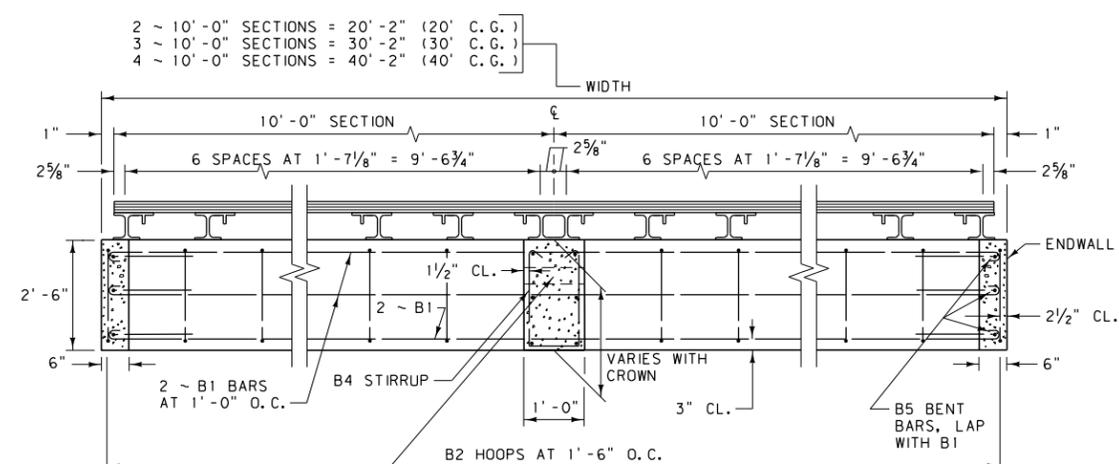
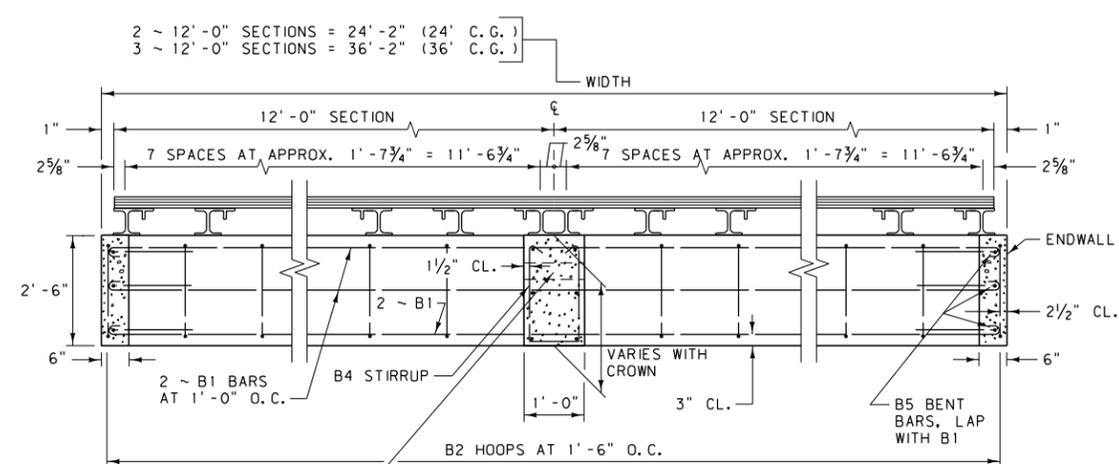


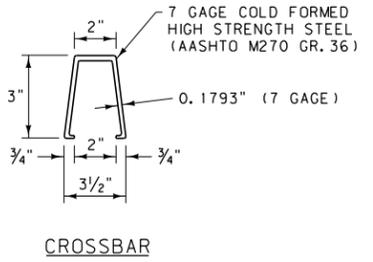
SECTION A-A
(8' SECTIONS)



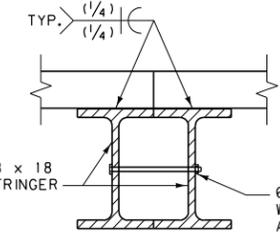
SECTION A-A
(10' SECTIONS)



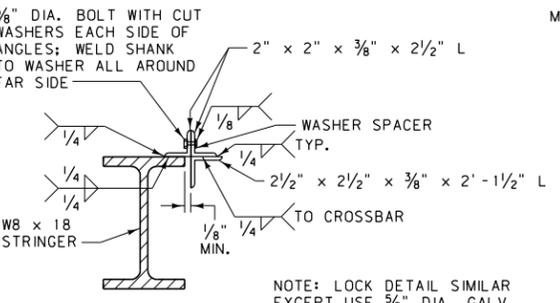
SECTION A-A
(12' SECTIONS)



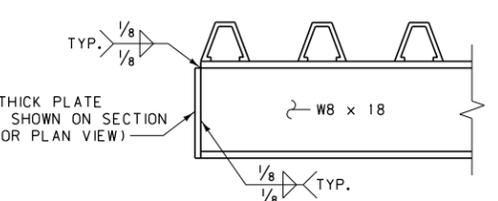
NOTE: WELD CROSSBARS TO 2 1/2" x 2 1/2" x 3/8" x 2'-1 1/2" ANGLES HINGED AREA ONLY. SEE HINGE DETAIL.



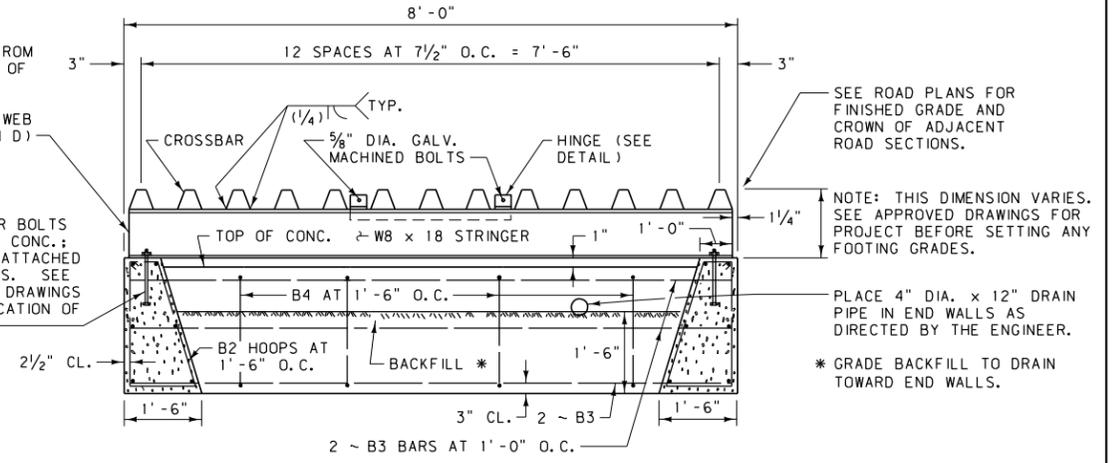
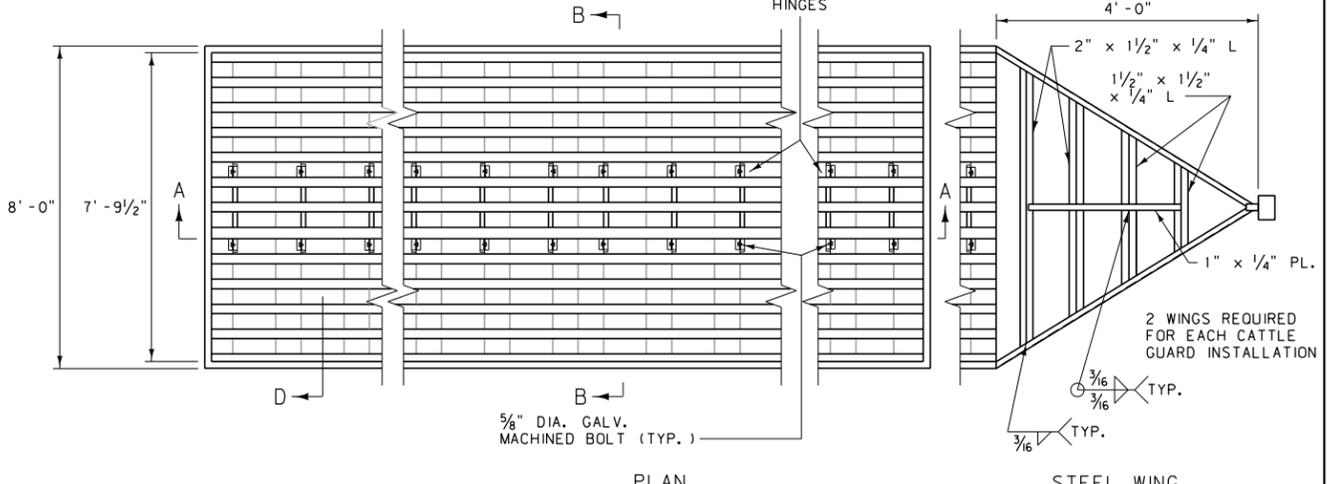
NOTE: EXTEND END PLATE FROM TOP OF STRINGER TO BOTTOM OF STRINGER WITH 1'-4" OF 1/8" FILLET WELD SYMMETRICALLY DISTRIBUTED TO FLANGE AND WEB OF STRINGER. (SEE SECTION D)



NOTE: LOCK DETAIL SIMILAR EXCEPT USE 3/8" DIA. GALV. MACHINED BOLT WITH GALV. CUT WASHER & GALV. HEX NUTS INSTEAD OF WELDED STUD BOLT.

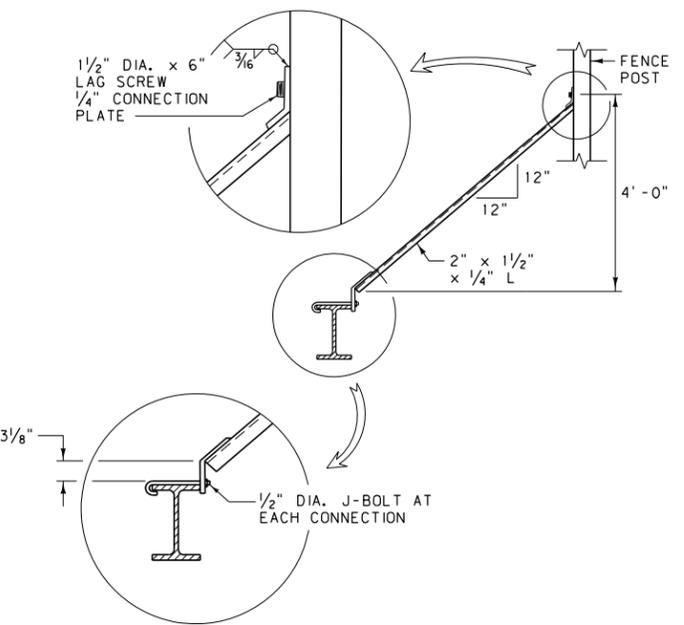


LIVE LOADING: STANDARD (HS20) LOADING



MAX. FOOTING PRESS = 1.1 TONS/SQ. FT.

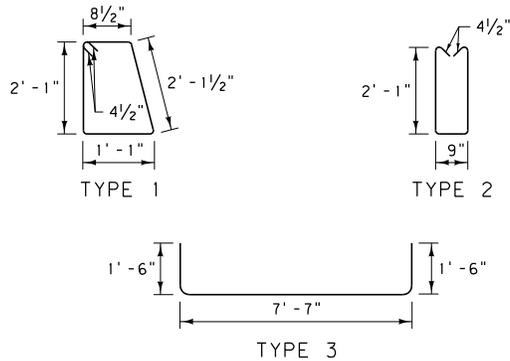
- NOTES:
- C.G. = CATTLE GUARD.
 - THE CONTRACTOR HAS THE OPTION OF USING PRECAST CONCRETE BASES FOR CATTLE GUARDS. SEE DTL. DWG. NO. 611-15.
 - FOR CATTLE GUARDS ON FIELD OR PRIVATE APPROACHES, THE PRECAST CONCRETE BASES IN DTL. DWG. NO. 611-10 MAY BE USED.
 - USE AN EVEN NUMBER OF STEEL CATTLE GUARD GRATES WHEN A CROWNED INSTALLATION IS REQUIRED.
 - SEE DTL. DWG. NO. 611-05 FOR CAST-IN-PLACE CATTLE GUARD REBAR DETAILS.
 - STRUCTURAL STEEL IS TO CONFORM TO AASHTO M270 GRADE 36.
 - ANCHOR BOLTS ARE TO CONFORM TO AASHTO M314 GRADE 36.
 - ALL NUTS, BOLTS, AND WASHERS ARE TO CONFORM TO ASTM A307 AND BE GALVANIZED PER AASHTO M232.



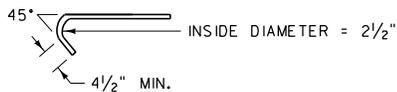
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 611	DWG. NO. 611-00
CAST-IN-PLACE CATTLE GUARD	
EFFECTIVE: FEBRUARY 2005	
 MONTANA DEPARTMENT OF TRANSPORTATION <i>servicing you with pride</i>	

BILL OF REINFORCING STEEL

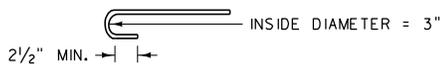
BENT BARS (ALL DIMENSIONS ARE OUT TO OUT)



16 FT. C. G.					30 FT. C. G.				
MARK	SIZE	NO.	TYPE	LENGTH	MARK	SIZE	NO.	TYPE	LENGTH
B1	#4	12	STR.	16' - 9"	B1	#4	12	STR.	30' - 9"
B2	#4	22	1	6' - 9"	B2	#4	42	1	6' - 9"
B3	#4	6	STR.	7' - 7"	B3	#4	12	STR.	7' - 7"
B4	#4	4	2	5' - 8"	B4	#4	8	2	5' - 8"
B5	#4	6	3	10' - 7"	B5	#4	6	3	10' - 7"
ESTIMATED WT. = 321 LB.					ESTIMATED WT. = 569 LB.				
20 FT. C. G.					32 FT. C. G.				
B1	#4	12	STR.	20' - 9"	B1	#4	12	STR.	32' - 9"
B2	#4	28	1	6' - 9"	B2	#4	44	1	6' - 9"
B3	#4	6	STR.	7' - 7"	B3	#4	18	STR.	7' - 7"
B4	#4	4	2	5' - 8"	B4	#4	12	2	5' - 8"
B5	#4	6	3	10' - 7"	B5	#4	6	3	10' - 7"
ESTIMATED WT. = 381 LB.					ESTIMATED WT. = 640 LB.				
24 FT. C. G.					36 FT. C. G.				
B1	#4	12	STR.	24' - 9"	B1	#4	12	STR.	36' - 9"
B2	#4	34	1	6' - 9"	B2	#4	50	1	6' - 9"
B3	#4	6	STR.	7' - 7"	B3	#4	12	STR.	7' - 7"
B4	#4	4	2	5' - 8"	B4	#4	8	2	5' - 8"
B5	#4	6	3	10' - 7"	B5	#4	6	3	10' - 7"
ESTIMATED WT. = 440 LB.					ESTIMATED WT. = 654 LB.				
40 FT. C. G.									
B1	#4	12	STR.	40' - 9"					
B2	#4	54	1	6' - 9"					
B3	#4	18	STR.	7' - 7"					
B4	#4	12	2	5' - 8"					
B5	#4	6	3	10' - 7"					
ESTIMATED WT. = 749 LB.									



BENT BARS
(TYPES 1 AND 2)



B1 AND B3 STRAIGHT BARS

REBAR DETAILS

ESTIMATED CLASS "A" CONC. QUANTITIES	
16' C. G. =	4.76 C. Y.
20' C. G. =	5.69 C. Y.
24' C. G. =	6.61 C. Y.
30' C. G. =	8.51 C. Y.
32' C. G. =	9.48 C. Y.
36' C. G. =	9.90 C. Y.
40' C. G. =	11.33 C. Y.

NOTES:

C. G. = CATTLE GUARD.

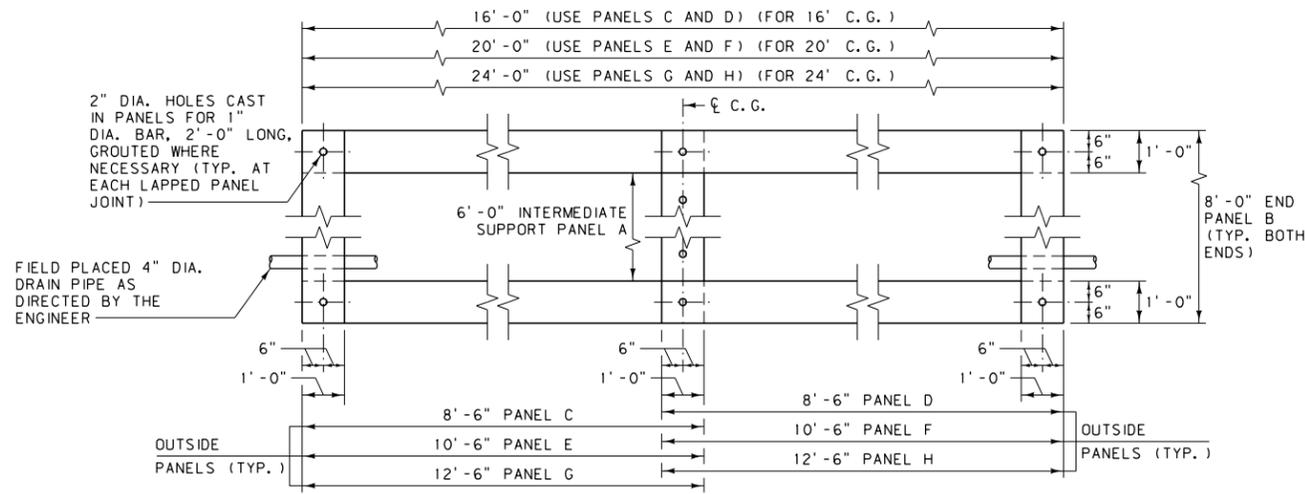
CONCRETE QUANTITIES WERE FIGURED WITHOUT A CROWN. INCREASE WHEN A CROWNED INSTALLATION IS USED.

DETAILED DRAWING

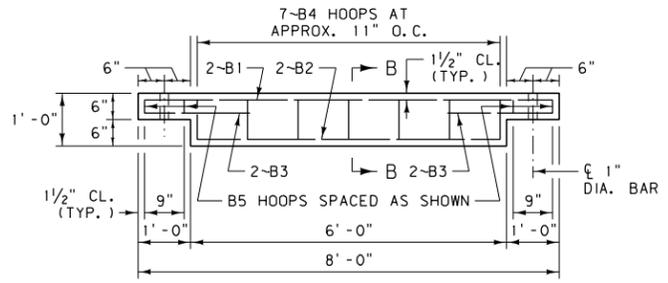
REFERENCE STANDARD SPEC. SECTION 611	DWG. NO. 611-05
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CAST-IN-PLACE
CATTLE GUARD
REBAR DETAILS

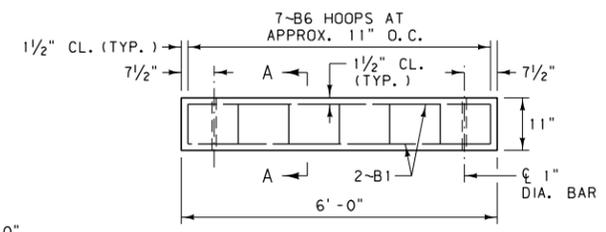
EFFECTIVE: FEBRUARY 2005



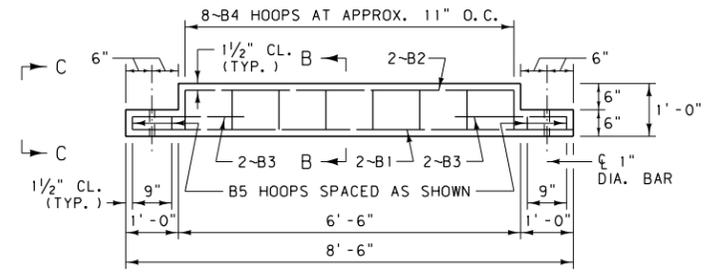
TYPICAL PLAN VIEW



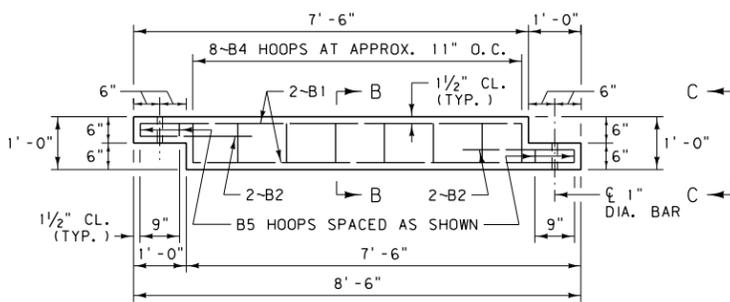
END PANEL B ELEVATION



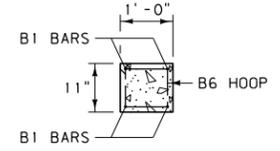
INTERMEDIATE SUPPORT PANEL A ELEVATION



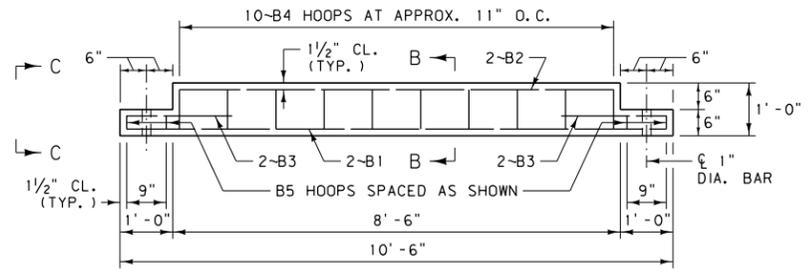
PANEL C ELEVATION



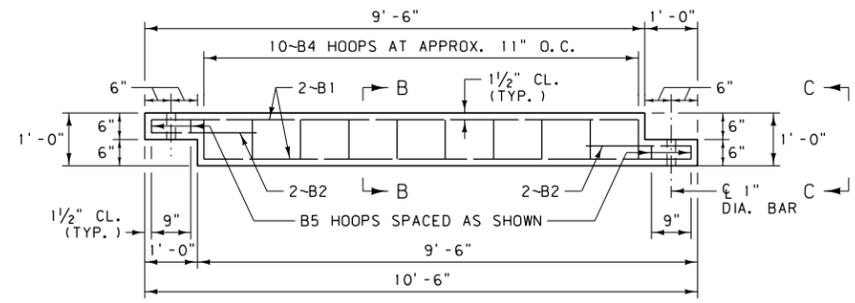
PANEL D ELEVATION



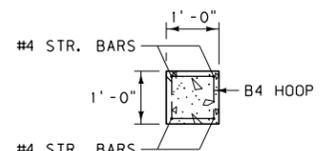
SECTION A-A



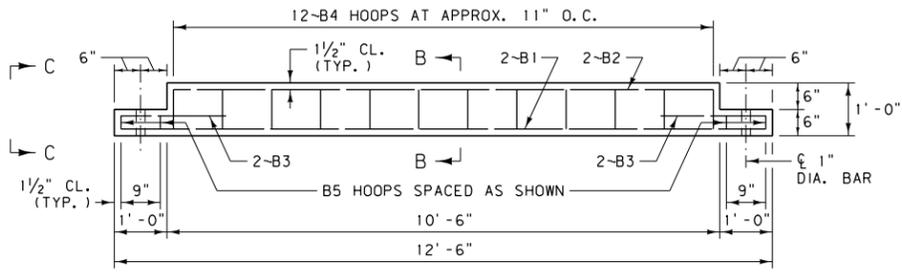
PANEL E ELEVATION



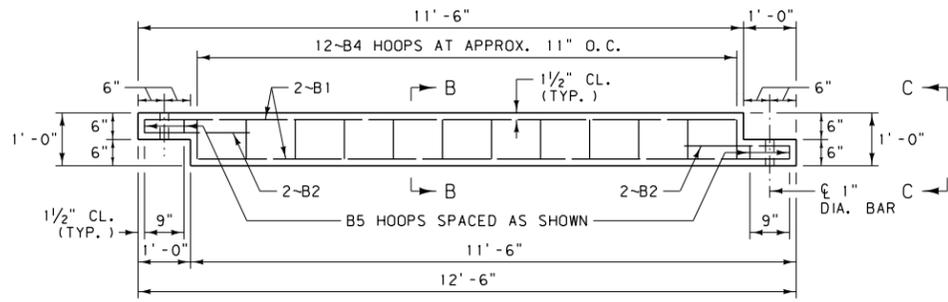
PANEL F ELEVATION



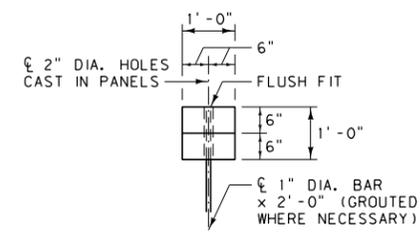
SECTION B-B



PANEL G ELEVATION



PANEL H ELEVATION



VIEW C-C (TYP. LAPPED PANEL JOINT)

NOTES:
 C.G. = CATTLE GUARD.
 USE ONLY ON FIELD OR PRIVATE APPROACHES.
 PROVIDE CAST-IN ANCHOR BOLTS AS SHOWN IN DTL. DWG. NO. 611-00 AT THE APPROPRIATE LOCATIONS. CAST-IN LAG PLATES, SIMILAR TO THOSE SHOWN IN DTL. DWG. NO. 611-15, MAY ALSO BE USED.
 FOR DETAILS OF STEEL GRATES AND STEEL WINGS SEE DTL. DWG. NO. 611-00.

BILL OF REINFORCING STEEL *

STRAIGHT BARS & BENT BARS (ALL DIMENSIONS OUT TO OUT)

MARK	SIZE	NO.	TYPE	LENGTH
6'-0" SECTION - PANEL A				
B1	#4	4	STRAIGHT	5'-9"
B6	#3	7	2	3'-5"
ESTIMATED WT. = 24 LB.				
8'-0" SECTION - PANEL B				
B1	#4	2	STRAIGHT	7'-9"
B2	#4	2	STRAIGHT	5'-9"
B3	#4	4	STRAIGHT	2'-2"
B4	#3	7	1	3'-7"
B5	#3	4	3	2'-7"
ESTIMATED WT. = 37 LB.				
8'-6" SECTION - PANEL C				
B1	#4	2	STRAIGHT	8'-3"
B2	#4	2	STRAIGHT	6'-3"
B3	#4	4	STRAIGHT	2'-2"
B4	#3	8	1	3'-7"
B5	#3	4	3	2'-7"
ESTIMATED WT. = 40 LB.				
8'-6" SECTION - PANEL D				
B1	#4	4	STRAIGHT	7'-3"
B2	#4	4	STRAIGHT	2'-2"
B4	#3	8	1	3'-7"
B5	#3	4	3	2'-7"
ESTIMATED WT. = 40 LB.				
10'-6" SECTION - PANEL E				
B1	#4	2	STRAIGHT	10'-3"
B2	#4	2	STRAIGHT	8'-3"
B3	#4	4	STRAIGHT	2'-2"
B4	#3	10	1	3'-7"
B5	#3	4	3	2'-7"
ESTIMATED WT. = 48 LB.				
10'-6" SECTION - PANEL F				
B1	#4	4	STRAIGHT	9'-3"
B2	#4	4	STRAIGHT	2'-2"
B4	#3	10	1	3'-7"
B5	#3	4	3	2'-7"
ESTIMATED WT. = 48 LB.				
12'-6" SECTION - PANEL G				
B1	#4	2	STRAIGHT	12'-3"
B2	#4	2	STRAIGHT	10'-3"
B3	#4	4	STRAIGHT	2'-2"
B4	#3	12	1	3'-7"
B5	#3	4	3	2'-7"
ESTIMATED WT. = 56 LB.				
12'-6" SECTION - PANEL H				
B1	#4	4	STRAIGHT	11'-3"
B2	#4	4	STRAIGHT	2'-2"
B4	#3	12	1	3'-7"
B5	#3	4	3	2'-7"
ESTIMATED WT. = 56 LB.				

* FOR ONE PANEL ONLY

ESTIMATED CLASS "D" CONCRETE QUANTITIES

6'-0" SECTION - PANEL A	= 0.20 C.Y.
8'-0" SECTION - PANEL B	= 0.26 C.Y.
8'-6" SECTION - PANEL C	= 0.28 C.Y.
8'-6" SECTION - PANEL D	= 0.28 C.Y.
10'-6" SECTION - PANEL E	= 0.35 C.Y.
10'-6" SECTION - PANEL F	= 0.35 C.Y.
12'-6" SECTION - PANEL G	= 0.43 C.Y.
12'-6" SECTION - PANEL H	= 0.43 C.Y.

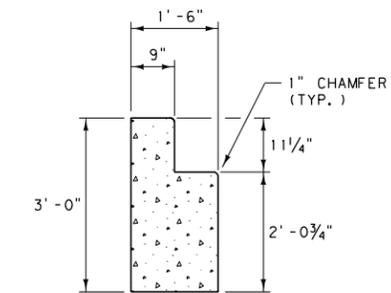
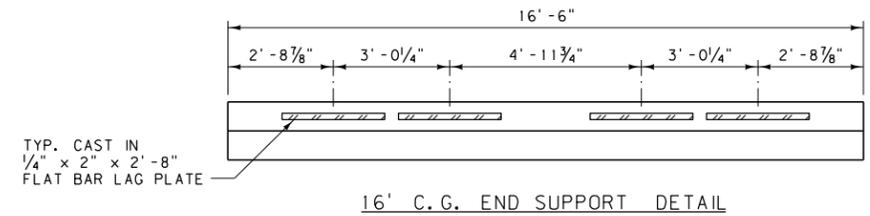
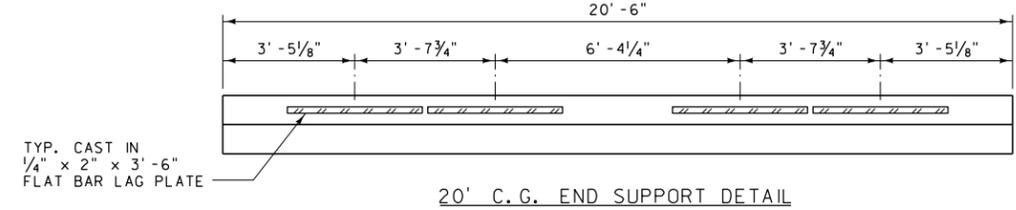
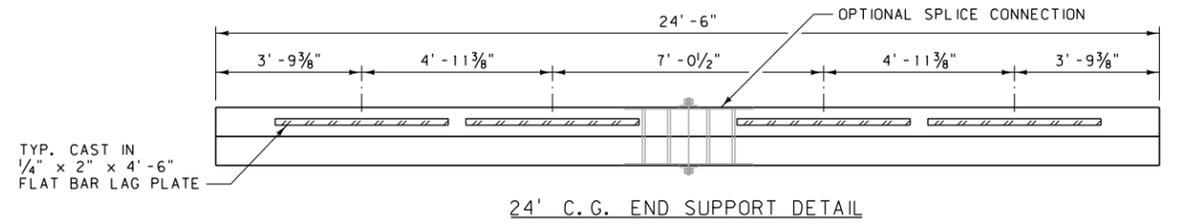
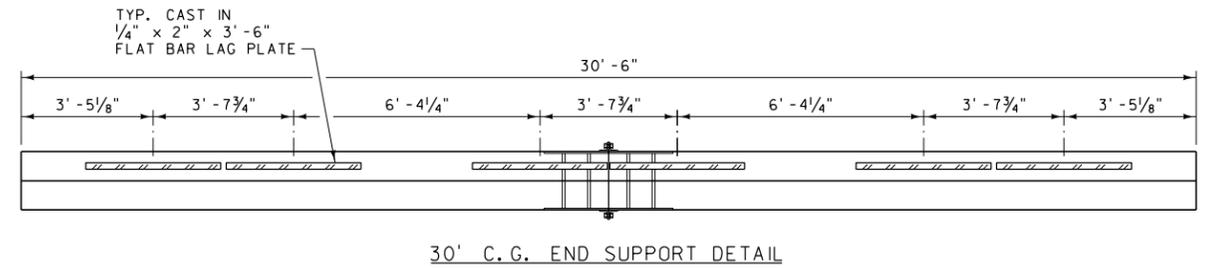
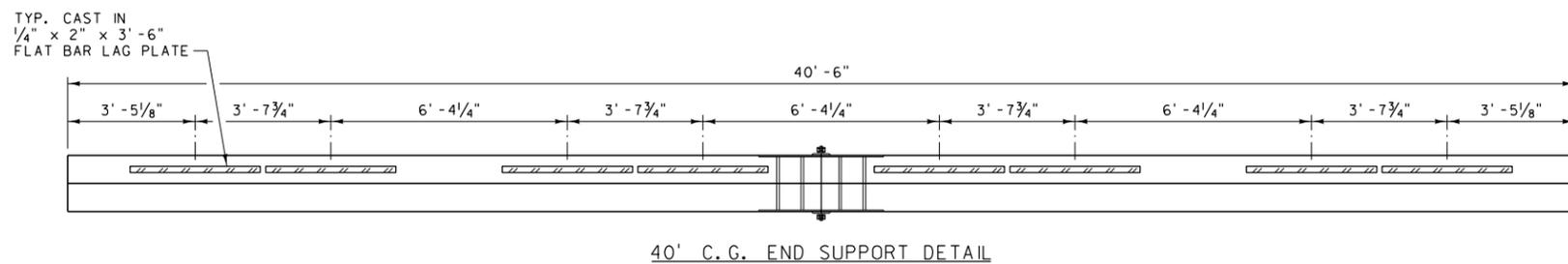
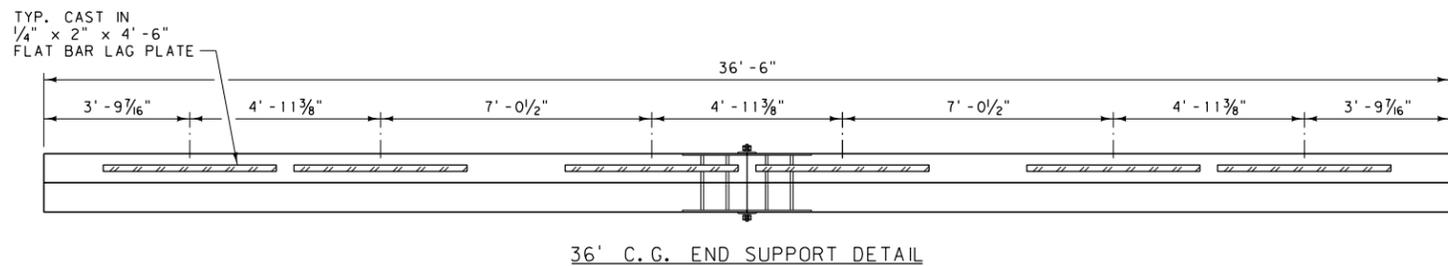
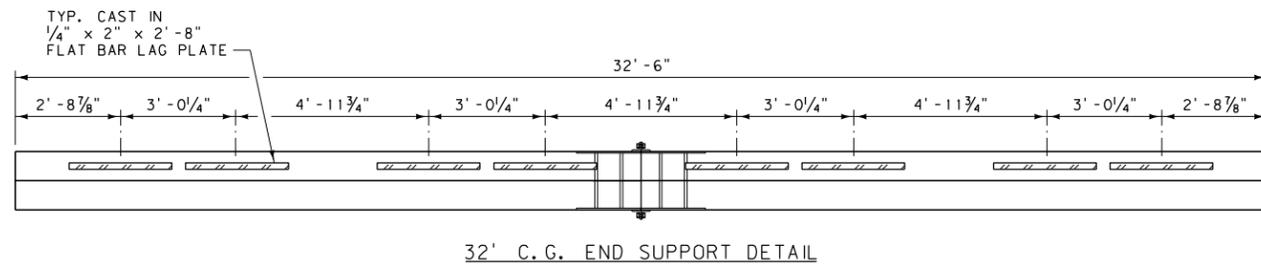
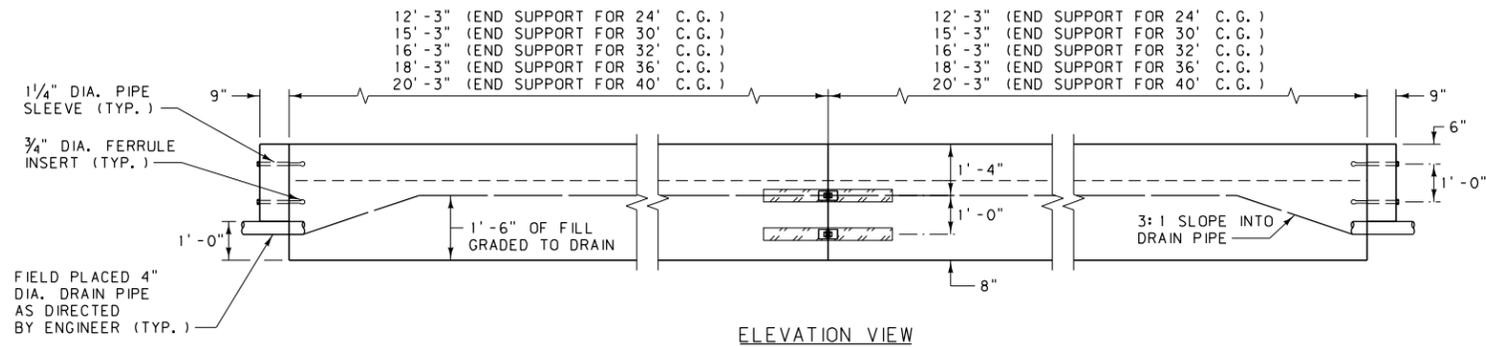
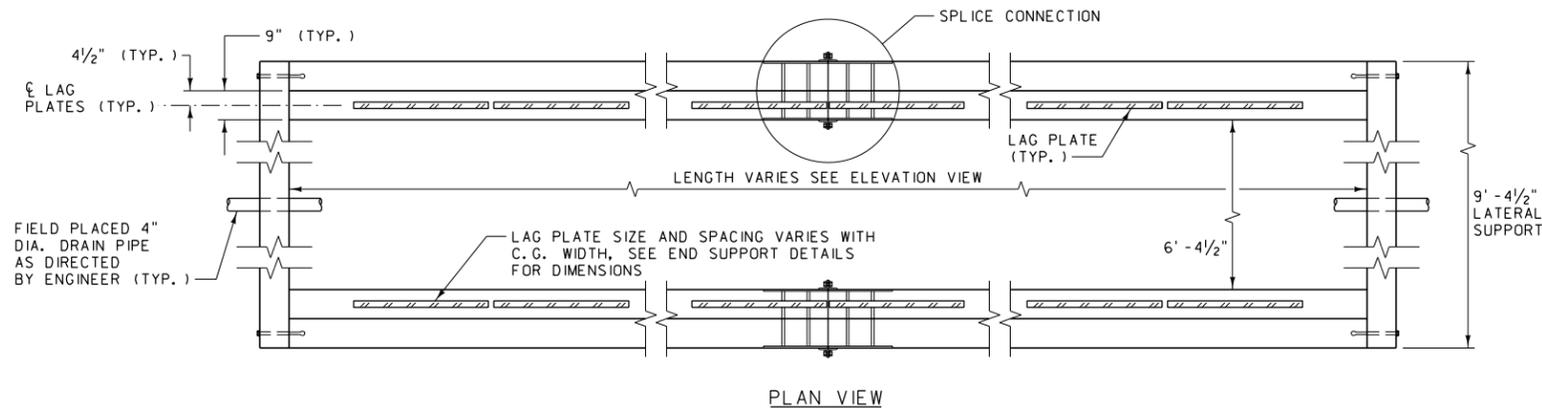
DETAILED DRAWING

REFERENCE DWG. NO. 611-10
 STANDARD SPEC. SECTION 611

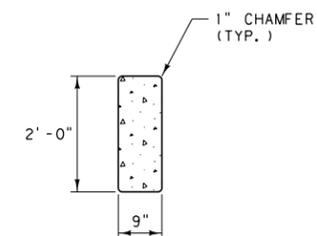
PRECAST CONCRETE
 BASE FOR CATTLE
 GUARD - APPROACHES

EFFECTIVE: FEBRUARY 2005

MDT MONTANA DEPARTMENT OF TRANSPORTATION
 serving you with pride



END SUPPORT SECTION VIEW



LATERAL SUPPORT SECTION VIEW

NOTES:

C.G. = CATTLE GUARD.

USE SPLICE CONNECTIONS WHEN A CROWNED INSTALLATION IS REQUIRED.

SEE DTL. DWG. NO. 611-20 FOR ADDITIONAL PRE-CAST CONCRETE CATTLE GUARD BASE AND MATERIAL QUANTITY DETAILS.

SEE DTL. DWG. NO. 611-00 FOR DETAILS OF STEEL GRATES AND STEEL WINGS.

INSTALLATION PROCEDURE:

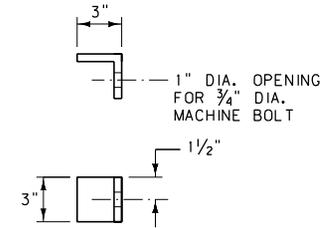
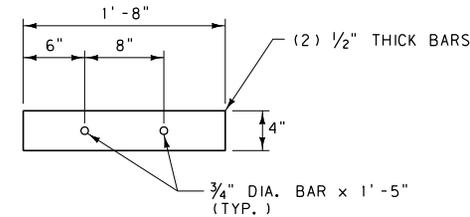
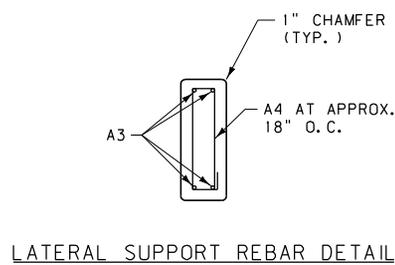
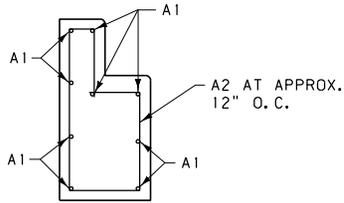
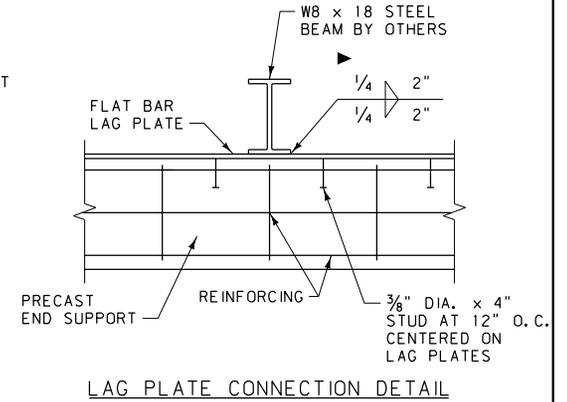
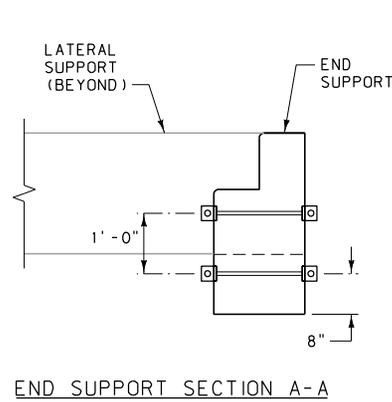
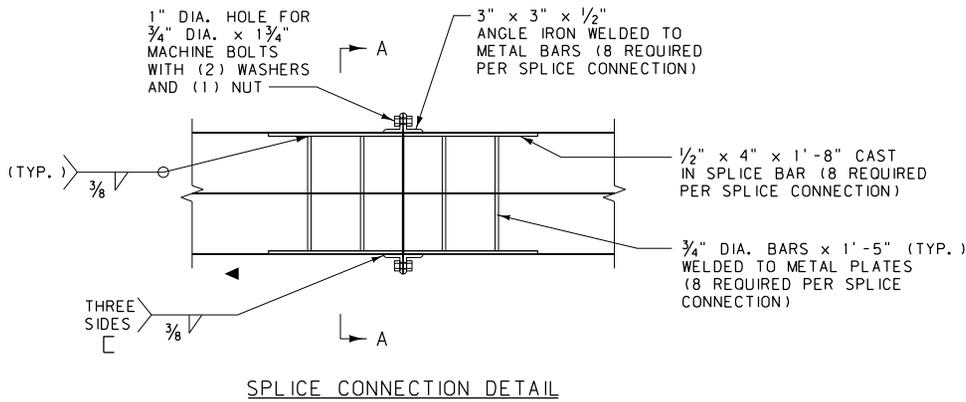
EXCAVATE 2'-0" BELOW THE ELEVATION OF THE BOTTOM OF THE CATTLE GUARD BASE. EXTEND THE EXCAVATION HORIZONTALLY AT LEAST 1'-0" IN ALL DIRECTIONS BEYOND THE CATTLE GUARD BASE'S EXTERIOR DIMENSION.

FILL THE EXCAVATION TO THE LEVEL OF THE BOTTOM OF THE CATTLE GUARD BASE WITH FILL MATERIAL OF AASHTO GRADE A-1-a OR BETTER, COMPACTED TO 95% OF PROCTOR DENSITY.

AFTER PLACING THE CATTLE GUARD, FILL THE EXTERIOR PORTION OF THE EXCAVATION TO GRADE WITH THE SAME MATERIAL.

FILL THE INTERIOR OF THE CATTLE GUARD BASE TO A DEPTH OF 1'-6" WITH THE SIMILARLY COMPACTED MATERIAL.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 611	DWG. NO. 611-15
PRECAST CONCRETE BASE FOR CATTLE GUARD	
EFFECTIVE: FEBRUARY 2005	
 serving you with pride	MONTANA DEPARTMENT OF TRANSPORTATION

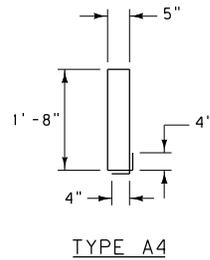
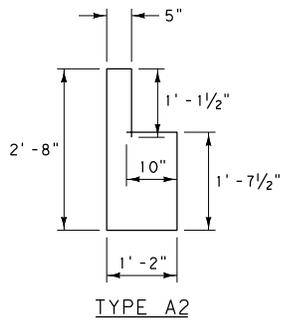


END SUPPORT REBAR DETAIL

LATERAL SUPPORT REBAR DETAIL

SPLICE BAR DETAIL

ANGLE IRON DETAIL



REINFORCING STEEL

NOTE: ALL REBAR DIMENSIONS ARE OUT TO OUT.

NOTES:

C.G. = CATTLE GUARD.

ALL HARDWARE IS TO BE PRIMER PAINTED.

ALL STEEL HARDWARE IS TO CONFORM TO AASHTO M270 GRADE 36.

ALL NUTS, BOLTS, AND WASHERS ARE TO CONFORM TO ASTM A307 AND BE GALVANIZED PER AASHTO M232.

ESTIMATED CLASS "DD" CONCRETE QUANTITIES	
16' - 0" C.G. =	5.68 C. Y.
20' - 0" C.G. =	6.81 C. Y.
24' - 0" C.G. =	7.93 C. Y.
* 24' - 0" C.G. =	7.93 C. Y.
30' - 0" C.G. =	9.62 C. Y.
32' - 0" C.G. =	10.18 C. Y.
36' - 0" C.G. =	11.31 C. Y.
40' - 0" C.G. =	12.43 C. Y.

QUANTITIES AND DIMENSIONS ARE APPROXIMATE ONLY BASED ON ONE COMPLETE CATTLE GUARD.													
NOMINAL C.G. SIZE	REINFORCING STEEL (NO. 4 BARS / GRADE 60)								MISC. STEEL				
	A1		A2		A3		A4		ESTIMATED WT. LB.	LAG PLATES		SPLICE CONNECTION	ESTIMATED WT. LB.
	REQUIRED	LENGTH	REQUIRED	LENGTH	REQUIRED	LENGTH	REQUIRED	LENGTH		REQUIRED	LENGTH		
16' - 0"	18	16' - 2"	36	7' - 10"	8	9' - 1 1/2"	14	4' - 10"	477	8	2' - 8"	NO	39
20' - 0"	18	20' - 2"	44	7' - 10"	8	9' - 1 1/2"	14	4' - 10"	567	8	3' - 6"	NO	52
24' - 0"	18	24' - 2"	52	7' - 10"	8	9' - 1 1/2"	14	4' - 10"	657	8	4' - 6"	NO	66
* 24' - 0"	36	11' - 11"	52	7' - 10"	8	9' - 1 1/2"	14	4' - 10"	653	8	4' - 6"	YES	323
30' - 0"	36	14' - 11"	64	7' - 10"	8	9' - 1 1/2"	14	4' - 10"	788	12	3' - 6"	YES	334
32' - 0"	36	15' - 11"	68	7' - 10"	8	9' - 1 1/2"	14	4' - 10"	833	16	2' - 8"	YES	335
36' - 0"	36	17' - 11"	76	7' - 10"	8	9' - 1 1/2"	14	4' - 10"	923	12	4' - 6"	YES	356
40' - 0"	36	19' - 11"	84	7' - 10"	8	9' - 1 1/2"	14	4' - 10"	1013	16	3' - 6"	YES	360

* 24' - 0" CATTLE GUARD WITH OPTIONAL SPLICE

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 611	DWG. NO. 611-20
PRECAST CONCRETE CATTLE GUARD BASE DETAILS	
EFFECTIVE: FEBRUARY 2005	
 MONTANA DEPARTMENT OF TRANSPORTATION	servicing you with pride