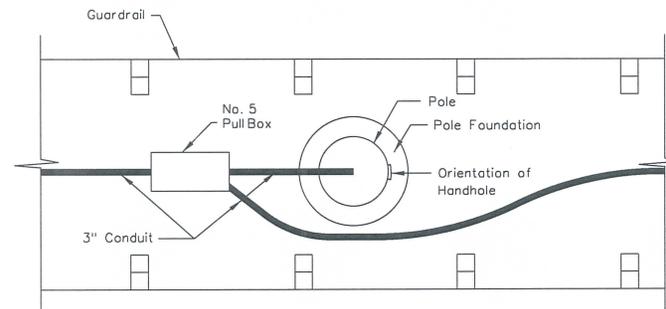


PLAN

INSTALLATION WITHIN CONCRETE BARRIER RAIL



ELEVATION



PLAN

INSTALLATION WITHIN GUARDRAIL

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

PULL BOX
(IN MEDIAN BARRIERS)

DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30.1.13 Page No.: T-23 Note: A separate form is required for each change.

Description of requested modification or correction: ADD DETAIL FOR
TERMINAL BLOCK HAND HOLE AND NOTES
TO UPDATE

(Please attach supporting information).

Reason for request: STANDARD PRACTICE

Requestor Information: Name: *Thomas Allen* Phone: 7566

For Standards/Manuals Personnel Only: Approved Denied

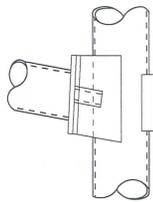
Revised by: Signature: _____ Date: _____

Policy Review:
 CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

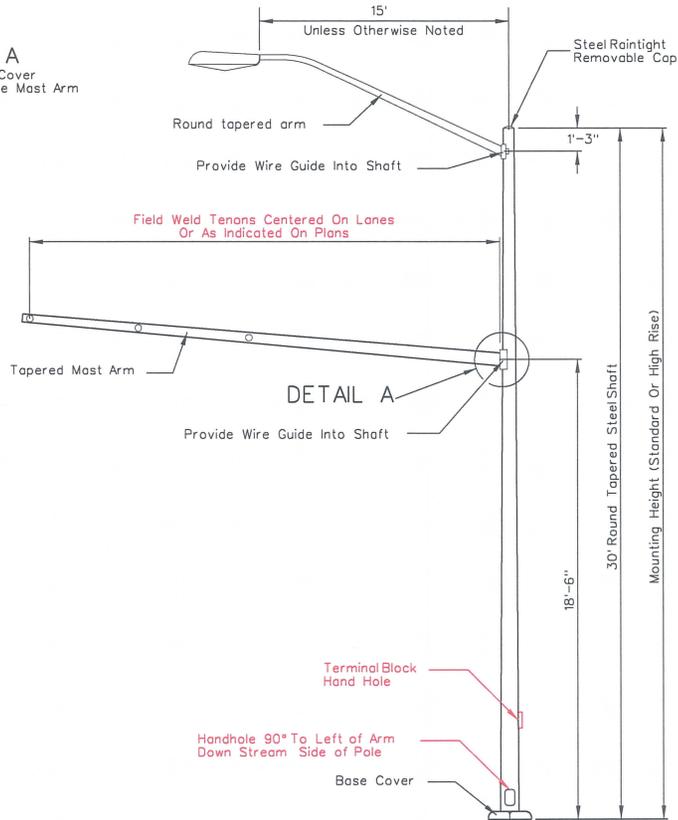
Notes: _____

66.LHS

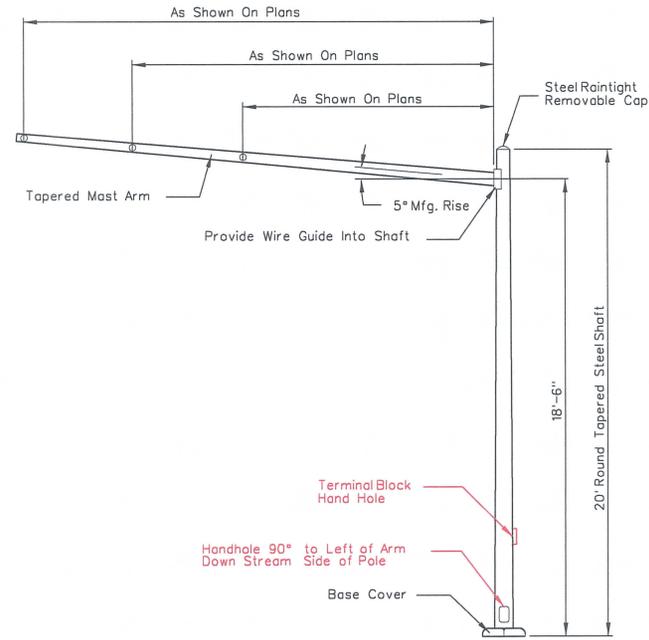


4 1/2" x 7" Min. (Inside Dim.)
Shall Be Mounted With
Tamper Resistant Screws

DETAIL A
Handhole and Cover
Located 180° Opposite Mast Arm



POLE TYPE 35 (MAST ARMS 45' AND LESS)
POLE TYPE 35-A (MAST ARMS 50' AND GREATER)

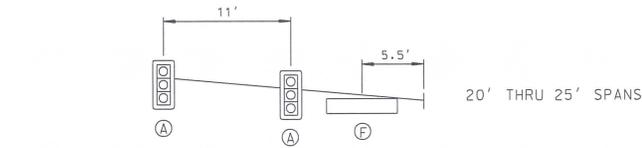


POLE TYPE 30 (MAST ARMS 45' AND LESS)
POLE TYPE 30-A (MAST ARMS 50' AND GREATER)

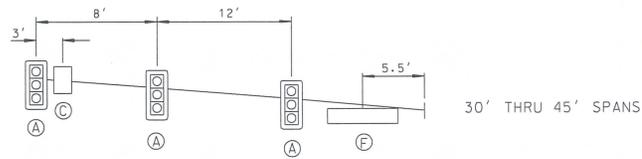
NOTES:

1. SHOP DRAWINGS AND STRUCTURAL CALCULATIONS SHALL BE SUBMITTED AND APPROVED BEFORE POLES MAY BE UTILIZED ON PROJECT.
2. IF INDICATED IN THE PLANS, ALL POLES SHALL BE PRIME PAINTED BY MANUFACTURER AND FINISH PAINTED BY CONTRACTOR. SEE STANDARD SPECIFICATION SECTION 714.03.01.
3. THE DISTANCE FROM THE ROADWAY SURFACE TO THE BOTTOM OF THE MAST ARM SIGNAL HEADS SHALL BE 17'.
4. SEE STANDARD PLAN DRAWING T-30.1.15 FOR POLE BASE, HANDHOLE, SIGNAL ARM, AND LUMINAIRE ATTACHMENT DETAILS.
5. COLD GALVANIZED ALL FIELD WELDS.

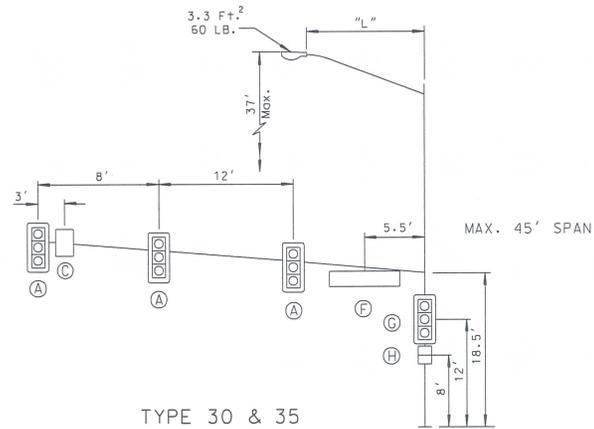
STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
TYPE 30 AND 35 POLES		
DET. *	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.



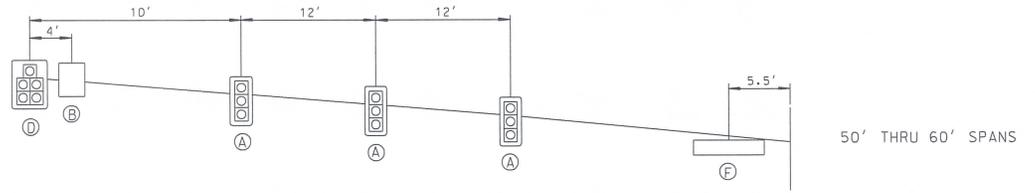
20' THRU 25' SPANS



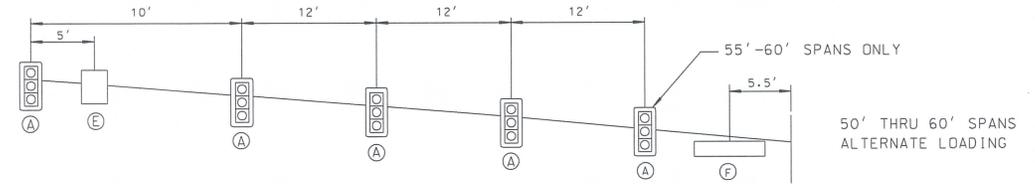
30' THRU 45' SPANS



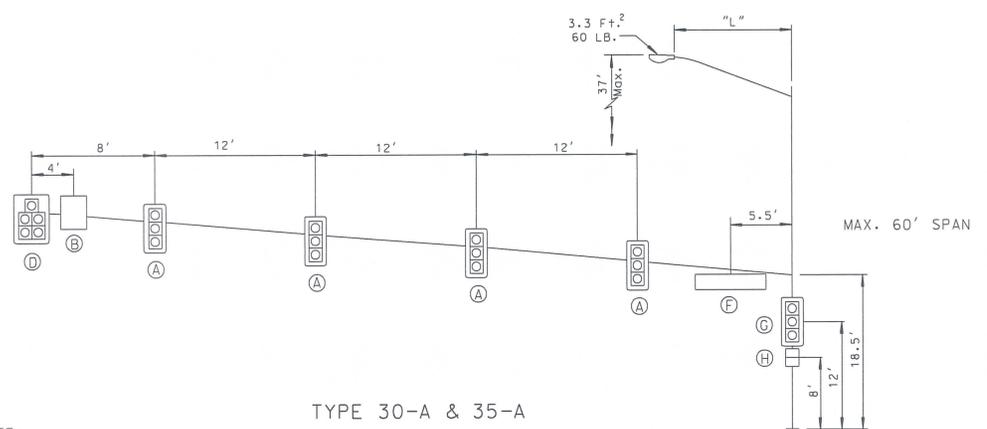
TYPE 30 & 35



50' THRU 60' SPANS



50' THRU 60' SPANS ALTERNATE LOADING



TYPE 30-A & 35-A

NOTE:
TYPE 30-A & 35-A POLE SHALL ALSO SUPPORT THE ALTERNATE LOADING SHOWN ABOVE.

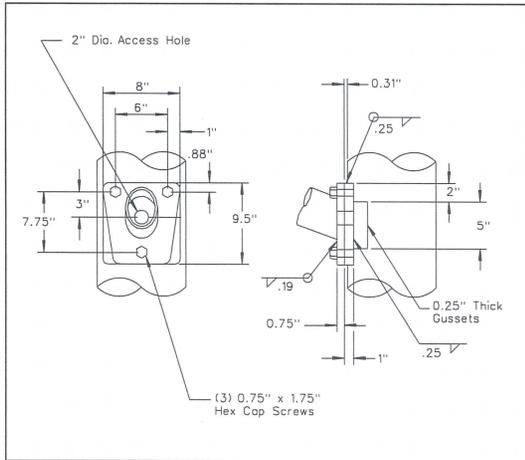
DEVICE	DESCRIPTION	PROJECT AREA (Ft.²)	WEIGHT (LBS.)
A	SIGNAL 12"-3 Sec. w/Backplates (2M)	9.80	40
B	--See Plans--	----	----
C	SIGN R3-4 24" x 24"	4.00	10
D	SIGNAL 12"-5 Sec. w/Backplates	13.68	80
E	SIGN R10-5d 36" x 45"	11.25	30
F	SIGN Street Name-Free Swinging 1.68' x 8'	13.44	100
G	SIGNAL Dual-12"-3 Sec. w/Backplates	17.34	80
H	SIGNAL Dual-Pedestrian	8.00	60

LUMINAIRE ARM DATA					
ARM SPAN (FT.)	FIXED END DIA. (IN.)	FREE END DIA. (IN.)	GAUGE	LUMINAIRE MOUNTING HEIGHT	
				Low Rise	High Rise
6	3.42	2.38	11	31'-0"	32'-0"
8	3.75	2.38	11	31'-6"	33'-3"
10	4.16	2.38	11	31'-9"	35'-0"
12	4.52	2.38	11	33'-0"	36'-6"
15	4.95	2.38	11	33'-6"	37'-0"

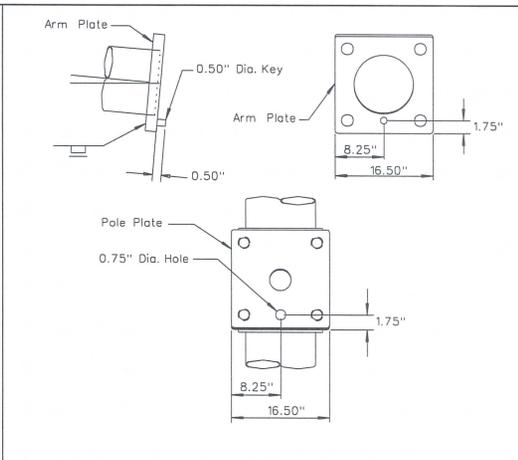
DESIGN CRITERIA:

1. AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS, 6TH EDITION DATED 2013 AND CURRENT INTERIMS.
2. USE FATIGUE IMPORTANCE FACTOR OF 1.0 IN DETERMINING WIND LOAD EFFECTS SPECIFIED IN ARTICLE 11.7.
3. APPROPRIATE DAMPING OR ENERGY-ABSORBING DEVICES, SHOWN TO REDUCE OR ELIMINATE GALLOPING VIBRATIONS, MAY BE SUBMITTED FOR APPROVAL IN LIEU OF DESIGNING FOR THE GALLOPING LIMIT STATE SPECIFIED IN ARTICLE 11.7.1.
4. BASIC WIND SPEED = 90 MPH.

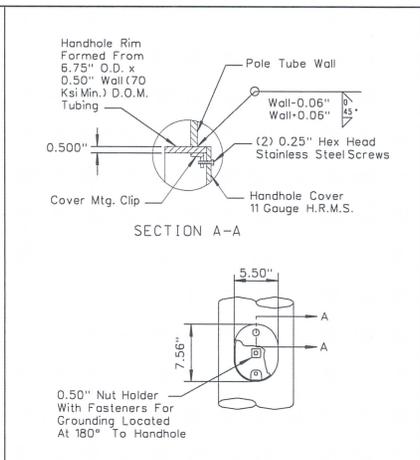
NEVADA DEPARTMENT OF TRANSPORTATION		
TYPE 30 & 30A 35 & 35A LOADING INFORMATION		
Signed Original On File	T-30.14	(623)
CHIEF SAFETY/TRAFFIC ENGR.	ADOPTED 10/94	REVISION 1/15



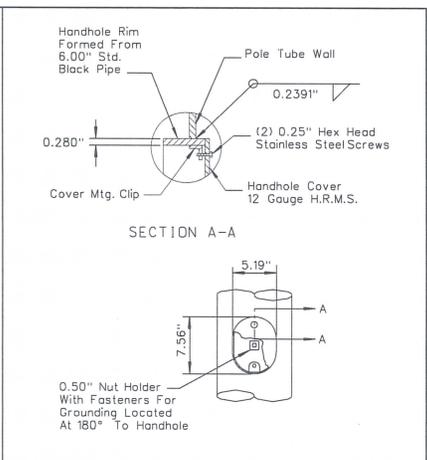
LUMINAIRE ARM ATTACHMENT



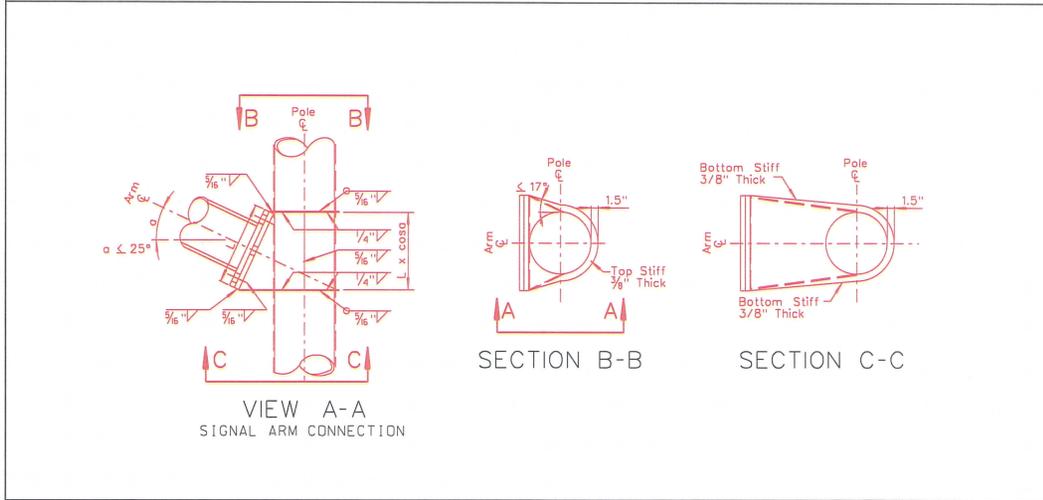
SIGNAL ARM SIMPLEX KEY



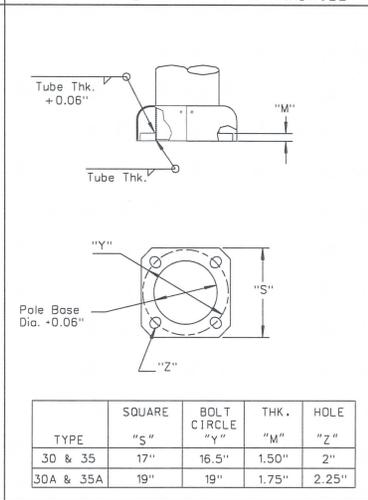
TYPE 30-A & 35-A HANDHOLE



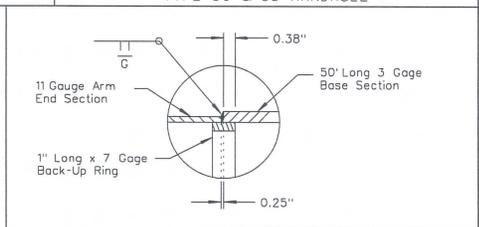
TYPE 30 & 35 HANDHOLE



SIGNAL ARM ATTACHMENT



POLE BASE PLATE



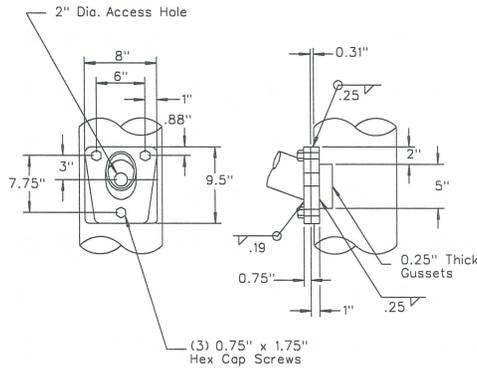
55' & 60' SIGNAL ARM SPLICE

T-25

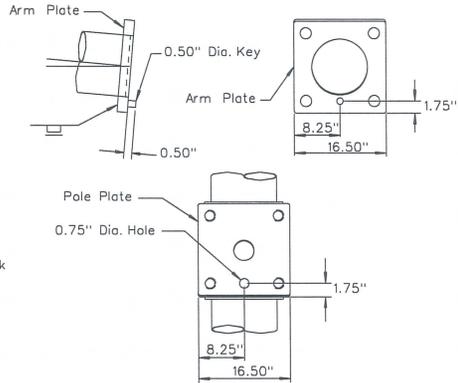
NEVADA DEPARTMENT OF TRANSPORTATION

**TYPE 30 & 30A
35 & 35A
DETAILS**

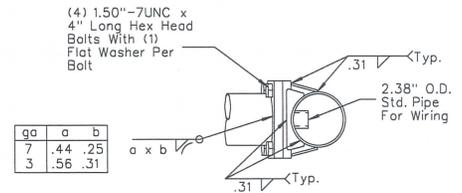
Signed Original On File | T-30.115 (623)
 CHIEF SAFETY/TRAFFIC ENGR. | ADOPTED 10/94 | REVISION 3/15



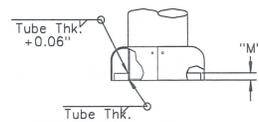
LUMINAIRE ARM ATTACHMENT



SIGNAL ARM SIMPLEX KEY

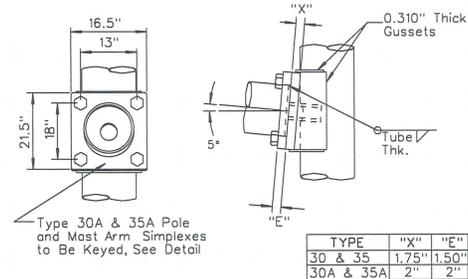


SIGNAL ARM ATTACHMENT



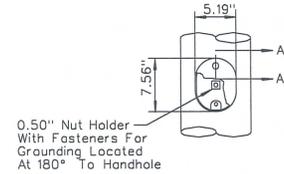
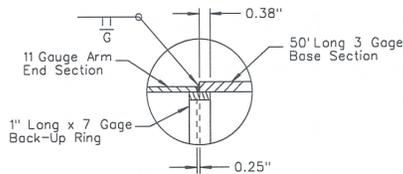
TYPE	SQUARE	BOLT CIRCLE	THK.	HOLE
	"S"	"Y"	"M"	"Z"
30 & 35	17"	16.5"	1.50"	2"
30A & 35A	19"	19"	1.75"	2.25"

POLE BASE PLATE

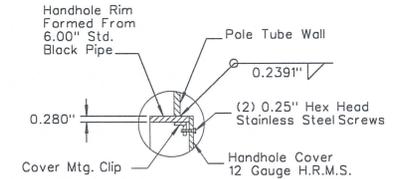


Type 30A & 35A Pole and Mast Arm Simplexes to Be Keyed, See Detail

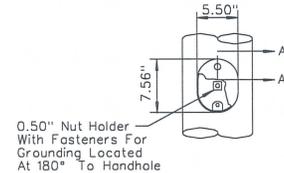
55' & 60' SIGNAL ARM SPLICE



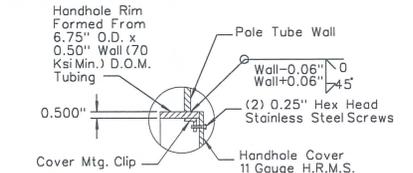
TYPE 30 & 35 HANDHOLE



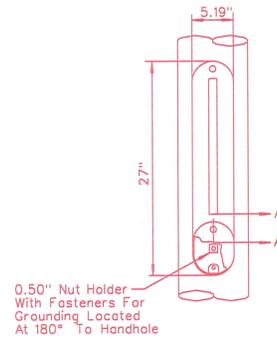
TYPE 30 & 35 SECTION A-A



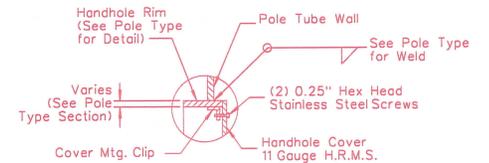
TYPE 30-A & 35-A HANDHOLE



TYPE 30-A & 35-A SECTION A-A

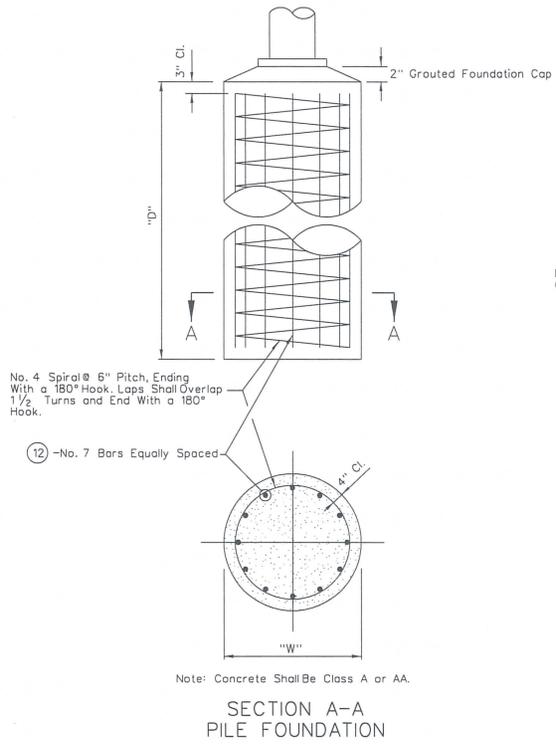


TERMINAL BLOCK HAND HOLE



TERMINAL BLOCK SECTION A-A

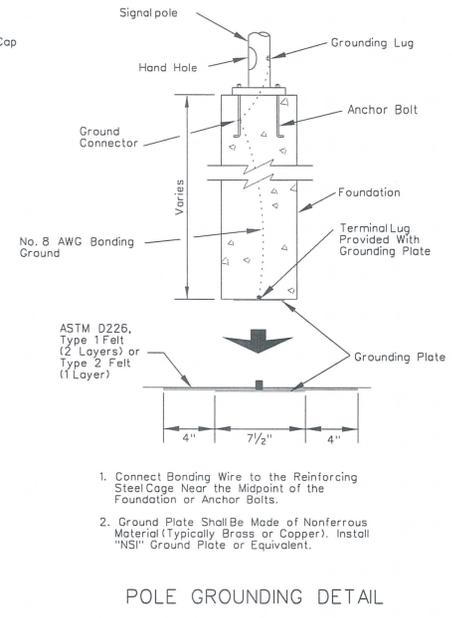
STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
TYPE 30 & 30A 35 & 35A DETAILS		
DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.



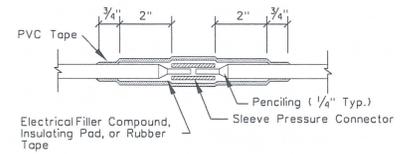
PILE FOUNDATION TABLE

POLE TYPE	MAST ARM LENGTH	**"D"	**"W" ①	ANCHOR BOLTS (4 EACH)
1A & 1B	N/A	3'	2'	3/4" x 18" x 4"
7	ALL	5'	2-6"	1" x 36" x 4"
14	ALL	5'	2-6"	1" x 36" x 4"
30 AND 35	≤ 45'	12'	3'	1 3/4" x 60" x 6"
30A AND 35A	≤ 60'	12'	3'	2" x 66" x 6"

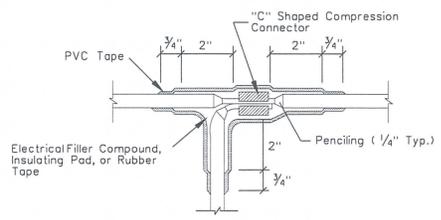
** Unless otherwise shown on plans.
 * Not applicable when mounted on structures.
 ① - When "W" = 2'-0" use 4-No.5 bars equally spaced.
 When "W" = 2'-6" use 8-No.5 bars equally spaced.



- NOTES:
1. ALL DIMENSIONS ARE MINIMAL.
 2. RUBBER TAPES SHALL BE ROLLED AFTER APPLICATION.
 3. WHEN PVC TAPE IS USED AS A FINAL LAYER, PAINT FINISHED SPLICE WITH ELECTRICAL INSULATING COATING.



- TYPE A SPLICE METHOD
(TWO FREE ENDS)
1. Completely Cover the Splice Area With An Electrical Insulating Coating and Allow to Dry.
 2. Apply Electrical Filler Compound With Minimum Thickness of 1/8".
 3. Apply 3 Layers of Half Lapped PVC Tape.



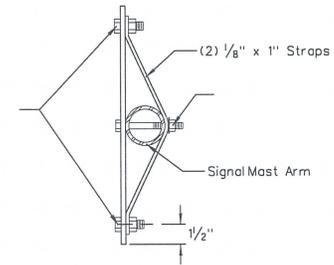
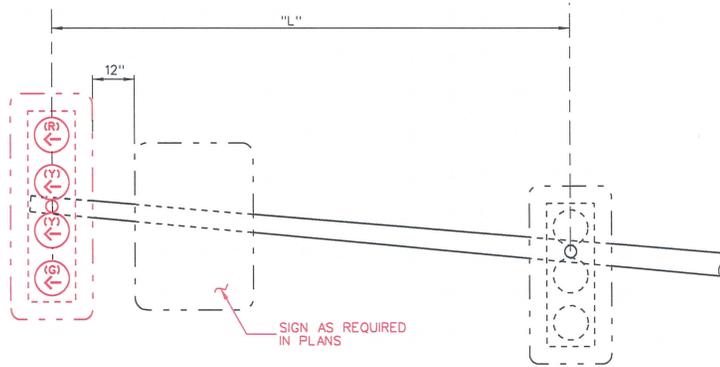
- TYPE B SPLICE METHOD
(THREE FREE ENDS OR ONE FREE END AND ONE THROUGH CONDUCTOR)
1. Completely Cover the Splice Area With An Electrical Insulating Coating and Allow to Dry.
 2. Apply 2 Layers of Electrical Insulating Pad With Minimum Thickness of 1/4" Each Layer or 2 Layers, Half Lapped, Synthetic Oil Resistant, Self Fusing Rubber Tape.
 3. Apply 3 Layers of Half Lapped PVC Tape.

CONDUCTOR SPLICING METHODS

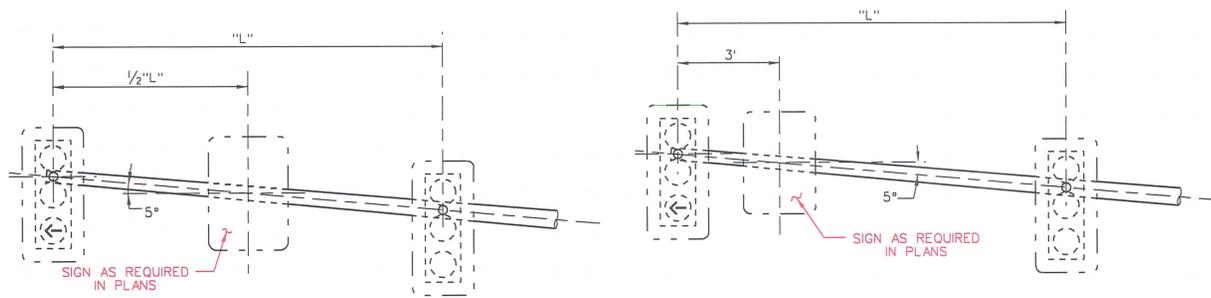
NEVADA DEPARTMENT OF TRANSPORTATION

PILE FOUNDATION,
POLE GROUNDING DETAIL,
CONDUCTOR SPLICE METHODS

Signed Original On File	T-30.1.16	(623)
CHIEF SAFETY/TRAFFIC ENGR.	ADOPTED 8/98	REVISION 12/14



TYPICAL METHOD OF ATTACHMENT



MAST ARM SIGNAL AND SIGN PLACEMENT
"L" = AS SHOWN ON PLANS

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
TRAFFIC SIGNAL SIGN PLACEMENT		
DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.



Standard Plans Change Request

Requests for modifying the Standard Plans for Road and Bridge Construction must be submitted to:

NDOT Specifications Division
Attn: Standards and Manuals Supervisor
1263 South Stewart Street
Carson City, Nevada 89712

Standard Sheet No.: T-30, 1.18 Page No.: T-29 Note: A separate form is required for each change.

Description of requested modification or correction: UPDATE PB FOR THE
NO. 9 MODIFIED AND WROUNDINW NOTE DETAIL

(Please attach supporting information).

Reason for request: ITS PB DETAILS AND WROUNDINW
DETAIL ON RECENT PROJECTS LIKE CACTUS
INTG

Requestor Information: Name: *Thomas Moore* Phone: 7566

For Standards/Manuals Personnel Only: Approved Denied

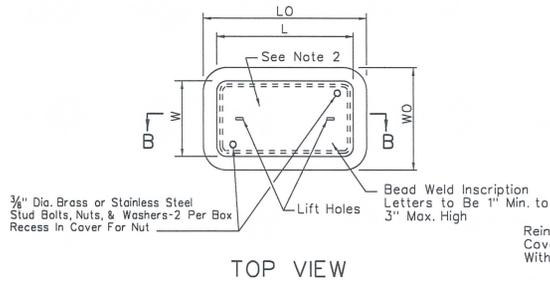
Revised by: Signature: _____ Date: _____

Policy Review:

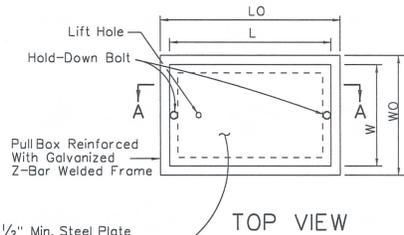
CADD Standards ASTM AASHTO Design Manual Specifications

Reviewed by: Signature: _____ Date: _____

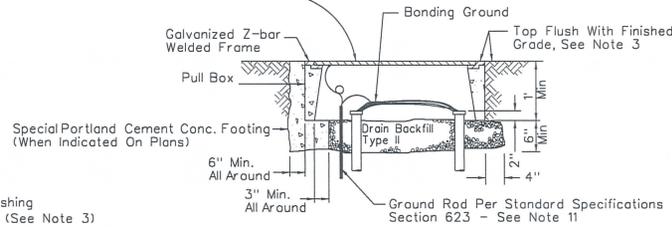
Notes: _____



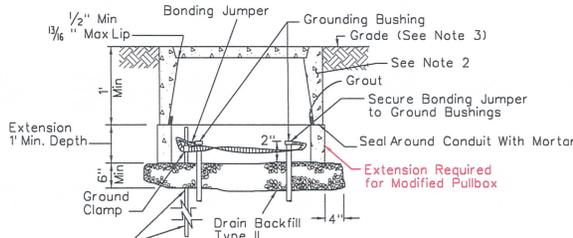
3/4" Dia. Brass or Stainless Steel Stud Bolts, Nuts, & Washers-2 Per Box
Recess in Cover For Nut



Reinforced 1/2" Min. Steel Plate Cover, Galvanized After Fabrication, With Bead Weld Inscription



SECTION A-A
PULL BOX
No. 3 1/2, No. 5, No. 7 & No. 9



Ground Rod Per Standard Specifications Section 623 - See Note 11

SECTION B-B

MODIFIED PULL BOX
No. 3 1/2, No. 5, No. 7

*FOR MODIFIED NO. 9, SEE SHEET M-1.13.1.

NOTES FOR PULL BOXES:

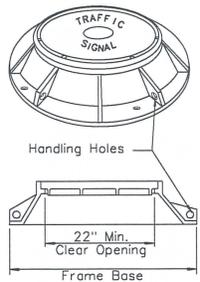
- STEEL COVER SHALL HAVE EMBOSSED NON-SKID PATTERN.
- STEEL REINFORCING SHALL BE PER MANUFACTURERS REQUIREMENTS.
- TOP OF PULL BOXES SHALL BE FLUSH WITH SURROUNDING GRADE OR TOP OF ADJACENT CURB, EXCEPT THAT IN UNPAVED AREAS WHERE PULL BOX IS NOT IMMEDIATELY ADJACENT TO AND PROTECTED BY A CONCRETE FOUNDATION, POLE OR OTHER CONSTRUCTION, THE BOX SHALL BE PLACED WITH ITS TOP 1" ABOVE SURROUNDING GRADE. WHERE PRACTICABLE, PULL BOXES SHOWN IN THE VICINITY OF CURBS SHALL BE PLACED ADJACENT TO THE BACK OF CURB, AND PULL BOXES SHOWN ADJACENT TO STANDARDS SHALL BE PLACED ON SIDE OF FOUNDATION FACING AWAY FROM TRAFFIC, UNLESS OTHERWISE NOTED. WHEN PULL BOX IS INSTALLED IN SIDEWALK AREA, THE DEPTH OF THE PULL BOX SHALL BE ADJUSTED SO THAT THE TOP OF THE PULL BOX IS FLUSH WITH THE TOP OF SIDEWALK.
- THE NOMINAL DIMENSIONS OF THE OPENING IN WHICH THE COVER SETS SHALL BE THE SAME AS THE COVER DIMENSIONS EXCEPT THE LENGTH AND WIDTH DIMENSIONS SHALL BE 1/8" GREATER.
- ALL COVERS AND BOXES SHALL BE INTERCHANGEABLE WITH NEVADA STANDARD MALE AND FEMALE GAGES. WHEN INTERCHANGED WITH A STANDARD MALE OR FEMALE GAGE, THE TOP SURFACES SHALL BE FLUSH WITH 1/8". TOP OUTSIDE EDGE OF ALL CONCRETE COVERS AND PULL BOXES SHALL HAVE A 1/4" MINIMUM RADIUS.
- PULL BOX SHALL NOT BE INSTALLED WITHIN THE BOUNDARIES OF NEW OR EXISTING CURB RAMP.
- PULL BOXES FOR ELECTROLIERS AND SIGNAL STANDARDS SHALL BE LOCATED AT THE SAME STATION (+5') AS THE ADJACENT ELECTROLIER OR SIGNAL STANDARD. PULL BOXES SHALL BE PLACED ADJACENT TO BACK OF CURB OR EDGE OF SHOULDER EXCEPT WHERE THIS IS IMPRACTICAL, A BOX MAY BE PLACED IN ANOTHER SUITABLE PROTECTED AND ACCESSIBLE LOCATION.
- IN AREAS WHERE THE POSSIBILITY OF MATERIAL ERODING FROM AROUND THE PULL BOX EXISTS, THE PULL BOX SHALL BE PLACED IN DRAIN BACKFILL TYPE II-(2" DEPTH ON EACH SIDE AND 1" DEPTH), AS DIRECTED BY THE ENGINEER.
- USE MODIFIED PULL BOXES ONLY WHEN INDICATED ON THE PLANS.
- INSTALL CONDUIT PLUG ON EACH UNUSED CONDUIT OR INNERDUCT.
- ALL METAL PULL BOX LIDS SHALL BE GROUNDED. INSTALL A STRANDED #4 (GREEN, 7-STRAND) THW WIRE, 4 FEET IN LENGTH, FROM THE LID TO THE BONDING GROUND. FASTEN THE #4 CONDUCTOR TO THE LID BY CAD WELDING.
- ALL CONDUITS SHALL HAVE A MINIMUM OF 6" CLEARANCE FROM THE TOP OF THE CONDUIT TO THE COVER. SEAL ALL CONDUIT ENDS WITH A DUCT SEALING COMPOUND.

Pull Box	CONCRETE BOX		NON-PCC BOX		CONCRETE OR NON-PCC COVERS					
	Minimum Depth Box and Extension	LO	WO	Minimum * X Thickness	Minimum Depth Box and Extension	L**	W**	R	Edge Thickness	Edge Taper
No. 3 1/2	No Extension	20"	14"	3/8"	No Extension	15 3/4"	10 1/4"	1"	2"	1/8"
No. 5	22 1/4"	28"	18"	3/8"	20"	23 3/4"	13 3/4"	1"	2"	1/8"
No. 7	24"	36"	23"	3/8"	20"	30 3/4"	17 3/4"	1"	2"	1/8"

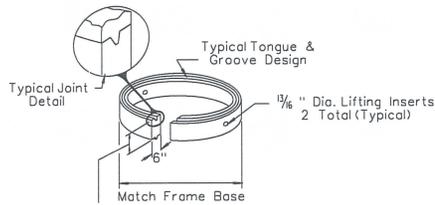
** Top dimension

Pull Box	CONCRETE BOX			STEEL COVER			EXTENSION
	LO	WO	Height	L**	W**	Edge Taper	Height
No. 3 1/2	19"+	12"+	12"+	14 1/2"+	8 3/4"+	None	12"
No. 5	25"+	15"+	12"+	20 1/2"+	10 1/2"+	None	10"
No. 7	35"+	22"+	12"+	30"+	17"+	None	8"
No. 9	52"+	35"+	14"+	47 3/4"+	30"+	None	10"

** Top Dimension
*** Top of Box



ELECTRICAL MANHOLE
FRAME & COVER



COLLAR RISER

NOTES FOR ELECTRICAL MANHOLE:

- A COMPACTED BASE AND A CONCRETE FOOTING SUPPORT SHALL BE CONSTRUCTED PRIOR TO PLACEMENT OF THE CAST IRON FRAME AS DIRECTED BY THE ENGINEER.
- ADJUSTMENTS TO ELEVATIONS SHALL BE MADE WITH COLLAR/RISERS AS REQUIRED. MINIMUM DEPTH 18".
- REFER TO STANDARD PLAN R-4.7.3 FOR CONCRETE COLLAR DETAILS.

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
PULL BOXES/ ELECTRICAL MANHOLE FRAME & COVER		
DET. #	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.