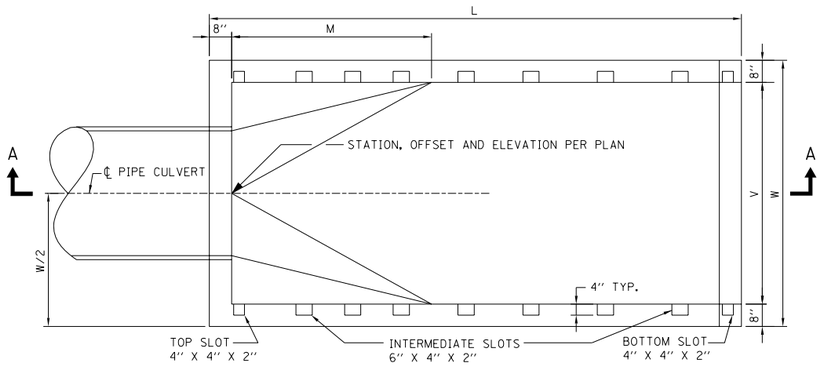
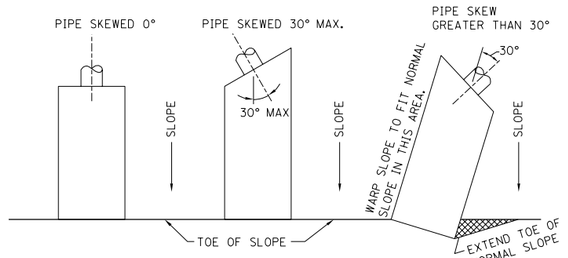
REVISIONS

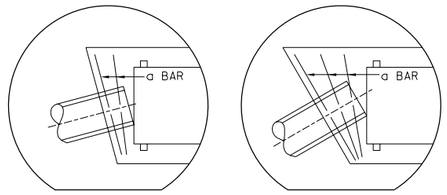


PLAN

SINGLE PIPE DESIGN



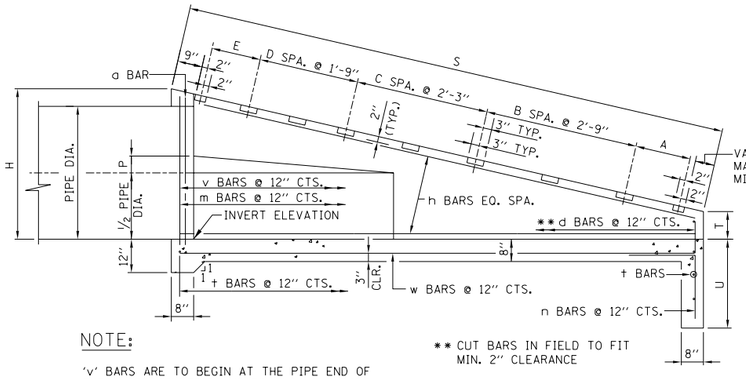
PLAN VIEW OF STRUCTURE LOCATIONS



NOTES:

ADDITIONAL 'A' BARS SHALL BE FURNISHED AND PLACED BY THE CONTRACTOR. THE ADDITIONAL BARS ARE NOT INCLUDED IN THE LISTED QUANTITIES BUT WILL BE PAID FOR AS REINFORCING STEEL.

1 ADDITIONAL BAR REQUIRED FOR EACH 15° SKEW OR FRACTION THEREOF.

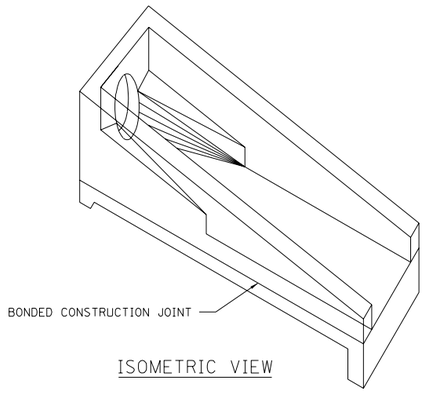


NOTE:

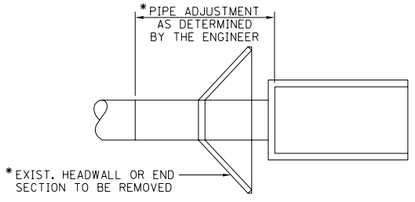
'v' BARS ARE TO BEGIN AT THE PIPE END OF THE SLOPED EXTERIOR HEADWALLS. 'm' BARS ARE TO BEGIN AT THE PIPE END OF THE SLOPED INTERIOR HEADWALLS.

** CUT BARS IN FIELD TO FIT MIN. 2'' CLEARANCE

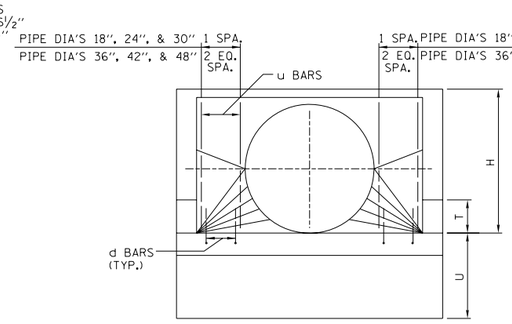
SECTION A-A



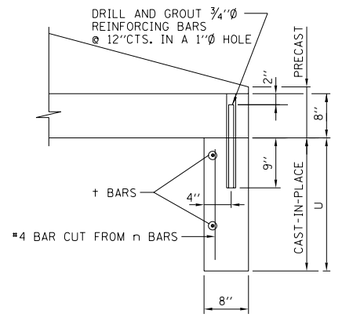
ISOMETRIC VIEW



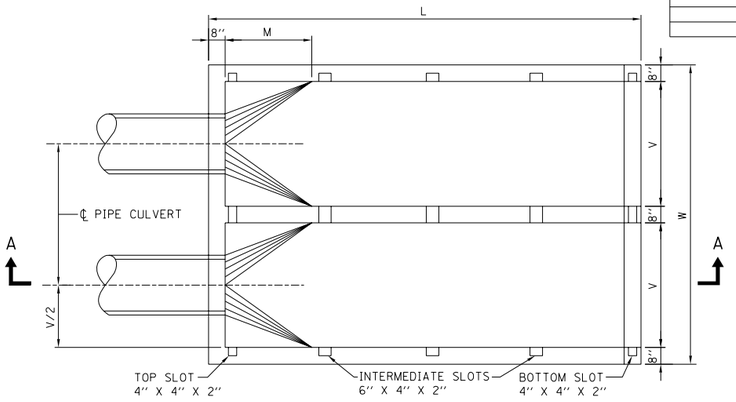
INSTALLATION DETAIL
SEE NOTE 1



FRONT ELEVATION

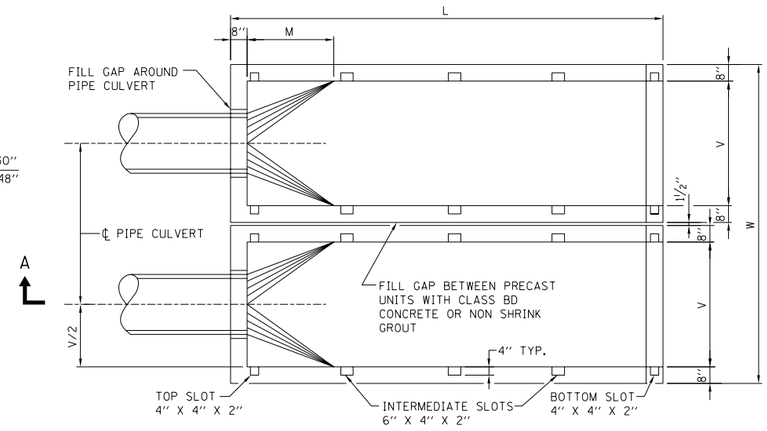


PRECAST DETAIL
CUT-OFF WALL



PLAN

CAST-IN-PLACE HEADWALL



PLAN
PRECAST HEADWALL

TWIN PIPE DESIGN

NOTES:

1. THE REQUIRED EXCAVATION, BACKFILLING, RESTORATION AND DITCH GRADING SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE FOR CONCRETE HEADWALLS AND COLLARS (CLASS SI). *
2. CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
3. REINFORCING STEEL SHALL BE DEFORMED BILLET BARS CONFORMING TO AASHTO M31 (ASTM DESIGNATION A615) GRADE 40 OR GRADE 60.
4. BAR BENDING DETAILS ARE DIMENSIONED OUT TO OUT OF BARS.
5. ALL EXPOSED EDGES SHALL HAVE A ¾'' - 45° CHAMFER. CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF ONE FOOT BELOW THE FINISHED GROUND LINE.
6. CARE SHALL BE EXERCISED IN REMOVING ANY LENGTH OF EXISTING PIPE SO THE REMAINING PIPE IS UNDAMAGED AND FULLY FUNCTIONING.
7. ANY ADDITIONAL LENGTHS OF PIPE NEEDED WILL BE PAID FOR BASED ON THE TYPE AND SIZE REQUIRED TO MATCH THE ORIGINAL CONSTRUCTION.
8. FOR DIMENSIONS AND QUANTITIES FOR SINGLE PIPE DESIGN SEE SHEET 2 (OF 5) IN THIS SERIES.
9. FOR DIMENSIONS AND QUANTITIES FOR TWIN PIPE DESIGN SEE SHEET 3 (OF 5) IN THIS SERIES.
10. FOR STEEL GRATING DETAILS SEE SHEET 5 (OF 5) IN THIS SERIES.
11. THE STATION, OFFSET AND INVERT ELEVATION FOR THE HEADWALL SHALL APPLY AT THE END OF THE CONNECTING PIPE OPENING.

* ADJUSTMENT TO THE LENGTH OF PIPE AND REMOVAL OF THE EXISTING HEADWALL OR END SECTION PAID SEPARATELY.

APPROVED Jeff Mosley CHIEF ENGINEER DATE 6-14-2006

SHEET 1 OF 5

Illinois Tollway
Open Roads for a Faster Future

HEADWALL TYPE III
18''-24''-30''-36''-42''-48''
FOR 4:1, 6:1, AND 10:1 SLOPES

DATE	STANDARD NO.
5-12-2005	SD 05-16

REVISIONS

DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III 4:1 SLOPE

PIPE DIA	DIMENSIONS											NO. OF SPACES			•CONCRETE CLASS SI CU. YD.	•REINF. STEEL LBS.
	H	L	M	P	S	T	U	V	W	A	E	B	C	D		
18"	2'-0"	7'-4"	2'-3"	2"	7'-6¾"	2"	2'-8"	3'-0"	4'-4"	2'-2"	1'-8"	--	1	--	1.7	132
24"	2'-8"	10'-0"	3'-0"	3"	10'-3¾"	2"	2'-8"	4'-0"	5'-4"	2'-2"	2'-2"	--	2	--	2.8	201
30"	3'-2"	12'-0"	3'-6"	4"	12'-4½"	2"	2'-8"	5'-0"	6'-4"	2'-8"	2'-8"	2	--	--	4.0	275
36"	3'-8"	14'-0"	4'-3"	4"	14'-5¼"	2"	2'-8"	6'-0"	7'-4"	2'-2"	1'-8"	--	4	--	5.3	351
42"	4'-3"	16'-4"	4'-8"	6"	16'-10"	2"	3'-2"	6'-6"	7'-10"	2'-8"	1'-8"	4	--	--	6.8	436
48"	4'-9"	18'-4"	5'-0"	6"	18'-10¾"	2"	3'-2"	7'-0"	8'-4"	2'-2"	1'-8"	--	6	--	8.2	513

DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III 6:1 SLOPE

PIPE DIA	DIMENSIONS											NO. OF SPACES			•CONCRETE CLASS SI CU. YD.	•REINF. STEEL LBS.
	H	L	M	P	S	T	U	V	W	A	E	B	C	D		
18"	2'-0"	11'-0"	2'-3"	2"	11'-1¾"	2"	2'-8"	3'-0"	4'-4"	2'-2"	1'-8"	--	1	2	2.2	183
24"	2'-8"	15'-0"	3'-0"	3"	15'-2½"	2"	2'-8"	4'-0"	5'-4"	2'-8"	2'-8"	3	--	--	3.8	278
30"	3'-2"	18'-0"	3'-6"	4"	18'-3"	2"	2'-8"	5'-0"	6'-4"	2'-2"	1'-8"	--	5	1	5.3	385
36"	3'-8"	21'-0"	4'-3"	4"	21'-3½"	2"	2'-8"	6'-0"	7'-4"	2'-8"	2'-2"	3	3	--	7.3	492
42"	4'-3"	24'-6"	4'-8"	6"	24'-10"	2"	3'-2"	6'-6"	7'-10"	2'-8"	1'-8"	5	--	3	9.4	616
48"	4'-9"	27'-6"	5'-0"	6"	27'-10½"	2"	3'-2"	7'-0"	8'-4"	2'-8"	2'-2"	7	1	--	11.3	727

DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III 10:1 SLOPE

PIPE DIA	DIMENSIONS											NO. OF SPACES			•CONCRETE CLASS SI CU. YD.	•REINF. STEEL LBS.
	H	L	M	P	S	T	U	V	W	A	E	B	C	D		
18"	2'-0"	18'-4"	2'-3"	2"	18'-5"	2"	2'-8"	3'-0"	4'-4"	2'-2"	1'-8"	--	5	1	3.4	279
24"	2'-8"	25'-0"	3'-0"	3"	25'-1½"	2"	2'-8"	4'-0"	5'-4"	2'-2"	1'-8"	--	8	1	5.8	434
30"	3'-2"	30'-0"	3'-6"	4"	30'-1¾"	2"	2'-8"	5'-0"	6'-4"	2'-2"	1'-8"	--	11	--	8.2	610
36"	3'-8"	35'-0"	4'-3"	4"	35'-2"	2"	2'-8"	6'-0"	7'-4"	2'-2"	2'-2"	--	13	--	11.2	778
42"	4'-3"	40'-10"	4'-8"	6"	41'-0½"	2"	3'-2"	6'-6"	7'-10"	2'-2"	1'-8"	--	12	5	14.3	984
48"	4'-9"	45'-10"	5'-0"	6"	46'-0¾"	2"	3'-2"	7'-0"	8'-4"	2'-2"	1'-8"	--	15	4	17.4	1165

PAY ITEMS ARE INDICATED BY AN ASTERISK (•).

REINFORCING BAR SCHEDULE FOR ONE HEADWALL

TYPE III 4:1 SLOPE

PIPE DIA	NO. 4 REINFORCING BARS					
	MARK	TYPE	NO. REQ'D.	LENGTH	a	b
18"	a18	1	1	8'-7"	2'-5"	
	d18	2	20	2'-6"	1'-9"	9"
	h18	STR.	6	7'-0"		
	n18	2	5	3'-0"	2'-0"	1'-0"
	t18	STR.	10	4'-0"		
	u18	STR.	4	1'-9"		
	w18	STR.	5	7'-0"		
24"	a24	1	1	10'-5"	3'-0"	
	d24	2	26	2'-3"	1'-6"	9"
	h24	STR.	6	9'-8"		
	n24	2	6	3'-0"	2'-0"	1'-0"
	t24	STR.	13	5'-0"		
	u24	STR.	4	2'-6"		
	v24	3	6	3'-9"	1'-3"	2'-6"
	w24	STR.	6	9'-8"		
30"	a30	1	1	11'-9"	3'-5"	
	d30	2	30	2'-3"	1'-6"	9"
	h30	STR.	8	11'-8"		
	n30	2	7	3'-0"	2'-0"	1'-0"
	t30	STR.	15	6'-0"		
	u30	STR.	4	3'-0"		
	v30	3	8	4'-3"	1'-3"	3'-0"
	w30	STR.	7	11'-8"		
36"	a36	1	1	13'-7"	4'-0"	
	d36	2	36	2'-3"	1'-6"	9"
	h36	STR.	8	13'-8"		
	n36	2	8	3'-0"	2'-0"	1'-0"
	t36	STR.	17	7'-0"		
	u36	STR.	6	3'-6"		
	v36	3	10	4'-9"	1'-3"	3'-6"
	w36	STR.	8	13'-8"		
42"	a42	1	1	15'-5"	4'-7"	
	d42	2	40	2'-3"	1'-6"	9"
	h42	STR.	10	16'-0"		
	n42	2	8	3'-6"	2'-6"	1'-0"
	t42	STR.	19	7'-6"		
	u42	STR.	6	4'-1"		
	v42	3	12	5'-4"	1'-3"	4'-1"
	w42	STR.	8	16'-0"		
48"	a48	1	1	17'-3"	5'-2"	
	d48	2	44	2'-3"	1'-6"	9"
	h48	STR.	10	18'-0"		
	n48	2	9	3'-6"	2'-6"	1'-0"
	t48	STR.	21	8'-0"		
	u48	STR.	6	4'-7"		
	v48	3	14	5'-10"	1'-3"	4'-7"
	w48	STR.	9	18'-0"		

REINFORCING BAR SCHEDULE FOR ONE HEADWALL

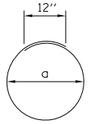
TYPE III 6:1 SLOPE

PIPE DIA	NO. 4 REINFORCING BARS					
	MARK	TYPE	NO. REQ'D.	LENGTH	a	b
18"	a18	1	1	8'-7"	2'-5"	
	d18	2	28	2'-6"	1'-9"	9"
	h18	STR.	6	10'-8"		
	n18	2	5	3'-0"	2'-0"	1'-0"
	t18	STR.	14	4'-0"		
	u18	STR.	4	1'-9"		
	w18	STR.	5	10'-8"		
24"	a24	1	1	10'-5"	3'-0"	
	d24	2	36	2'-3"	1'-6"	9"
	h24	STR.	6	14'-8"		
	n24	2	6	3'-0"	2'-0"	1'-0"
	t24	STR.	18	5'-0"		
	u24	STR.	4	2'-6"		
	v24	3	8	3'-9"	1'-3"	2'-6"
	w24	STR.	6	14'-8"		
30"	a30	1	1	11'-9"	3'-5"	
	d30	2	42	2'-3"	1'-6"	9"
	h30	STR.	8	17'-8"		
	n30	2	7	3'-0"	2'-0"	1'-0"
	t30		21	6'-0"		
	u30	STR.	4	3'-0"		
	v30	3	11	4'-3"	1'-3"	3'-0"
	w30	STR.	7	17'-8"		
36"	a36	1	1	13'-7"	4'-0"	
	d36	2	50	2'-3"	1'-6"	9"
	h36	STR.	8	20'-8"		
	n36	2	8	3'-0"	2'-0"	1'-0"
	t36	STR.	24	7'-0"		
	u36	STR.	6	3'-6"		
	v36	3	14	4'-9"	1'-3"	3'-6"
	w36	STR.	8	20'-8"		
42"	a42	1	1	15'-5"	4'-7"	
	d42	2	56	2'-3"	1'-6"	9"
	h42	STR.	10	24'-2"		
	n42	2	8	3'-6"	2'-6"	1'-0"
	t42	STR.	27	7'-6"		
	u42	STR.	6	4'-1"		
	v42	3	17	5'-4"	1'-3"	4'-1"
	w42	STR.	8	24'-2"		
48"	a48	1	1	17'-3"	5'-2"	
	d48	2	62	2'-3"	1'-6"	9"
	h48	STR.	10	27'-2"		
	n48	2	9	3'-6"	2'-6"	1'-0"
	t48	STR.	30	8'-0"		
	u48	STR.	6	4'-7"		
	v48	3	20	5'-10"	1'-3"	4'-7"
	w48	STR.	9	27'-2"		

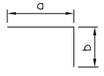
REINFORCING BAR SCHEDULE FOR ONE HEADWALL

TYPE III 10:1 SLOPE

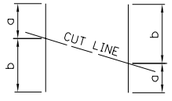
PIPE DIA	NO. 4 REINFORCING BARS					
	MARK	TYPE	NO. REQ'D.	LENGTH	a	b
18"	a18	1	1	8'-7"	2'-5"	
	d18	2	42	2'-6"	1'-9"	9"
	h18	STR.	6	18'-0"		
	n18	2	5	3'-0"	2'-0"	1'-0"
	t18	STR.	21	4'-0"		
	u18	STR.	4	1'-9"		
	w18	STR.	5	18'-0"		
24"	a24	1	1	10'-5"	3'-0"	
	d24	2	56	2'-3"	1'-6"	9"
	h24	STR.	6	24'-8"		
	n24	2	6	3'-0"	2'-0"	1'-0"
	t24	STR.	28	5'-0"		
	u24	STR.	4	2'-6"		
	v24	3	13	3'-9"	1'-3"	2'-6"
	w24	STR.	6	24'-8"		
30"	a30	1	1	11'-9"	3'-5"	
	d30	2	66	2'-3"	1'-6"	9"
	h30		8	29'-8"		
	n30	2	7	3'-0"	2'-0"	1'-0"
	t30	STR.	33	6'-0"		
	u30	STR.	4	3'-0"		
	v30	3	18	4'-3"	1'-3"	3'-0"
	w30	STR.	7	29'-8"		
36"	a36	1	1	13'-7"	4'-0"	
	d36	2	78	2'-3"	1'-6"	9"
	h36	STR.	8	34'-8"		
	n36	2	8	3'-0"	2'-0"	1'-0"
	t36	STR.	38	7'-0"		
	u36	STR.	6	3'-6"		
	v36	3	23	4'-9"	1'-3"	3'-6"
	w36	STR.	8	34'-8"		
42"	a42	1	1	15'-5"	4'-7"	
	d42	2	90	2'-3"	1'-6"	9"
	h42	STR.	10	40'-6"		
	n42	2	8	3'-6"	2'-6"	1'-0"
	t42	STR.	44	7'-6"		
	u42	STR.	6	4'-1"		
	v42	3	27	5'-4"	1'-3"	4'-1"
	w42	STR.	8	40'-6"		
48"	a48	1	1	17'-3"	5'-2"	
	d48	2	100	2'-3"	1'-6"	9"
	h48	STR.	10	45'-6"		
	n48	2	9	3'-6"	2'-6"	1'-0"
	t48	STR.	49	8'-0"		
	u48	STR.	6	4'-7"		
	v48	3	32	5'-10"	1'-3"	4'-7"
	w48	STR.	9	45'-6"		



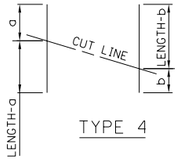
TYPE 1



TYPE 2



TYPE 3



TYPE 4

NOTES:

1. THE 'v' BARS, TYPE 3, SHALL BE ORDERED FULL LENGTH AND CUT IN THE FIELD. THE REMAINING PORTION OF THE 'v' BARS SHALL BE USED IN THE OTHER WALL.
2. THE LONG LEG OF THE 'd' AND 'n' BARS SHALL BE VERTICAL.
3. QUANTITIES ON THIS DRAWING ARE BASED ON THE CAST-IN-PLACE DESIGN.
4. "STR." = STRAIGHT BAR.
5. ALL REINFORCING BARS ARE #4 BARS.

SINGLE PIPE DESIGN

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

HEADWALL TYPE III
18"-24"-30"-42"-48"
FOR 4:1, 6:1, AND 10:1 SLOPES

DATE 5-12-2005

STANDARD NO. SD 05-16

REVISIONS

DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III 4:1 SLOPE TWIN PIPE CULVERT

PIPE DIA	DIMENSIONS											NO. OF SPACES			•CONCRETE CLASS SI CU. YD.	•REINF. STEEL LBS.
	H	L	M	P	S	T	U	V	W	A	E	B	C	D		
18''	2'-0''	7'-4''	2'-3''	2''	7'-6¾''	2''	2'-8''	3'-0''	8'-0''	2'-2''	1'-8''	--	1	--	2.9	228
24''	2'-8''	10'-0''	3'-0''	3''	10'-3¾''	2''	2'-8''	4'-0''	10'-0''	2'-2''	2'-2''	--	2	--	4.6	347
30''	3'-2''	12'-0''	3'-6''	4''	12'-4½''	2''	2'-8''	5'-0''	12'-0''	2'-8''	2'-8''	2	--	--	7.1	475
36''	3'-8''	14'-0''	4'-3''	4''	14'-5¼''	2''	2'-8''	6'-0''	14'-0''	2'-2''	1'-8''	--	4	--	9.7	611
42''	4'-3''	16'-4''	4'-8''	6''	16'-10''	2''	3'-2''	6'-6''	15'-0''	2'-8''	1'-8''	4	--	--	12.5	766
48''	4'-9''	18'-4''	5'-0''	6''	18'-10¾''	2''	3'-2''	7'-0''	16'-0''	2'-2''	1'-8''	--	6	--	15.1	890

DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III 6:1 SLOPE TWIN PIPE CULVERT

PIPE DIA	DIMENSIONS											NO. OF SPACES			•CONCRETE CLASS SI CU. YD.	•REINF. STEEL LBS.
	H	L	M	P	S	T	U	V	W	A	E	B	C	D		
18''	2'-0''	11'-0''	2'-3''	2''	11'-1¼''	2''	2'-8''	3'-0''	8'-0''	2'-2''	1'-8''	--	1	2	5.1	312
24''	2'-8''	15'-0''	3'-0''	3''	15'-2½''	2''	2'-8''	4'-0''	10'-0''	2'-8''	2'-8''	3	--	--	6.7	476
30''	3'-2''	18'-0''	3'-6''	4''	18'-3''	2''	2'-8''	5'-0''	12'-0''	2'-2''	1'-8''	--	5	1	9.6	662
36''	3'-8''	21'-0''	4'-3''	4''	21'-3½''	2''	2'-8''	6'-0''	14'-0''	2'-8''	2'-2''	3	3	--	13.2	852
42''	4'-3''	24'-6''	4'-8''	6''	24'-10''	2''	3'-2''	6'-6''	15'-0''	2'-8''	1'-8''	5	--	3	16.9	1079
48''	4'-9''	27'-6''	5'-0''	6''	27'-10½''	2''	3'-2''	7'-0''	16'-0''	2'-8''	2'-2''	7	1	--	20.4	1255

DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III 10:1 SLOPE TWIN PIPE CULVERT

PIPE DIA	DIMENSIONS											NO. OF SPACES			•CONCRETE CLASS SI CU. YD.	•REINF. STEEL LBS.
	H	L	M	P	S	T	U	V	W	A	E	B	C	D		
18''	2'-0''	18'-4''	2'-3''	2''	18'-5''	2''	2'-8''	3'-0''	8'-0''	2'-2''	1'-8''	--	5	1	6.0	472
24''	2'-8''	25'-0''	3'-0''	3''	25'-1½''	2''	2'-8''	4'-0''	10'-0''	2'-2''	1'-8''	--	8	1	10.2	739
30''	3'-2''	30'-0''	3'-6''	4''	30'-1¾''	2''	2'-8''	5'-0''	12'-0''	2'-2''	1'-8''	--	11	--	14.7	1039
36''	3'-8''	35'-0''	4'-3''	4''	35'-2''	2''	2'-8''	6'-0''	14'-0''	2'-2''	2'-2''	--	13	--	20.0	1340
42''	4'-3''	40'-10''	4'-8''	6''	41'-0½''	2''	3'-2''	6'-6''	15'-0''	2'-2''	1'-8''	--	12	5	25.7	1714
48''	4'-9''	45'-10''	5'-0''	6''	46'-0¾''	2''	3'-2''	7'-0''	16'-0''	2'-2''	1'-8''	--	15	4	31.1	2002

PAY ITEMS ARE INDICATED BY AN ASTERISK (•).

REINFORCING BAR SCHEDULE FOR ONE HEADWALL TYPE III 4:1 SLOPE TWIN PIPE CULVERT

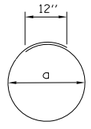
PIPE DIA	NO. 4 REINFORCING BARS					
	MARK	TYPE	NO. REQ'D.	LENGTH	a	b
18''	a18	1	2	8'-7''	2'-5''	
	d18	2	32	2'-6''	1'-9''	9''
	h18	STR.	9	7'-0''		
	n18	2	9	3'-0''	2'-0''	1'-0''
	t18	STR.	10	7'-8''		
	u18	STR.	8	1'-9''		
	w18	STR.	9	7'-0''		
24''	a24	1	2	10'-5''	3'-0''	
	d24	2	41	2'-3''	1'-6''	9''
	h24	STR.	9	9'-8''		
	n24	2	11	3'-0''	2'-0''	1'-0''
	t24	STR.	13	9'-8''		
	u24	STR.	8	2'-6''		
	v24	3	6	3'-9''	1'-3''	2'-6''
	m24	4	3	3'-9''	1'-3''	2'-0''
	w24	STR.	11	9'-8''		
30''	a30	1	2	11'-9''	3'-5''	
	d30	2	47	2'-3''	1'-6''	9''
	h30	STR.	12	11'-8''		
	n30	2	13	3'-0''	2'-0''	1'-0''
	t30	STR.	15	11'-8''		
	u30	STR.	8	3'-0''		
	v30	3	8	4'-3''	1'-3''	3'-0''
	m30	4	4	4'-3''	1'-3''	2'-3''
	w30	STR.	13	11'-8''		
36''	a36	1	2	13'-7''	4'-0''	
	d36	2	57	2'-3''	1'-6''	9''
	h36	STR.	12	13'-8''		
	n36	2	15	3'-0''	2'-0''	1'-0''
	t36	STR.	17	13'-8''		
	u36	STR.	12	3'-6''		
	v36	3	10	4'-9''	1'-3''	3'-6''
	m36	4	5	4'-9''	1'-3''	2'-6''
	w36	STR.	15	13'-8''		
42''	a42	1	2	15'-5''	4'-7''	
	d42	2	63	2'-3''	1'-6''	9''
	h42	STR.	15	16'-0''		
	n42	2	16	3'-6''	2'-6''	1'-0''
	t42	STR.	19	14'-8''		
	u42	STR.	12	4'-1''		
	v42	3	12	5'-4''	1'-3''	4'-1''
	m42	4	6	5'-4''	1'-3''	2'-10''
	w42	STR.	16	16'-0''		
48''	a48	1	2	17'-3''	5'-2''	
	d48	2	69	2'-3''	1'-6''	9''
	h48	STR.	15	18'-0''		
	n48	2	17	3'-6''	2'-6''	1'-0''
	t48	STR.	21	15'-8''		
	u48	STR.	12	4'-7''		
	v48	3	14	5'-10''	1'-3''	4'-7''
	m48	4	7	5'-10''	1'-3''	3'-1''
	w48	STR.	17	18'-0''		

REINFORCING BAR SCHEDULE FOR ONE HEADWALL TYPE III 6:1 SLOPE TWIN PIPE CULVERT

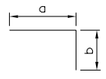
PIPE DIA	NO. 4 REINFORCING BARS					
	MARK	TYPE	NO. REQ'D.	LENGTH	a	b
18''	a18	1	2	8'-7''	2'-5''	
	d18	2	44	2'-6''	1'-9''	9''
	h18	STR.	9	10'-8''		
	n18	2	9	3'-0''	2'-0''	1'-0''
	t18	STR.	14	7'-8''		
	u18	STR.	8	1'-9''		
	w18	STR.	9	10'-8''		
24''	a24	1	2	10'-5''	3'-0''	
	d24	2	56	2'-3''	1'-6''	9''
	h24	STR.	9	14'-8''		
	n24	2	11	3'-0''	2'-0''	1'-0''
	t24	STR.	18	9'-8''		
	u24	STR.	8	2'-6''		
	v24	3	8	3'-9''	1'-3''	2'-6''
	m24	4	4	3'-9''	1'-3''	2'-0''
	w24	STR.	11	14'-8''		
30''	a30	1	2	11'-9''	3'-5''	
	d30	2	65	2'-3''	1'-6''	9''
	h30	STR.	12	17'-8''		
	n30	2	13	3'-0''	2'-0''	1'-0''
	t30	STR.	21	11'-8''		
	u30	STR.	8	3'-0''		
	v30	3	11	4'-3''	1'-3''	3'-0''
	m30	4	6	4'-3''	1'-3''	2'-2''
	w30	STR.	13	17'-8''		
36''	a36	1	2	13'-7''	4'-0''	
	d36	2	78	2'-3''	1'-6''	9''
	h36	STR.	12	20'-8''		
	n36	2	15	3'-0''	2'-0''	1'-0''
	t36	STR.	24	13'-8''		
	u36	STR.	12	3'-6''		
	v36	3	14	4'-9''	1'-3''	3'-6''
	m36	4	7	4'-9''	1'-3''	2'-6''
	w36	STR.	15	20'-8''		
42''	a42	1	2	15'-5''	4'-7''	
	d42	2	87	2'-3''	1'-6''	9''
	h42	STR.	15	24'-2''		
	n42	2	16	3'-6''	2'-6''	1'-0''
	t42	STR.	27	14'-8''		
	u42	STR.	12	4'-1''		
	v42	3	17	5'-4''	1'-3''	4'-1''
	m42	4	9	5'-4''	1'-3''	2'-9''
	w42	STR.	16	24'-2''		
48''	a48	1	2	17'-3''	5'-2''	
	d48	2	96	2'-3''	1'-6''	9''
	h48	STR.	15	27'-2''		
	n48	2	17	3'-6''	2'-6''	1'-0''
	t48	STR.	30	15'-8''		
	u48	STR.	12	4'-7''		
	v48	3	20	5'-10''	1'-3''	4'-7''
	m48	4	10	5'-10''	1'-3''	3'-1''
	w48	STR.	17	27'-2''		

REINFORCING BAR SCHEDULE FOR ONE HEADWALL TYPE III 10:1 SLOPE TWIN PIPE CULVERT

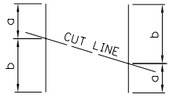
PIPE DIA	NO. 4 REINFORCING BARS					
	MARK	TYPE	NO. REQ'D.	LENGTH	a	b
18''	a18	1	2	8'-7''	2'-5''	
	d18	2	65	2'-6''	1'-9''	9''
	h18	STR.	9	18'-0''		
	n18	2	9	3'-0''	2'-0''	1'-0''
	t18	STR.	21	7'-8''		
	u18	STR.	8	1'-9''		
	w18	STR.	9	18'-0''		
24''	a24	1	2	10'-5''	3'-0''	
	d24	2	86	2'-3''	1'-6''	9''
	h24	STR.	9	24'-8''		
	n24	2	11	3'-0''	2'-0''	1'-0''
	t24	STR.	28	9'-8''		
	u24	STR.	8	2'-6''		
	v24	3	13	3'-9''	1'-3''	2'-6''
	m24	4	7	3'-9''	1'-3''	1'-11''
	w24	STR.	11	24'-8''		
30''	a30	1	2	11'-9''	3'-5''	
	d30	2	101	2'-3''	1'-6''	9''
	h30	STR.	12	29'-8''		
	n30	2	13	3'-0''	2'-0''	1'-0''
	t30	STR.	33	11'-8''		
	u30	STR.	8	3'-0''		
	v30	3	18	4'-3''	1'-3''	3'-0''
	m30	4	9	4'-3''	1'-3''	2'-2''
	w30	STR.	13	29'-8''		
36''	a36	1	2	13'-7''	4'-0''	
	d36	2	120	2'-3''	1'-6''	9''
	h36	STR.	12	34'-8''		
	n36	2	15	3'-0''	2'-0''	1'-0''
	t36	STR.	38	13'-8''		
	u36	STR.	12	3'-6''		
	v36	3	23	4'-9''	1'-3''	3'-6''
	m36	4	12	4'-9''	1'-3''	2'-5''
	w36	STR.	15	34'-8''		
42''	a42	1	2	15'-5''	4'-7''	
	d42	2	138	2'-3''	1'-6''	9''
	h42	STR.	15	40'-6''		
	n42	2	16	3'-6''	2'-6''	1'-0''
	t42	STR.	44	14'-8''		
	u42	STR.	12	4'-1''		
	v42	3	27	5'-4''	1'-3''	4'-1''
	m42	4	14	5'-4''	1'-3''	2'-10''
	w42	STR.	16	40'-6''		
48''	a48	1	2	17'-3''	5'-2''	
	d48	2	153	2'-3''	1'-6''	9''
	h48	STR.	15	45'-6''		
	n48	2	17	3'-6''	2'-6''	1'-0''
	t48	STR.	49	15'-8''		
	u48	STR.	12	4'-7''		
	v48	3	32	5'-10''	1'-3''	4'-7''
	m48	4	16	5'-10''	1'-3''	3'-1''
	w48	STR.	17	45'-6''		



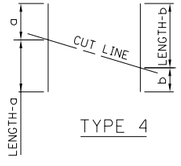
TYPE 1



TYPE 2



TYPE 3



TYPE 4

NOTES:

1. THE 'v' BARS, TYPE 3, AND 'm' BARS, TYPE 4, SHALL BE ORDERED FULL LENGTH AND CUT IN THE FIELD. THE REMAINING PORTION OF THE 'v' BARS SHALL BE USED IN THE OTHER EXTERIOR WALL. THE 'm' BARS SHALL BE USED IN THE INTERIOR WALL.
2. THE LONG LEG OF THE 'd' AND 'n' BARS SHALL BE VERTICAL.
3. QUANTITIES ON THIS DRAWING ARE BASED ON THE CAST-IN-PLACE DESIGN.
4. "STR." = STRAIGHT BAR.
5. ALL REINFORCING BARS ARE #4 BARS.

TWIN PIPE DESIGN

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

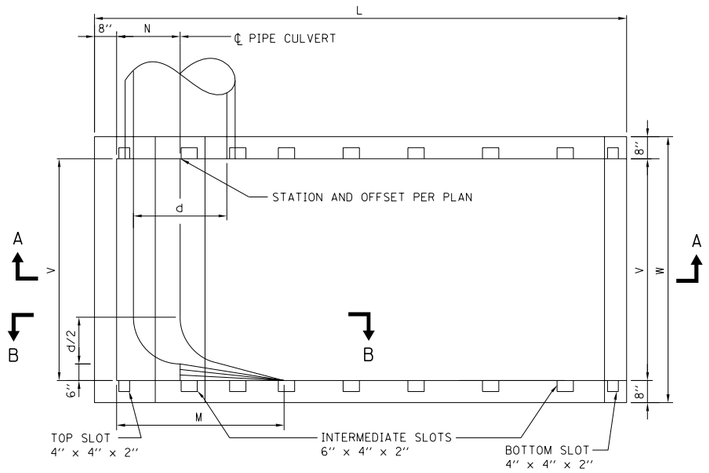
Illinois Tollway
Open Roads for a Faster Future

HEADWALL TYPE III
18''-24''-30''-36''-42''-48''
FOR 4:1, 6:1, AND 10:1 SLOPES

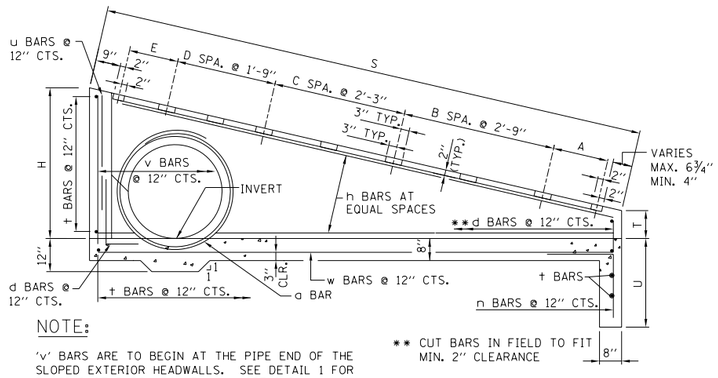
DATE 5-12-2005

STANDARD NO. SD 05-16

REVISIONS



PLAN

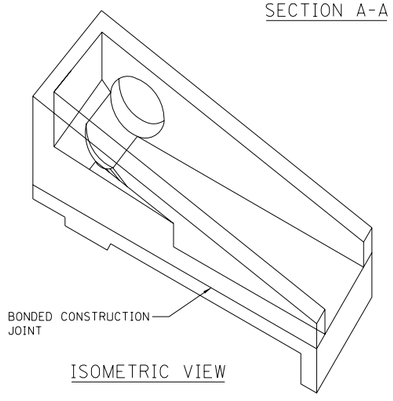


NOTE:

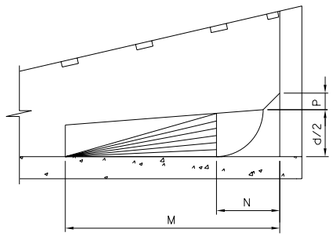
'v' BARS ARE TO BEGIN AT THE PIPE END OF THE SLOPED EXTERIOR HEADWALLS. SEE DETAIL 1 FOR PLACING OF BARS AROUND WALL OPENING.

** CUT BARS IN FIELD TO FIT MIN. 2" CLEARANCE

SECTION A-A



ISOMETRIC VIEW



SECTION B-B

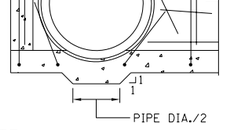
DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III 4:1 SLOPE

PIPE DIA	DIMENSIONS												NO. OF SPACES			•CONCRETE CLASS SI CU. YD.	•REINF. STEEL LBS.
	H	L	M	N	P	S	T	U	V	W	A	E	B	C	D		
18"	3'-2"	12'-0"	3'-6"	1'-6"	4"	12'-4½"	2"	2'-8"	3'-0"	4'-4"	2'-8"	2'-8"	2	--	--	2.8	244
24"	3'-8"	14'-0"	4'-3"	1'-8"	4"	14'-5¼"	2"	2'-8"	4'-0"	5'-4"	2'-2"	1'-8"	--	4	--	4.1	316
30"	4'-3"	16'-4"	4'-8"	1'-10"	6"	16'-10"	2"	2'-8"	5'-0"	6'-4"	2'-8"	1'-8"	4	--	--	5.6	422
36"	4'-9"	18'-4"	5'-0"	2'-0"	6"	18'-10¾"	2"	2'-8"	6'-0"	7'-4"	2'-2"	1'-8"	--	6	--	7.2	514
42"	5'-4"	20'-8"	5'-4"	2'-3"	6"	21'-3¾"	2"	3'-2"	6'-6"	7'-10"	2'-8"	2'-2"	3	3	--	8.8	625
48"	5'-11"	23'-0"	5'-8"	2'-6"	6"	23'-8½"	2"	3'-2"	7'-0"	8'-4"	2'-8"	2'-2"	3	4	--	10.6	731

PAY ITEMS ARE INDICATED BY AN ASTERISK (•).

DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III 6:1 SLOPE

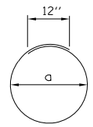
PIPE DIA	DIMENSIONS												NO. OF SPACES			•CONCRETE CLASS SI CU. YD.	•REINF. STEEL LBS.
	H	L	M	N	P	S	T	U	V	W	A	E	B	C	D		
18"	3'-2"	18'-0"	3'-6"	1'-6"	4"	18'-3"	2"	2'-8"	3'-0"	4'-4"	2'-2"	1'-8"	--	5	1	4.1	340
24"	3'-8"	21'-0"	4'-3"	1'-8"	4"	21'-3½"	2"	2'-8"	4'-0"	5'-4"	2'-8"	2'-2"	3	3	--	5.7	440
30"	4'-3"	24'-6"	4'-8"	1'-10"	6"	24'-10"	2"	2'-8"	5'-0"	6'-4"	2'-8"	1'-8"	5	--	3	7.8	593
36"	4'-9"	27'-6"	5'-0"	2'-0"	6"	27'-10½"	2"	2'-8"	6'-0"	7'-4"	2'-8"	2'-2"	7	1	--	10.0	722
42"	5'-4"	31'-0"	5'-4"	2'-3"	6"	31'-5¼"	2"	3'-2"	6'-6"	7'-10"	2'-8"	2'-2"	5	5	--	12.3	874
48"	5'-11"	34'-6"	5'-8"	2'-6"	6"	34'-11¾"	2"	3'-2"	7'-0"	8'-4"	2'-8"	2'-2"	3	9	--	14.7	1025



NOTE:

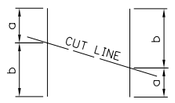
'd' BARS, 'v' BARS AND 'w' BARS SHALL BE BENT OR DIPPED AS REQUIRED, AROUND THE WALL OPENING. 'h' BARS SHALL BE BENT OR CUT AS REQUIRED, AROUND THE OPENING.

DETAIL 1



TYPE 1

TYPE 2



TYPE 3

REINFORCING BAR SCHEDULE FOR ONE HEADWALL

TYPE III 4:1 SLOPE

PIPE DIA	NO. 4 REINFORCING BARS					
	MARK	TYPE	NO. REQ'D.	LENGTH	a	b
18"	a18	1	1	8'-7"	2'-5"	
	d18	2	30	2'-3"	1'-6"	9"
	h18	STR.	8	11'-8"		
	n18	2	5	3'-0"	2'-0"	1'-0"
	t18	STR.	19	4'-0"		
	u18	STR.	4	3'-0"		
	v18	3	8	4'-3"	1'-3"	3'-0"
	w18	STR.	5	11'-8"		
24"	a24	1	1	10'-5"	3'-0"	
	d24	2	35	2'-3"	1'-6"	9"
	h24	STR.	8	13'-8"		
	n24	2	6	3'-0"	2'-0"	1'-0"
	t24	STR.	22	5'-0"		
	u24	STR.	5	3'-6"		
	v24	3	10	4'-9"	1'-3"	3'-6"
	w24	STR.	6	13'-8"		
30"	a30	1	1	11'-9"	3'-5"	
	d30	2	42	2'-3"	1'-6"	9"
	h30	STR.	10	16'-0"		
	n30	2	7	3'-0"	2'-0"	1'-0"
	t30	STR.	24	6'-0"		
	u30	STR.	6	4'-1"		
	v30	3	12	5'-4"	1'-3"	4'-1"
	w30	STR.	7	16'-0"		
36"	a36	1	1	13'-7"	4'-0"	
	d36	2	47	2'-3"	1'-6"	9"
	h36	STR.	10	18'-0"		
	n36	2	8	3'-0"	2'-0"	1'-0"
	t36	STR.	27	7'-0"		
	u36	STR.	7	4'-7"		
	v36	3	14	5'-10"	1'-3"	4'-7"
	w36	STR.	8	18'-0"		
42"	a42	1	1	15'-5"	4'-7"	
	d42	2	52	2'-3"	1'-6"	9"
	h42	STR.	12	20'-4"		
	n42	2	8	3'-6"	2'-6"	1'-0"
	t42	STR.	30	7'-6"		
	u42	STR.	8	5'-2"		
	v42	3	16	6'-5"	1'-3"	5'-2"
	w42	STR.	8	20'-4"		
48"	a48	1	1	17'-3"	5'-2"	
	d48	2	56	2'-3"	1'-6"	9"
	h48	STR.	12	22'-8"		
	n48	2	9	3'-6"	2'-6"	1'-0"
	t48	STR.	33	8'-0"		
	u48	STR.	8	5'-9"		
	v48	3	19	7'-0"	1'-3"	5'-9"
	w48	STR.	9	22'-8"		

REINFORCING BAR SCHEDULE FOR ONE HEADWALL

TYPE III 6:1 SLOPE

PIPE DIA	NO. 4 REINFORCING BARS					
	MARK	TYPE	NO. REQ'D.	LENGTH	a	b
18"	a18	1	1	8'-7"	2'-5"	
	d18	2	43	2'-3"	1'-6"	9"
	h18	STR.	8	17'-8"		
	n18	2	5	3'-0"	2'-0"	1'-0"
	t18	STR.	25	4'-0"		
	u18	STR.	4	3'-0"		
	v18	3	11	4'-3"	1'-3"	3'-0"
	w18	STR.	5	17'-8"		
24"	a24	1	1	10'-5"	3'-0"	
	d24	2	50	2'-3"	1'-6"	9"
	h24	STR.	8	20'-8"		
	n24	2	6	3'-0"	2'-0"	1'-0"
	t24	STR.	29	5'-0"		
	u24	STR.	5	3'-6"		
	v24	3	14	4'-9"	1'-3"	3'-6"
	w24	STR.	6	20'-8"		
30"	a30	1	1	11'-9"	3'-5"	
	d30	2	58	2'-3"	1'-6"	9"
	h30	STR.	10	24'-2"		
	n30	2	7	3'-0"	2'-0"	1'-0"
	t30	STR.	33	6'-0"		
	u30	STR.	6	4'-1"		
	v30	3	17	5'-4"	1'-3"	4'-1"
	w30	STR.	7	24'-2"		
36"	a36	1	1	13'-7"	4'-0"	
	d36	2	65	2'-3"	1'-6"	9"
	h36	STR.	10	27'-2"		
	n36	2	8	3'-0"	2'-0"	1'-0"
	t36	STR.	37	7'-0"		
	u36	STR.	7	4'-7"		
	v36	3	20	5'-10"	1'-3"	4'-7"
	w36	STR.	8	27'-2"		
42"	a42	1	1	15'-5"	4'-7"	
	d42	2	72	2'-3"	1'-6"	9"
	h42	STR.	12	30'-8"		
	n42	2	8	3'-6"	2'-6"	1'-0"
	t42	STR.	40	7'-6"		
	u42	STR.	8	5'-2"		
	v42	3	23	6'-5"	1'-3"	5'-2"
	w42	STR.	8	30'-8"		
48"	a48	1	1	17'-3"	5'-2"	
	d48	2	80	2'-3"	1'-6"	9"
	h48	STR.	12	34'-2"		
	n48	2	9	3'-6"	2'-6"	1'-0"
	t48	STR.	45	8'-0"		
	u48	STR.	8	5'-9"		
	v48	3	26	7'-0"	1'-3"	5'-9"
	w48	STR.	9	34'-2"		

NOTES:

1. THE 'v' BARS, TYPE 3, SHALL BE ORDERED FULL LENGTH AND CUT IN THE FIELD. THE REMAINING PORTION OF THE 'v' BARS SHALL BE USED IN THE OTHER WALL. THE LONG LEG OF THE 'd' BARS AND THE 'n' BARS SHALL BE VERTICAL.
2. THE LONG LEG OF THE 'd' AND 'n' BARS SHALL BE VERTICAL.
3. QUANTITIES ON THIS DRAWING ARE BASED ON THE CAST-IN-PLACE DESIGN.
4. "STR." = STRAIGHT BAR.
5. ALL REINFORCING BARS ARE #4 BARS.

SIDE ENTRANCE DESIGN

FOR STEEL GRATING DETAILS SEE SHEET 5 (OF 5) IN THIS SERIES

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

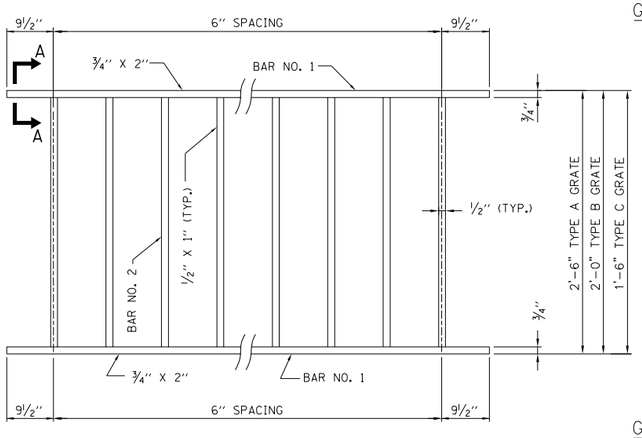
SHEET 4 OF 5

Illinois Tollway
Open Roads for a Faster Future

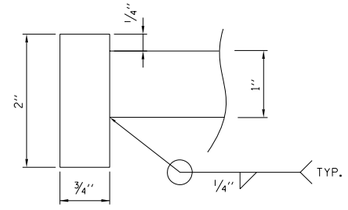
HEADWALL TYPE III
18"-24"-30"-36"-42"-48"
FOR 4:1, 6:1 AND 10:1 SLOPES

DATE	STANDARD NO.
5-12-2005	SD 05-16

REVISIONS



TYPICAL GRATE



SECTION A-A

GRATE DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III END ENTRANCE 4:1 SLOPE

INSIDE PIPE DIAMETER	GRATES		BARS FOR ONE GRATE				HEADWALL GRATES (LBS.)	
			BAR NO. 1		BAR NO. 2			
	NUMBER REQUIRED	TYPE REQ'D.	BARS REQ'D.	LENGTH	BARS REQ'D.	LENGTH	EACH GRATE	TOTAL
18"	2	B	2	3'-7"	5	1'-10½"	53	154
	1	C	2	3'-7"	5	1'-4½"	48	
24"	4	B	2	4'-7"	7	1'-10½"	69	276
	-	-	-	-	-	-	-	
30"	4	A	2	5'-7"	9	2'-4½"	94	376
	-	-	-	-	-	-	-	
36"	5	B	2	6'-7"	11	1'-10½"	103	608
	1	C	2	6'-7"	11	1'-4½"	93	
42"	5	A	2	7'-1"	12	2'-4½"	121	705
	1	C	2	7'-1"	12	1'-4½"	100	
48"	7	B	2	7'-7"	13	1'-10½"	119	941
	1	C	2	7'-7"	13	1'-4½"	108	

GRATE DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III END ENTRANCE 6:1 SLOPE

INSIDE PIPE DIAMETER	GRATES		BARS FOR ONE GRATE				HEADWALL GRATES (LBS.)	
			BAR NO. 1		BAR NO. 2			
	NUMBER REQUIRED	TYPE REQ'D.	BARS REQ'D.	LENGTH	BARS REQ'D.	LENGTH	EACH GRATE	TOTAL
18"	2	B	2	3'-7"	5	1'-10½"	53	250
	3	C	2	3'-7"	5	1'-4½"	48	
24"	5	A	2	4'-7"	7	2'-4½"	75	375
	-	-	-	-	-	-	-	
30"	6	B	2	5'-7"	9	1'-10½"	86	672
	2	C	2	5'-7"	9	1'-4½"	78	
36"	4	A	2	6'-7"	11	2'-4½"	112	860
	4	B	2	6'-7"	11	1'-10½"	103	
42"	6	A	2	7'-1"	12	2'-4½"	121	1126
	4	C	2	7'-1"	12	1'-4½"	100	
48"	8	A	2	7'-7"	13	2'-4½"	130	1278
	2	B	2	7'-7"	13	1'-10½"	119	

GRATE DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III END ENTRANCE 10:1 SLOPE

INSIDE PIPE DIAMETER	GRATES		BARS FOR ONE GRATE				HEADWALL GRATES (LBS.)	
			BAR NO. 1		BAR NO. 2			
	NUMBER REQUIRED	TYPE REQ'D.	BARS REQ'D.	LENGTH	BARS REQ'D.	LENGTH	EACH GRATE	TOTAL
18"	6	B	2	3'-7"	5	1'-10½"	53	414
	2	C	2	3'-7"	5	1'-4½"	48	
24"	9	B	2	4'-7"	7	1'-10½"	69	747
	2	C	2	4'-7"	7	1'-4½"	63	
30"	12	B	2	5'-7"	9	1'-10½"	86	1110
	1	C	2	5'-7"	9	1'-4½"	78	
36"	15	B	2	6'-7"	11	1'-10½"	103	1535
	-	-	-	-	-	-	-	
42"	13	B	2	7'-1"	12	1'-10½"	111	2043
	6	C	2	7'-1"	12	1'-4½"	100	
48"	16	B	2	7'-7"	13	1'-10½"	119	2443
	5	C	2	7'-7"	13	1'-4½"	108	

GRATE DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III SIDE ENTRANCE 4:1 SLOPE

INSIDE PIPE DIAMETER	GRATES		BARS FOR ONE GRATE				HEADWALL GRATES (LBS.)	
			BAR NO. 1		BAR NO. 2			
	NUMBER REQUIRED	TYPE REQ'D.	BARS REQ'D.	LENGTH	BARS REQ'D.	LENGTH	EACH GRATE	TOTAL
18"	4	A	2	3'-7"	5	2'-4½"	57	228
	-	-	-	-	-	-	-	
24"	5	B	2	4'-7"	7	1'-10½"	69	408
	1	C	2	4'-7"	7	1'-4½"	63	
30"	5	A	2	5'-7"	9	2'-4½"	94	548
	1	C	2	5'-7"	9	1'-4½"	78	
36"	7	B	2	6'-7"	11	1'-10½"	103	814
	1	C	2	6'-7"	11	1'-4½"	93	
42"	4	A	2	7'-1"	12	2'-4½"	121	928
	4	B	2	7'-1"	12	1'-10½"	111	
48"	4	A	2	7'-7"	13	2'-4½"	130	1115
	5	B	2	7'-7"	13	1'-10½"	119	

GRATE DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE III SIDE ENTRANCE 6:1 SLOPE

INSIDE PIPE DIAMETER	GRATES		BARS FOR ONE GRATE				HEADWALL GRATES (LBS.)	
			BAR NO. 1		BAR NO. 2			
	NUMBER REQUIRED	TYPE REQ'D.	BARS REQ'D.	LENGTH	BARS REQ'D.	LENGTH	EACH GRATE	TOTAL
18"	6	B	2	3'-7"	5	1'-10½"	53	414
	2	C	2	3'-7"	5	1'-4½"	48	
24"	4	A	2	4'-7"	7	2'-4½"	75	576
	4	B	2	4'-7"	7	1'-10½"	69	
30"	6	A	2	5'-7"	9	2'-4½"	94	876
	4	C	2	5'-7"	9	1'-4½"	78	
36"	8	A	2	6'-7"	11	2'-4½"	112	1102
	2	B	2	6'-7"	11	1'-10½"	103	
42"	6	A	2	7'-1"	12	2'-4½"	121	1392
	6	B	2	7'-1"	12	1'-10½"	111	
48"	4	A	2	7'-7"	13	2'-4½"	130	1602
	10	B	2	7'-7"	13	1'-10½"	119	

PAY ITEMS ARE INDICATED BY AN ASTERISK (•).

NOTES:

1. ALL STRUCTURAL STEEL SHALL BE AASHTO M270, GRADE 36.
2. GALVANIZING SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
3. FOR PLACEMENT OF GRATES, SEE SHEET 1 OR 4 (OF 5) IN THIS SERIES.
4. ALL TABLE DIMENSIONS AND QUANTITIES ARE FOR SINGLE PIPE CULVERT HEADWALLS. TO ADAPT ANY OF THESE TABLES FOR DOUBLE PIPE CULVERTS, DOUBLE THE NUMBER OF GRATES REQUIRED AND DOUBLE THE TOTAL WEIGHT (LBS.) OF THE GRATES.

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

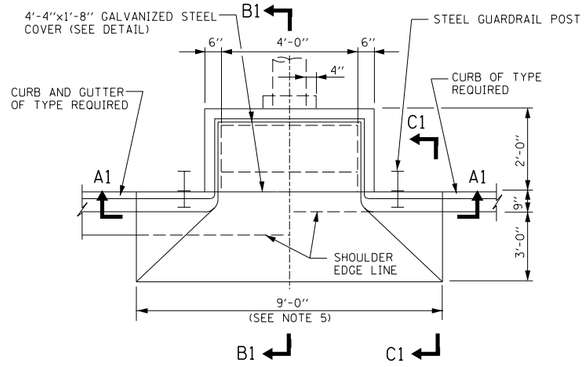
Illinois Tollway
Open Roads for a Faster Future

HEADWALL TYPE III
18"-24"-30"-36"-42"-48"
FOR 4:1, 6:1, AND 10:1 SLOPES

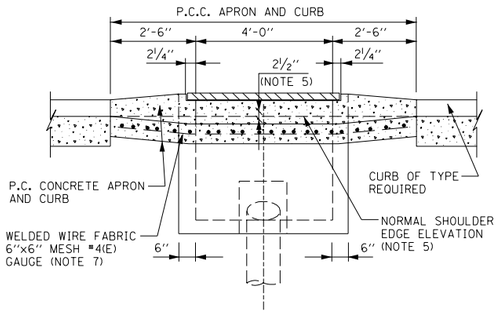
DATE 5-12-2005

STANDARD NO. SD 05-16

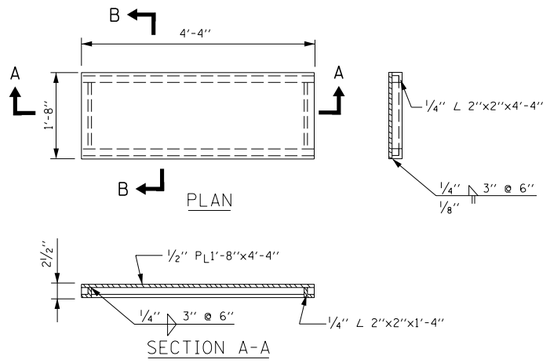
REVISIONS



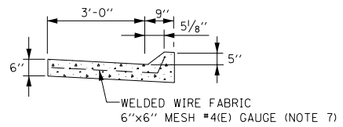
PLAN



SECTION A1-A1



GALVANIZED STEEL COVER DETAIL



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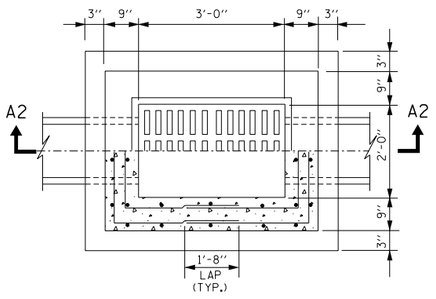
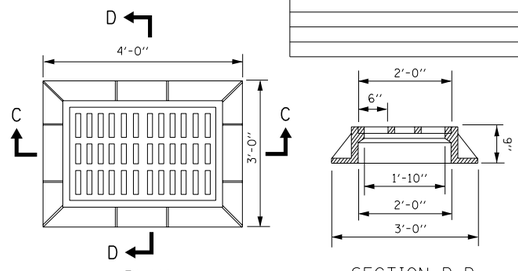
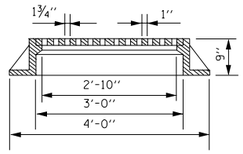


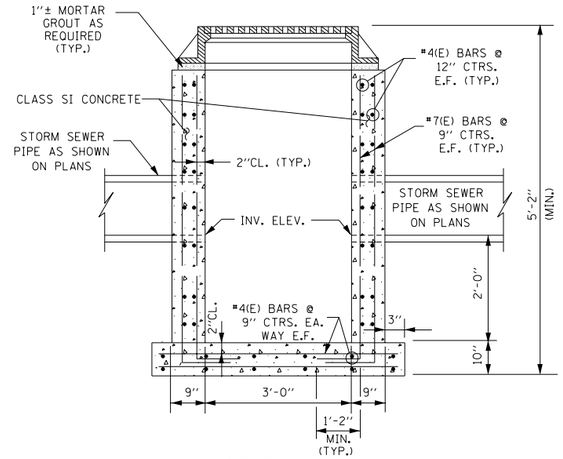
HALF PLAN



SECTION D-D

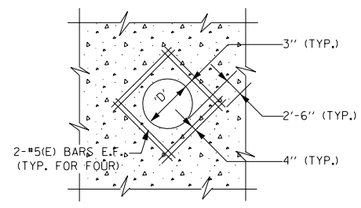


SECTION C-C

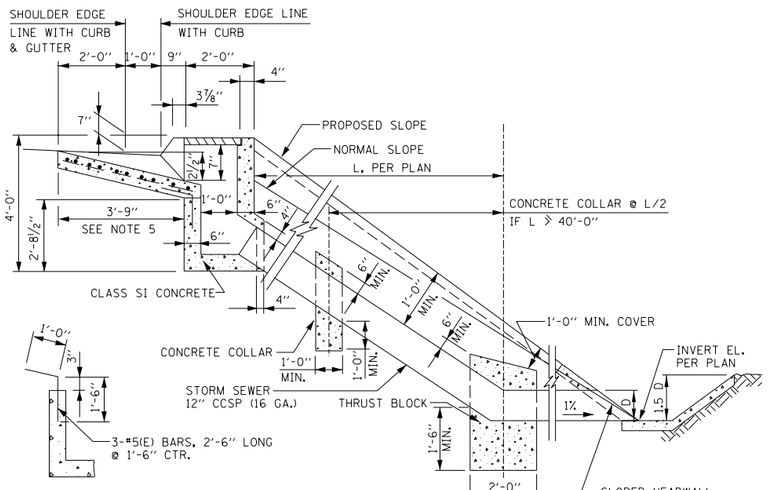


SECTION A2-A2

FRAME AND GRATE DETAIL



TYPICAL REINFORCEMENT AROUND STORM SEWER PIPE



BAR INSTALLATION DETAIL

SECTION B1-B1

SLOPE DRAIN INLET

NOTES FOR SLOPE DRAIN INLET:

1. THE LOCATION OF THE SLOPE DRAIN INLET SHALL BE AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. THE INLET MUST BE LOCATED IN THE FIELD TO CLEAR THE POST SPACING OF EXISTING OR PROPOSED GUARDRAIL. WHERE CONDITIONS REQUIRE THAT THE SLOPE DRAIN INLET BE LOCATED ADJACENT TO A GUARDRAIL ANCHOR INSTALLATION, THE SLOPED DRAIN INLET MUST BE CONSTRUCTED OUTSIDE THE LIMIT OF THE ANCHOR INSTALLATION.
2. INLET CONSTRUCTION EXCLUSIVE OF P.C.C. APRON SHALL BE COMPLETED PRIOR TO SHOULDER OVERLAY. CONSTRUCTION OF P.C.C. APRON SHALL FOLLOW SHOULDER OVERLAY.
3. THE MATERIALS AND CONSTRUCTION OF THE INLET SHALL CONFORM TO THE APPLICABLE PORTIONS OF THE STANDARD SPECIFICATIONS AND THE SPECIAL PROVISIONS.
4. THE CONCRETE CURB WITHIN THE P.C.C. APRON WILL TRANSITION TO MATCH THE SHAPE OF ABUTTING CURBS.
5. INCREASE NORMAL SHOULDER SLOPE WITHIN LIMITS OF P.C.C. APRON AND SHAPE TO DRAIN INTO INLET OPENING. THE INLET OPENING SHALL BE 2½" BELOW THE NORMAL SHOULDER EDGE ELEVATION.
6. GALVANIZED STEEL COVER PLATE SHALL CONFORM TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS.
7. EXPANDED METAL FABRIC OF EQUAL STRENGTH MAY BE USED IN LIEU OF WELDED WIRE FABRIC SUBJECT TO ENGINEER'S APPROVAL.
8. PRECAST CONCRETE UNITS FOR SLOPE DRAIN INLET WILL BE ACCEPTABLE PROVIDED THEY MEET ALL THE REQUIREMENTS SHOWN ON THIS DRAWING. FABRICATION DRAWINGS SHOWING PIPE OPENINGS, REINFORCEMENT AND OTHER PERTINENT DIMENSIONS WILL BE REQUIRED FOR EACH UNIT, FOR APPROVAL BY THE ENGINEER PRIOR TO FABRICATION.
9. REINFORCEMENT BARS AND WELDED WIRE FABRIC DESIGNAT.

NOTES FOR CATCH BASIN TYPE B:

1. THE LOCATION OF THE CATCH BASIN SHALL BE AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
2. FOR MATERIALS AND CONSTRUCTION REQUIREMENTS OF THE CATCH BASIN, REFER TO THE STANDARD SPECIFICATIONS.
3. FRAME AND GRATE FOR CATCH BASIN TYPE B SHALL BE NEENAH FOUNDRY COMPANY TYPE R-3455C OR APPROVED EQUAL.
4. AT LOCATIONS WHERE EXISTING UNDERDRAINS AND/OR STORM SEWER PIPES ARE TO BE CONNECTED TO THE NEW CATCH BASIN, THE REMOVAL OF EXISTING PIPES, FURNISHING OF NEW PIPE SECTIONS OF THE SAME SIZE AND OTHER MATERIALS NECESSARY FOR THE CONNECTIONS SHALL BE INCIDENTAL TO THE COST OF CATCH BASIN TYPE B.
5. PRECAST CONCRETE UNITS FOR CATCH BASIN WILL BE ACCEPTABLE PROVIDED THEY MEET ALL THE REQUIREMENTS AS SHOWN ON THIS DRAWING. BASE EXTENSION OF 3" NOT REQUIRED FOR PRECAST UNITS. FABRICATION DRAWINGS SHOWING PIPE OPENINGS, REINFORCEMENT AND OTHER PERTINENT DIMENSIONS WILL BE REQUIRED FOR EACH UNIT, FOR APPROVAL BY THE ENGINEER PRIOR TO FABRICATION.
6. REINFORCEMENT BARS DESIGNATED (E) SHALL BE EPOXY COATED.

CATCH BASIN TYPE B

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

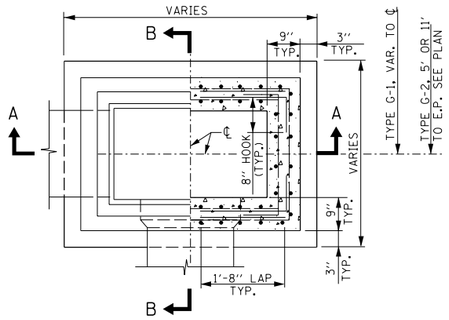
CATCH BASIN TYPE B AND SLOPE DRAIN INLET

DATE	STANDARD NO.
5-12-2005	SD 05-21C

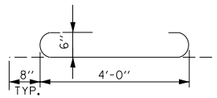
REVISIONS

NOTES:

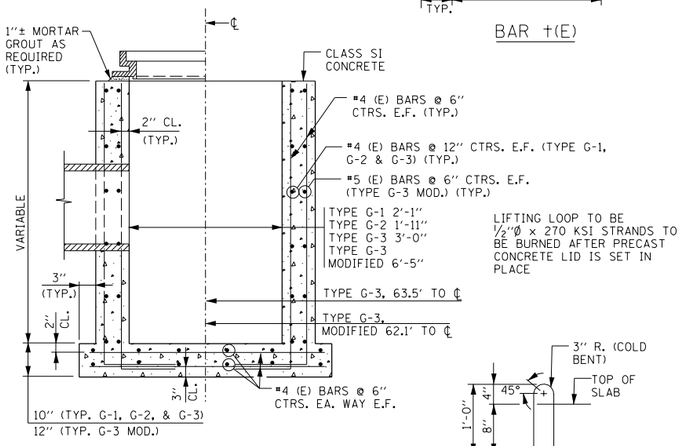
1. PRECAST CONCRETE UNITS WILL BE ACCEPTABLE PROVIDED THEY MEET ALL THE REQUIREMENTS AS SHOWN ON THIS DRAWING. BASE EXTENSION OF 3" NOT REQUIRED FOR PRECAST UNITS. FABRICATION DRAWINGS SHOWING PIPE OPENINGS, REINFORCEMENT AND OTHER PERTINENT DIMENSIONS WILL BE REQUIRED FOR EACH UNIT, FOR APPROVAL BY THE ENGINEER PRIOR TO FABRICATION.
2. CATCH BASINS TYPE G-SERIES SHALL BE USED IN THE SWALE ON THE HIGH SIDE OF SUPERELEVATED PAVEMENT.
3. CATCH BASINS TYPE G-2 SHALL BE USED ALONG RAMPS WHERE G-2 GUTTER IS PROVIDED.
4. CATCH BASINS TYPE G-3 SHALL BE USED WHERE G-3 GUTTER IS PROVIDED.
5. CATCH BASINS TYPE G-3 MODIFIED SHALL BE USED IN PAVEMENT SECTIONS AND ON THE LOW SIDE OF SUPERELEVATED PAVEMENT.
6. CATCH BASINS TYPE G-3 MODIFIED SHALL BE PROVIDED WITH A REINFORCED CONCRETE SLAB TOP AS DETAILED ON THIS DRAWING.
7. TYPE S FRAME AND GRATE SHALL BE NEENAH R-3338-F MODIFIED BY THE ADDITION OF THE FOURTH SIDE OF THE FRAME, OR APPROVED EQUAL.
8. REFER TO STANDARD SD XX-211 (FRAME AND GRATE TYPE S, REINFORCED CONCRETE LID FOR TYPES G-3 & S FRAMES) FOR FRAME AND GRATE DETAILS.
9. TYPE G-2 FRAME AND GRATE SHALL BE NEENAH R-3508-A2 OR APPROVED EQUAL.
10. TYPE G-3 FRAME AND GRATE SHALL BE NEENAH INLET FOR ROLL TYPE CURB R-3501-U OR EAST JORDAN IRON WORKS 10004 OR APPROVED EQUAL.
11. TYPE G-3, MODIFIED FRAME AND GRATE SHALL BE NEENAH INLET FOR ROLL TYPE CURB SPECIAL R-3501-U1 OR APPROVED EQUAL.
12. MORTAR OR SEALER SHALL BE USED WHEN A PRECAST REINFORCED CONCRETE LID IS USED.
13. REINFORCEMENT BARS DESIGNATED (E) SHALL BE EPOXY COATED.



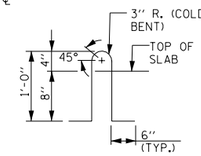
HALF PLAN



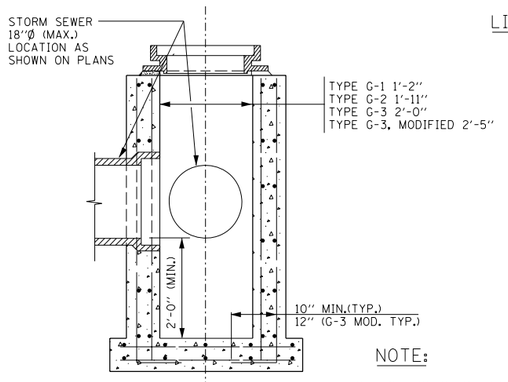
BAR t(E)



SECTION A-A



LIFTING LOOP DETAIL

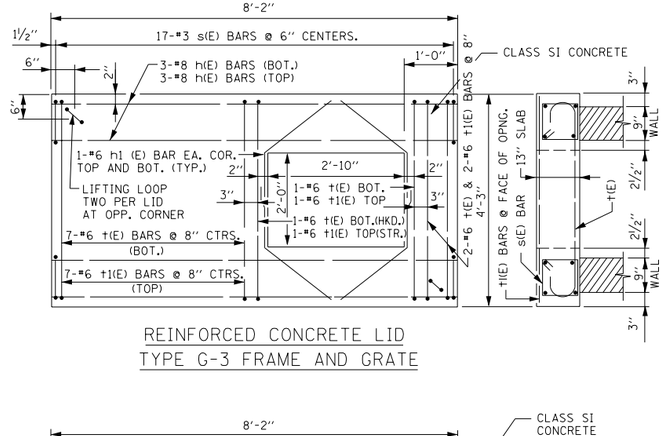


SECTION B-B

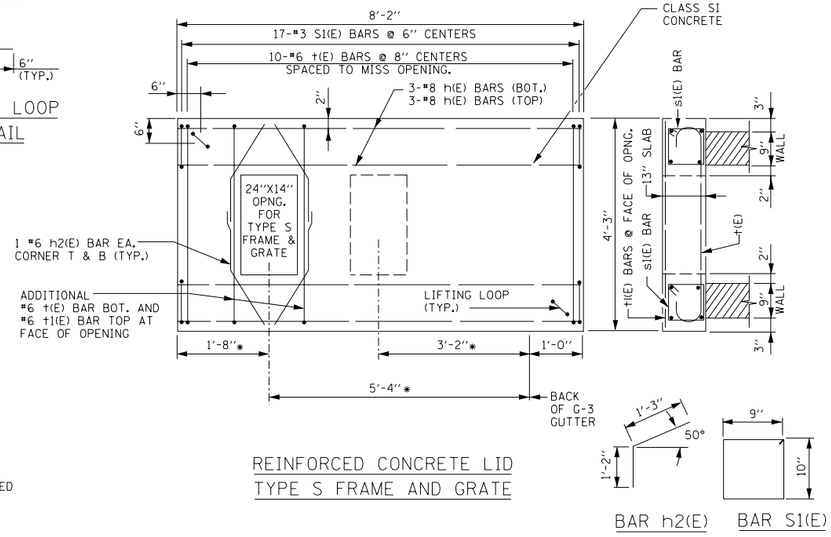
NOTE:

* POSITION OF OPENING VARIES FROM 3'-2" TO 5'-4" MEASURED FROM BACK OF GUTTER LINE

CATCH BASIN TYPE "G" SERIES



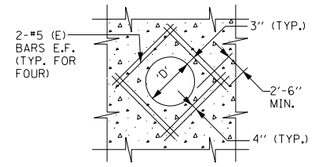
REINFORCED CONCRETE LID
TYPE G-3 FRAME AND GRATE



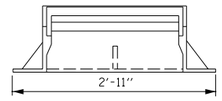
REINFORCED CONCRETE LID
TYPE S FRAME AND GRATE

BAR h2(E) BAR S1(E)

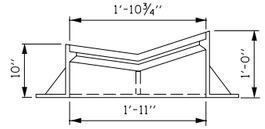
DRAINAGE STRUCTURE TYPE G-3, MODIFIED



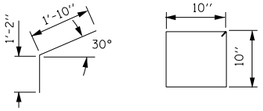
TYPICAL REINFORCEMENT
AROUND STORM SEWER PIPE



SECTION Y-Y

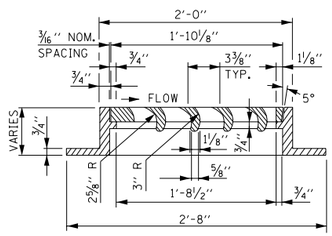


SECTION Z-Z

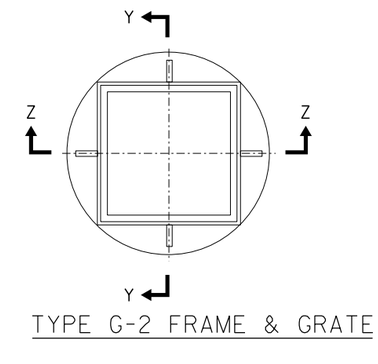


BAR h1(E)

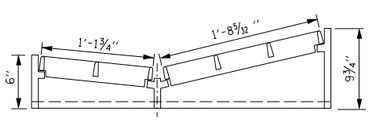
BAR s(E)



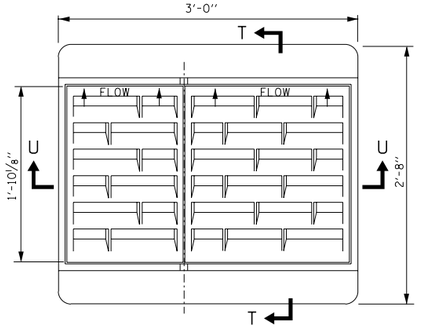
SECTION T-T



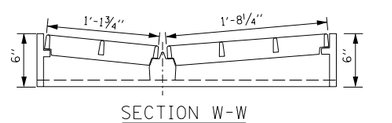
TYPE G-2 FRAME & GRATE



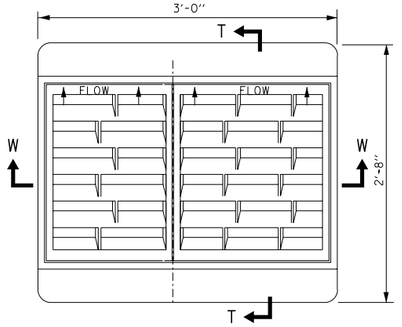
SECTION U-U



TYPE G-3 FRAME & GRATE



SECTION W-W



TYPE G-3, MODIFIED
FRAME & GRATE

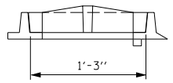
APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

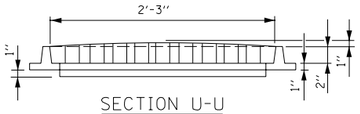
CATCH BASINS TYPES G & TYPE G MODIFIED, FRAMES AND GRATES TYPE G-2, G-3 & G-3 MODIFIED

DATE	STANDARD NO.
5-12-2005	SD 05-21F

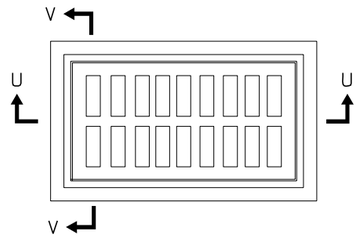
REVISIONS



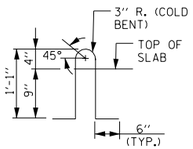
SECTION V-V



SECTION U-U

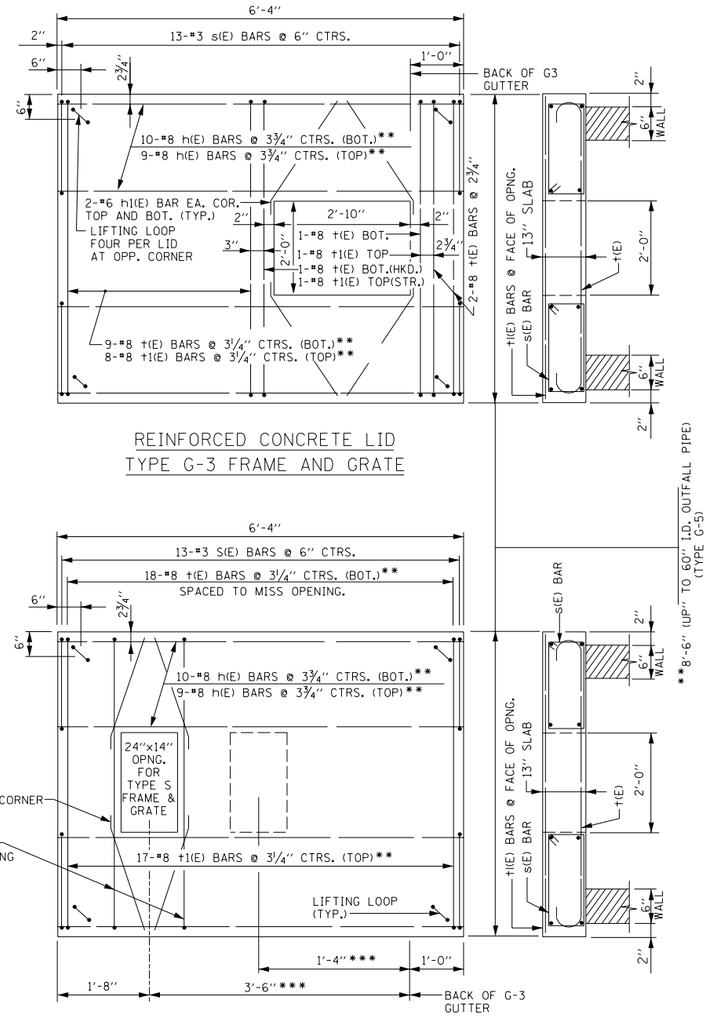


TYPE S FRAME & GRATE



LIFTING LOOP DETAIL

LIFTING LOOP TO BE ½"Ø x 270 KSI STRANDS TO BE BURNED AFTER PRECAST CONCRETE LID IS SET IN PLACE.

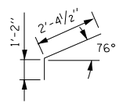


REINFORCED CONCRETE LID
TYPE G-3 FRAME AND GRATE

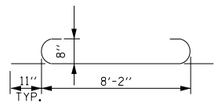
NOTE:

***POSITION OF OPENING VARIES FROM 1'-4" TO 3'-6" MEASURED FROM BACK OF GUTTER LINE

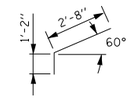
REINFORCED CONCRETE LID
TYPE S FRAME AND GRATE



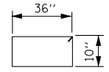
BAR h2(E)



BAR t(E)



BAR h1(E)



BAR s(E)

NOTES:

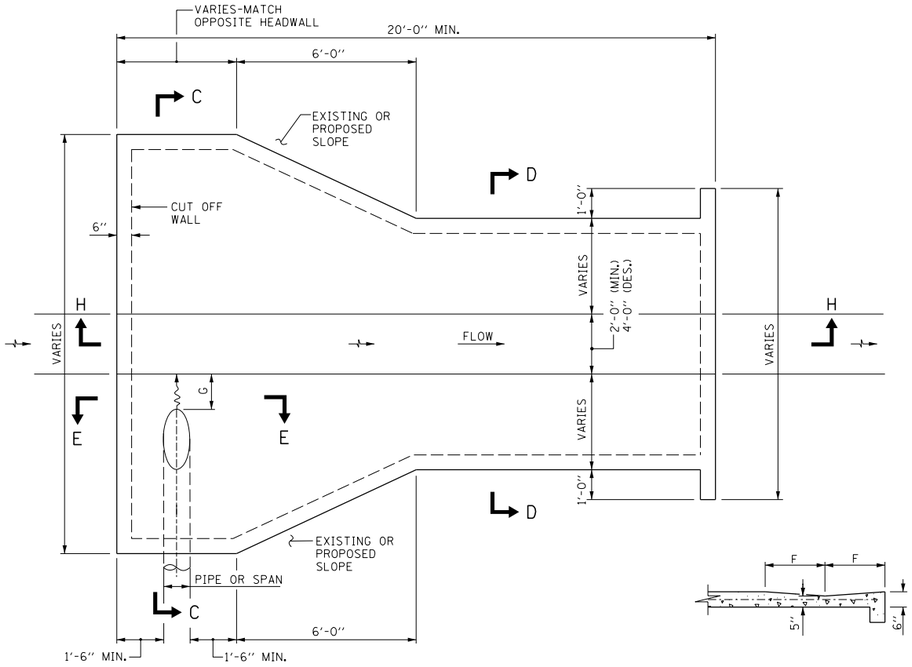
1. PRECAST CONCRETE UNITS WILL BE ACCEPTABLE PROVIDED THEY MEET ALL THE REQUIREMENTS AS SHOWN ON THIS DRAWING. FABRICATION DRAWINGS SHOWING PIPE OPENINGS AND OTHER PERTINENT DIMENSIONS WILL BE REQUIRED FOR EACH UNIT, FOR APPROVAL BY THE ENGINEER PRIOR TO FABRICATION.
2. TYPE S FRAME AND GRATE SHALL BE NEENAH R-3338-F MODIFIED BY THE ADDITION OF THE FOURTH SIDE OF THE FRAME, OR APPROVED EQUAL. WEIGHT=210 LBS.
3. TYPE G-3 FRAME AND GRATE SHALL BE NEENAH INLET FOR ROLL TYPE CURB R-3501-U (WEIGHT=475 LBS.) OR EAST JORDAN IRON WORKS 10004 OR APPROVED EQUAL.
4. REFER TO STANDARD SD XX-21F (CATCH BASINS TYPES G & TYPE G MODIFIED, FRAMES AND GRATES TYPE G-2, G-3 & G-3 MODIFIED) FOR FRAME AND GRATE DETAILS.
5. REINFORCEMENT BARS DESIGNATED (E) SHALL BE EPOXY COATED.
6. MORTAR OR SEALER SHALL BE USED WHEN A PRECAST REINFORCED CONCRETE LID IS USED.

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

FRAME AND GRATE TYPE S, REINFORCED CONCRETE LID FOR TYPES G-3 & S FRAMES

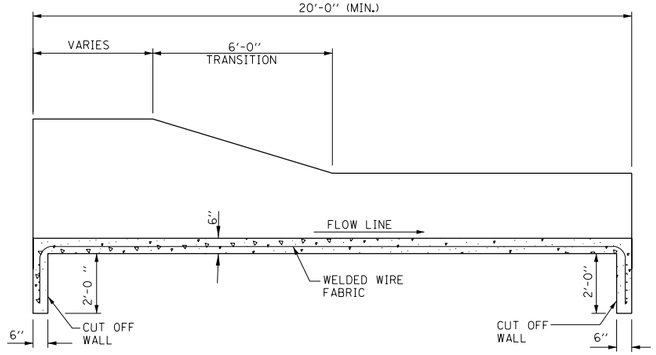
DATE	STANDARD NO.
5-12-2005	SD 05-21I



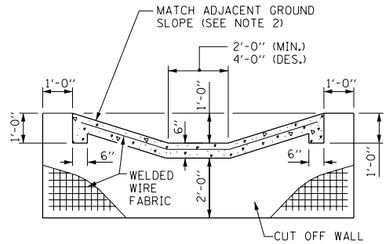
PLAN

F = ½" DIA. (PIPE) + 1'-0" (MIN.)

SECTION E-E



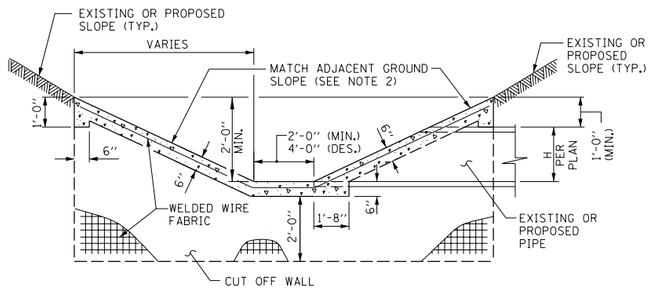
SECTION H-H



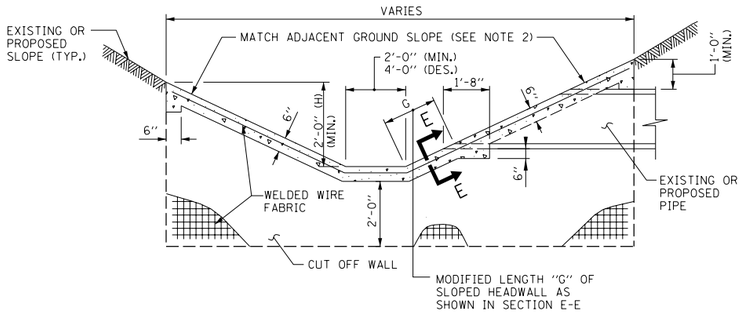
SECTION D-D

NOTES:

1. CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
2. THE SLOPED HEADWALL TYPE IV SHALL BE CONSTRUCTED FLUSH WITH EXISTING OR PROPOSED SLOPE.
3. THE SLOPED HEADWALL DETAILS SHOWN IN THIS DRAWING ARE FOR USE ONLY WITH PIPES HAVING DIAMETER OR SPAN OF 18" OR LESS AND SHALL NOT BE USED WHEN THE PIPE OPENING IS FACING THE TRAFFIC UNLESS THE LOCATION IS OUTSIDE THE REQUIRED CLEAR ZONE.
4. WELDED WIRE FABRIC SHALL BE 6"X6" W4×W4, 58 LBS. PER 100 SQ. FT.
5. QUANTITIES FOR CONCRETE HEADWALLS AND COLLARS (CLASS SI) AND WELDED WIRE FABRIC SHOWN IN THE SCHEDULES OF QUANTITIES ARE BASED ON THE FOLLOWING:
   A. DIMENSION "G" IS 0'-0".
   B. DIMENSION "H" IS 1'-0".
   C. PAVED DITCH LENGTH IS 20'-0".
   D. PAVED DITCH BOTTOM SHALL MATCH EXISTING OR PROPOSED DITCH, 2'-0" OR 4'-0".
   E. BACKSLOPE AND FORESLOPE ARE THE SAME. ADJUSTMENT TO QUANTITIES FOR SLOPED HEADWALLS WITH DIMENSIONS OR BACKSLOPE / FORESLOPE COMBINATIONS OTHER THAN ABOVE SHALL BE INDICATED ON THE PLANS.



SECTION C-C
DETAIL FOR PIPE AT DITCH FLOW LINE



SECTION C-C
DETAIL FOR PIPE ABOVE DITCH FLOW LINE

QUANTITIES FOR SLOPED HEADWALLS TYPE IV

(SEE NOTE 5)

SLOPE	PIPE DIA.	CONCRETE HEADWALLS AND COLLARS (CLASS SI) (CUBIC YARDS) 2'-0" BOTTOM	CONCRETE HEADWALLS AND COLLARS (CLASS SI) (CUBIC YARDS) 4'-0" BOTTOM	WELDED WIRE FABRIC (SQUARE FEET) 2'-0" BOT.	WELDED WIRE FABRIC (SQUARE FEET) 4'-0" BOT.
3:1	6"	5.41	6.45	239	295
	12"	5.61	6.64	251	307
	15"	5.80	6.84	262	318
	18"	6.01	7.05	274	330
4:1	6"	6.68	7.03	297	353
	12"	6.93	7.97	312	368
	15"	7.19	8.23	327	383
	18"	7.47	8.51	343	399
6:1	6"	9.26	10.30	414	470
	12"	9.63	10.67	437	493
	15"	10.02	11.05	459	515
	18"	10.42	11.46	483	539

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

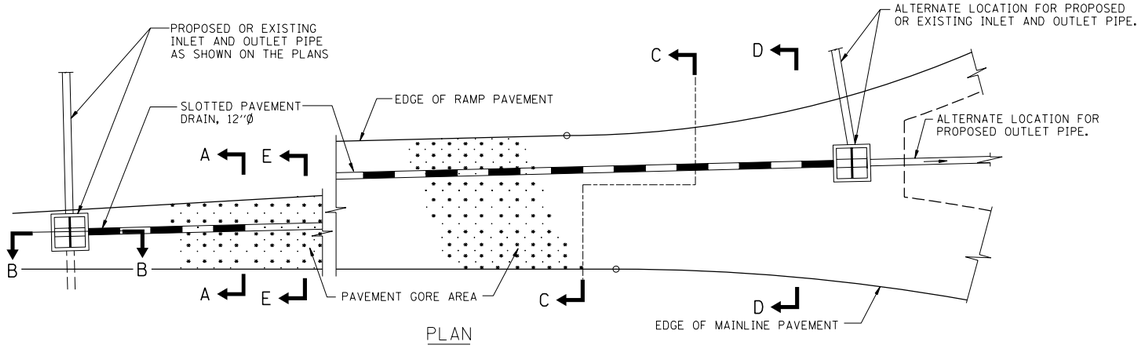
Illinois Tollway
Open Roads for a Faster Future

SLOPED HEADWALLS
TYPE IV DETAILS

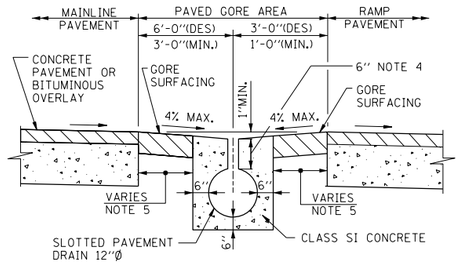
DATE 5-12-2005

STANDARD NO. SD 05-24A

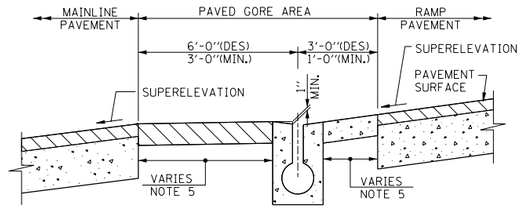
REVISIONS



PLAN

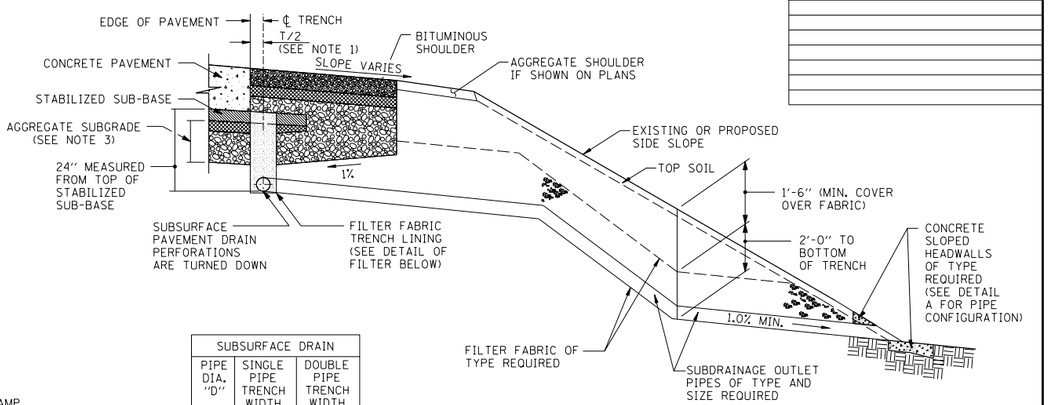


SECTION A-A



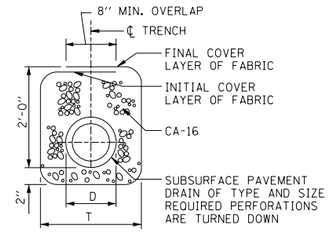
SECTION E-E

RAMP ON OUTSIDE OF SUPERELEVATED MAINLINE SECTION



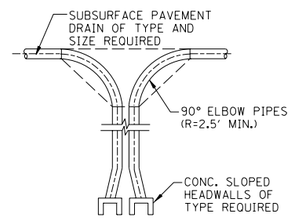
DETAIL OF SUBSURFACE PAVEMENT DRAIN (FILTER FABRIC)

SUBSURFACE DRAIN		
PIPE DIA. "D"	SINGLE PIPE TRENCH WIDTH "T"	DOUBLE PIPE TRENCH WIDTH "T"
4"	12"	20"
6"	14"	24"
8"	16"	28"

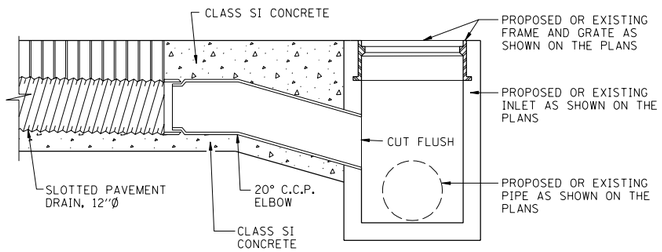


DETAIL OF FILTER

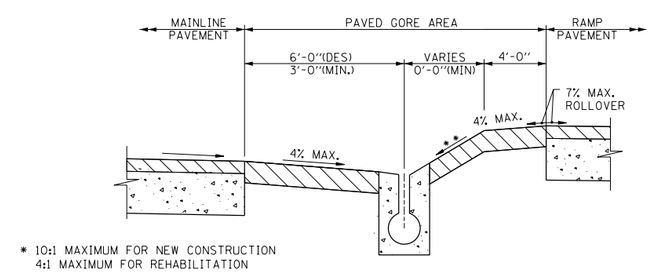
(SEE NOTE 2)



DETAIL A



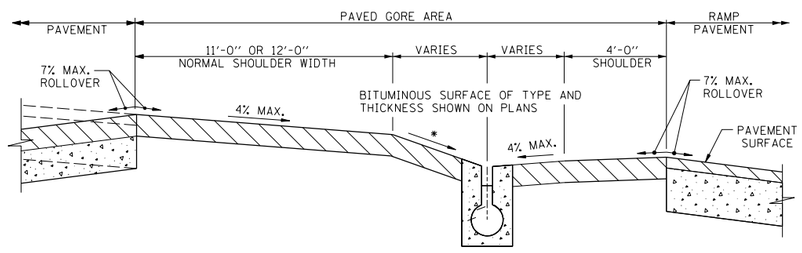
SECTION B-B



* 10:1 MAXIMUM FOR NEW CONSTRUCTION
4:1 MAXIMUM FOR REHABILITATION

** 4% DESIRABLE FOR NEW CONSTRUCTION
10:1 MAXIMUM FOR NEW CONSTRUCTION
4:1 MAXIMUM FOR REHABILITATION

SECTION C-C



SECTION D-D

DETAIL OF SLOTTED PAVEMENT DRAIN

NOTES FOR SLOTTED PAVEMENT DRAIN:

1. SLOTTED PAVEMENT DRAINS SHALL BE 12" DIA. 16 GAUGE, FULL BITUMINOUS COATED WITH PAVED INVERT UNLESS OTHERWISE SPECIFIED.
2. SLOTTED PAVEMENT DRAINS SHALL BE INSTALLED IN A CONTOURED TRENCH AND BACKFILLED WITH CLASS SI CONCRETE.
3. THE UPSTREAM END OF EACH SLOTTED PAVEMENT DRAIN, 12" DIA, INSTALLATION SHALL BE SEALED WITH A WELDED END PLATE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS, UNLESS CONNECTED TO A DRAINAGE STRUCTURE.
4. DEPTH OF SLOT CAN BE VARIED FROM 6" MINIMUM TO 12" MAXIMUM TO INCREASE SLOPE OF PIPE AS DETAILED FOR EACH SITE.
5. WHEN THE CONCRETE ENCASEMENT FOR SLOTTED PAVEMENT DRAIN IS WITHIN 3 FEET OF THE PAVEMENT, REPLACE THE GORE SURFACING WITH CLASS SI CONCRETE 9 IN. DEPTH.

NOTES FOR SUBSURFACE PAVEMENT DRAIN (FILTER FABRIC):

1. WHEN LOCATED ALONG EXISTING PAVEMENT THE CENTERLINE OF THE PROPOSED SUBSURFACE PAVEMENT DRAIN SHALL NOT BE CLOSER THAN 2'-9" TO THE EDGE OF EXISTING PAVEMENT.
2. AT OUTLET LOCATIONS, SUBDRAINAGE OUTLET PIPES SHALL SEPARATE SUFFICIENTLY TO PROVIDE SPACE FOR TWO END SECTIONS TO BE CONNECTED SEE DETAIL A. ADDITIONAL GRANULAR BACKFILL AND FILTER FABRIC SHALL BE INCIDENTAL TO THE SUBDRAINAGE OUTLET PIPE OF TYPE AND SIZE REQUIRED.
3. AGGREGATE SUBGRADE SHALL CONSIST OF A 3" CA-6 CAP ABOVE A PGE BASE, THICKNESS AS NOTED IN THE PLANS.

NOTE TO DSE

THIS BASE SHEET SHOWS TYPICAL NEW CONSTRUCTION BUT IT IS NOT A STANDARD DRAWING. IT REQUIRES COMPLETION BY THE DSE PRIOR TO INSERTION INTO A CONTRACT. MICROSTATION FILES ARE CONTAINED W/IN THE ICAPP MANUAL RESOURCE CD OR AVAILABLE FROM THE AUTHORITY. THE DSE SHALL ACCEPT THE RESPONSIBILITY OF THE DESIGN OF THIS SHEET UPON ITS COMPLETION & INSERTION INTO A CONTRACT. THIS "NOTE TO DSE" SHALL BE REMOVED BY THE DSE PRIOR TO INSERTION OF THE SHEET INTO THE PLAN SET.

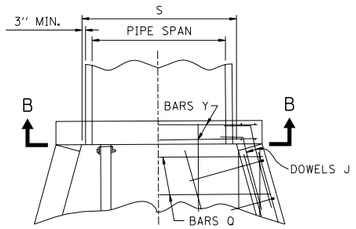
APPROVED Jeff Daley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

SUBSURFACE PAVEMENT DRAIN (FILTER FABRIC) AND SLOTTED PAVEMENT DRAIN

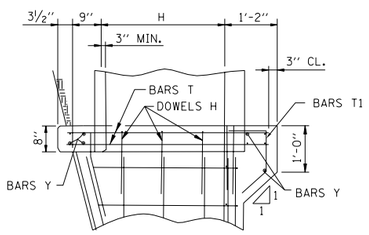
DATE	STANDARD NO.
5-12-2005	BASE SHEET

REVISIONS

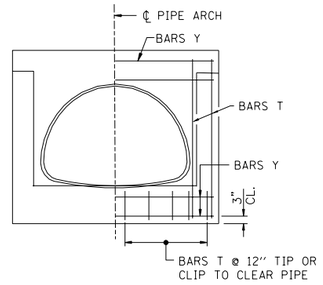


HALF PLAN SHOWING DIMENSIONS

HALF PLAN SHOWING REINFORCING BARS

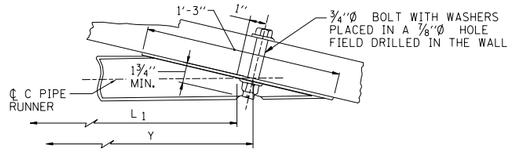


ELEVATION

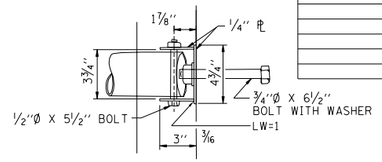


SECTION B-B

PIPE ARCH CULVERT DETAILS



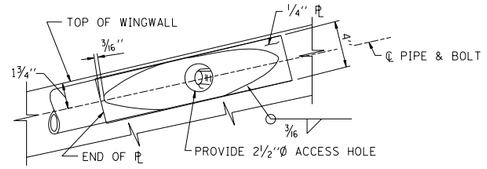
SECTION AT WING



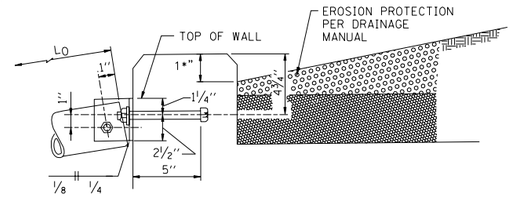
PLAN AT HEADWALL

NOTE:

A ¾"Ø X 9½" BOLT WITH ADDITIONAL ℙ WASHER PLACED IN A ⅞"Ø HOLE DRILLED THROUGH THE HEADWALL OR A ¾"Ø X 8" THREADED ROD EPOXY GROUTED IN A ⅞"Ø HOLE WITH A MINIMUM EMBEDMENT OF 6⅝" MAY BE USED IN LIEU OF CAST-IN-PLACE BOLT SHOWN.



ELEVATION AT WING



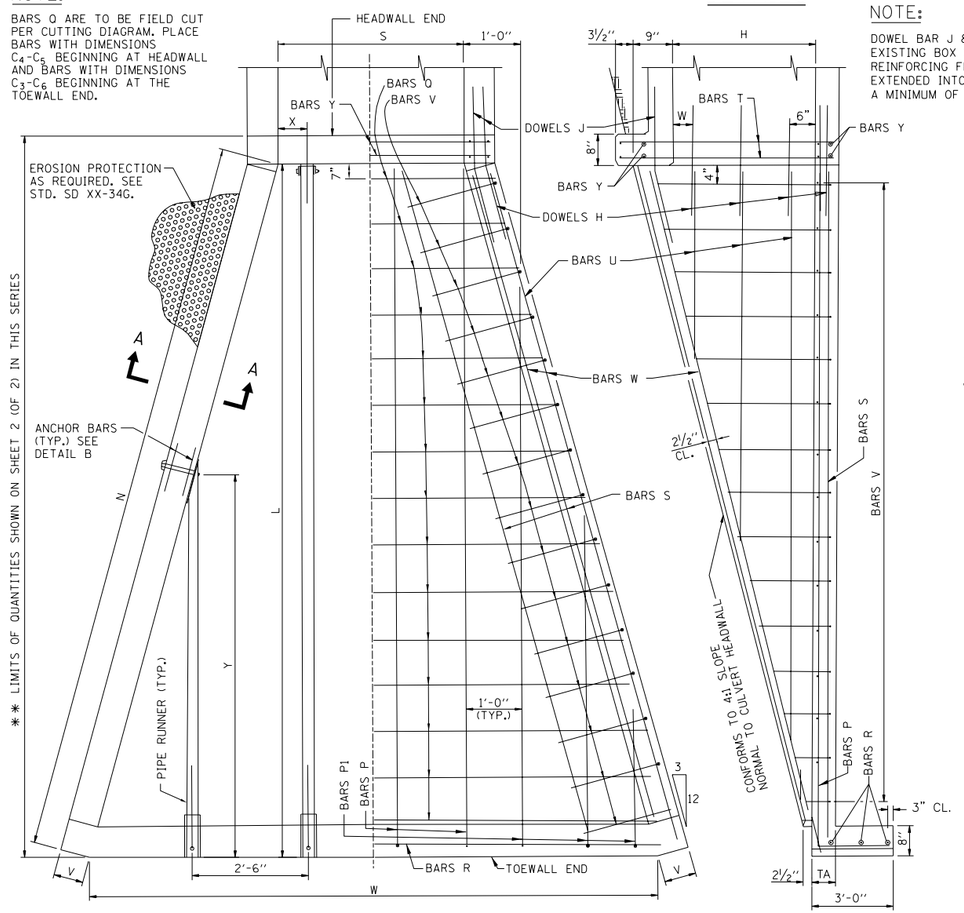
ELEVATION AT HEADWALL

NOTE:

BARS Q ARE TO BE FIELD CUT PER CUTTING DIAGRAM. PLACE BARS WITH DIMENSIONS C_4-C_5 BEGINNING AT HEADWALL AND BARS WITH DIMENSIONS C_3-C_6 BEGINNING AT THE TOEWALL END.

NOTE:

DOWEL BAR J & H NOT REQUIRED WITH EXISTING BOX CULVERTS PROVIDING THE REINFORCING FROM THE EXISTING BOX IS EXTENDED INTO THE NEW CONCRETE A MINIMUM OF 1'-3".



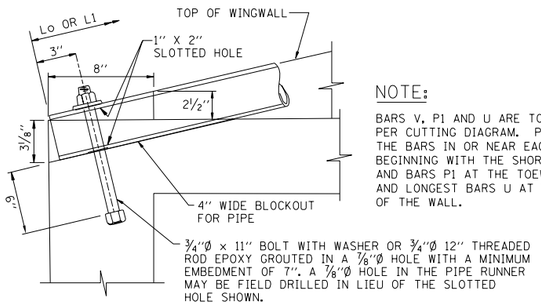
HALF PLAN SHOWING DIMENSIONS

HALF PLAN SHOWING REINFORCING BARS

ELEVATION PARALLEL TO BARREL

** DOWEL BARS EXTENDING INTO THE CONCRETE BOX CULVERT ARE INCLUDED IN THE QUANTITIES

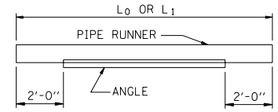
BOX CULVERT DETAILS

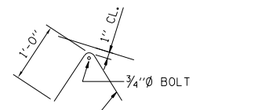


SECTION THRU TOEWALL

NOTE:

BARS V, P1 AND U ARE TO BE FIELD CUT PER CUTTING DIAGRAM. PLACE ONE-HALF THE BARS IN OR NEAR EACH WINGWALL BEGINNING WITH THE SHORTEST BARS V AND BARS P1 AT THE TOEWALL END AND LONGEST BARS U AT THE BOTTOM OF THE WALL.



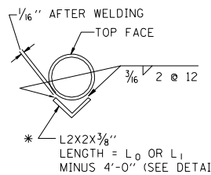


ANCHOR BARS
CONTRACTOR SHALL PROVIDE 2-#3 ANCHOR BARS PER SIDEWALL BOLT.

DETAIL A

DETAIL B

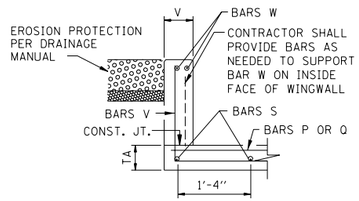
PIPE RUNNER DETAILS



* NOTE:

WHERE L_O OR L_1 EXCEEDS THE FOLLOWING LENGTH, THE PIPE RUNNER SHALL BE STRENGTHENED OVER THE MIDSPAN AS SHOWN.

PIPE	LENGTH
3"Ø, SCH. 40	12'-8"



SECTION A-A

S = DESIGN SPAN

H = DESIGN HEIGHT

GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS SI.
2. ALL EXPOSED CONCRETE EDGES SHALL HAVE A ¾" x 45° CHAMFER. CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF ONE FOOT BELOW FINISHED GROUND LEVEL. COVER FROM THE FACE OF CONCRETE TO THE FACE OF REINFORCEMENT BARS SHALL BE 2", UNLESS OTHERWISE SHOWN.
3. CONCRETE QUANTITIES SHOWN ON SHEET 2 (OF 2) IN THIS SERIES ARE FOR REINFORCED CONCRETE BOX CULVERT SECTIONS AND ADDITIONAL CONCRETE REQUIRED IN HEADWALLS FOR PIPE OR ARCH CULVERT SECTIONS SHALL BE ADDED TO THESE QUANTITIES.
4. THIS STANDARD MAY BE USED FOR CULVERTS WITH SKEW OF 0° ± 7.5°.
5. DESIGN: SAFETY PIPE RUNNERS ARE DESIGNED FOR A TRANSVERSING LOAD OF 1,800 POUNDS AT YIELD AS RECOMMENDED BY RESEARCH REPORT 280-1, SAFETY TREATMENT OF ROADSIDE CROSS DRAINAGE STRUCTURES, TEXAS TRANSPORTATION INSTITUTE, MARCH 1981.

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

SAFETY END TREATMENT FOR SINGLE CULVERTS
0° SKEW 4:1 SLOPE H ≤ 4'

DATE	STANDARD NO.
5-12-2005	SD 05-34A

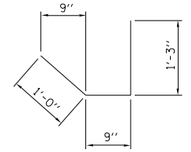
REVISIONS

CULVERT SIZE	TABLE OF DIMENSIONS							TOTAL QUANTITIES ONE END				PIPE RUNNERS FOR ONE END - SIZE 3" DIA.			
								CONC.	RE-BAR	PIPE RUNNER	RIPRAP HAND-LAID	HEADWALL PIPE		WINGWALL PIPE	
S x H	L	N	V	W	TA	X	Y	CU. YD.	LBS.	FT.	SQ. YD.	NO.	LO	NO.	LI
3 x 2	10'-10"	11'-2"	7"	8'-5"	6"	0'-3"	--	2.8	346	22.16	5.1	2	11'-1"	0	--
3 x 3	14'-10"	15'-3½"	7"	10'-5"	6"	1'-6"	10'-10"	4.4	489	37.50	6.5	1	15'-2"	2	11'-2"
4 x 2	10'-10"	11'-2"	7"	9'-5"	6"	0'-9"	--	3.0	372	22.16	5.3	2	11'-1"	0	--
4 x 3	14'-10"	15'-3½"	7"	11'-5"	6"	2'-0"	12'-10"	4.7	521	41.50	6.7	1	15'-2"	2	13'-2"
4 x 4	18'-10"	19'-5"	7"	13'-5"	6"	0'-9"	11'-10"	6.7	727	63.00	8.1	2	19'-4"	2	12'-2"
5 x 2	10'-10"	11'-2"	7"	10'-5"	6"	1'-3"	5'-10"	3.2	397	34.16	5.5	2	11'-1"	2	6'-0"
5 x 3	14'-10"	15'-3½"	7"	12'-5"	6"	1'-3"	9'-10"	4.9	554	50.50	6.9	2	15'-2"	2	10'-1"
5 x 4	18'-10"	19'-5"	7"	14'-5"	6"	1'-3"	13'-10"	7.0	765	67.17	8.3	2	19'-4"	2	14'-3"
6 x 3	14'-10"	15'-3½"	7"	13'-5"	6"	1'-9"	11'-10"	5.1	586	54.67	7.0	2	15'-2"	2	12'-2"
6 x 4	18'-10"	19'-5"	7"	15'-5"	6"	0'-6"	10'-10"	7.2	803	80.33	8.5	3	19'-4"	2	11'-2"
7 x 3	14'-10"	15'-3½"	7"	14'-5"	6½"	2'-3"	13'-10"	5.6	618	58.83	7.2	2	15'-2"	2	14'-3"
7 x 4	18'-10"	19'-5"	7"	16'-5"	6½"	1'-0"	12'-10"	7.8	839	84.33	8.6	3	19'-4"	2	13'-2"
8 x 4	18'-10"	19'-5"	7"	17'-5"	7"	0'-3"	9'-10"	8.4	877	97.50	8.8	4	19'-4"	2	10'-1"

PIPE ARCH AND ELLIPTICAL PIPE CULVERTS

FOR PIPE ARCH OR ELLIPTICAL PIPE CULVERTS SELECT APPROPRIATE "S" & "H" FROM SIZES SHOWN. ADD THE FOLLOWING ADDTITIONAL BARS:

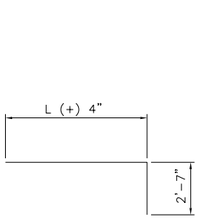
(a) 1 ADDITIONAL Y BAR
(b) #4 - T1 BARS @ APPROX. 12" CTS. (NO. = S + 2)



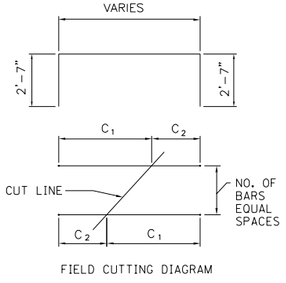
T1 BARS

THE WEIGHT OF THE ADDITIONAL BARS AND THE ADDITIONAL QUANTITY OF CONCRETE IN THE HEADWALL SHALL BE ADDED TO THE QUANTITIES SHOWN.

CULVERT SIZE	TABLE OF REINFORCING STEEL FOR ONE END																														
	DOWEL H #4 @ 12"		DOWEL J #6		BARS P #4 @ 12"		BARS P_1 #4 @ 12"				BARS Q #4 @ 12"						BARS R 3-#4	BARS S 4-#4	BARS U #4 @ 12"				BARS V #4 @ 12"				4 BARS W		BARS Y 8-#5	BARS T 8-#5
S x H	NO.	LENGTH.	NO.	LENGTH.	NO.	LENGTH.	NO.	C_1	C_2	LENGTH.	NO.	C_3	C_4	C_5	C_6	LENGTH.	LENGTH.	LENGTH.	NO.	C_7	C_8	LENGTH.	NO.	C_9	C_{10}	LENGTH.	SIZE	LENGTH.	LENGTH.	LENGTH.
3 x 2	6	2'-6"	4	4'-0"	4	13'-9"	2	8'-4"	4'-4"	17'-10"	5	8'-8"	4'-2"	6'-2"	6'-8"	12'-10"	8'-9"	11'-6"	2	8'-7"	4'-5"	13'-0"	10	2'-9"	6"	6'-3"	#5	10'-4"	3'-8"	3'-2"
3 x 3	8	2'-6"	4	4'-0"	4	17'-9"	3	12'-4"	4'-4"	21'-10"	7	10'-8"	4'-2"	7'-2"	7'-8"	14'-10"	10'-9"	15'-7"	3	12'-8"	4'-5"	17'-1"	14	3'-9"	6"	7'-3"	#5	14'-6"	3'-8"	4'-2"
4 x 2	6	2'-6"	4	4'-0"	5	13'-9"	2	8'-4"	4'-4"	17'-10"	5	9'-8"	5'-2"	7'-2"	7'-8"	14'-10"	9'-9"	11'-6"	2	8'-7"	4'-5"	13'-0"	10	2'-9"	6"	6'-3"	#5	10'-4"	4'-8"	3'-2"
4 x 3	8	2'-6"	4	4'-0"	5	17'-9"	3	12'-4"	4'-4"	21'-10"	7	11'-8"	5'-2"	8'-2"	8'-8"	16'-10"	11'-9"	15'-7"	3	12'-8"	4'-5"	17'-1"	14	3'-9"	6"	7'-3"	#5	14'-6"	4'-8"	4'-2"
4 x 4	10	2'-6"	4	4'-0"	5	21'-9"	4	16'-4"	4'-4"	25'-10"	9	13'-8"	5'-2"	9'-2"	9'-8"	18'-10"	13'-9"	19'-9"	4	16'-9"	4'-5"	21'-2"	18	4'-9"	6"	8'-3"	#6	18'-7"	4'-8"	5'-2"
5 x 2	6	2'-6"	4	4'-0"	6	13'-9"	2	8'-4"	4'-4"	17'-10"	5	10'-8"	6'-2"	8'-2"	8'-8"	16'-10"	10'-9"	11'-6"	2	8'-7"	4'-5"	13'-0"	10	2'-9"	6"	6'-3"	#5	10'-4"	5'-8"	3'-2"
5 x 3	8	2'-6"	4	4'-0"	6	17'-9"	3	12'-4"	4'-4"	21'-10"	7	12'-8"	6'-2"	9'-2"	9'-8"	18'-10"	13'-9"	15'-7"	3	12'-8"	4'-5"	17'-1"	14	3'-9"	6"	7'-3"	#5	14'-6"	5'-8"	4'-2"
5 x 4	10	2'-6"	4	4'-0"	6	21'-9"	4	16'-4"	4'-4"	25'-10"	9	14'-8"	6'-2"	10'-2"	10'-8"	20'-10"	15'-9"	19'-9"	4	16'-9"	4'-5"	21'-2"	18	4'-9"	6"	8'-3"	#6	18'-7"	5'-8"	5'-2"
6 x 3	8	2'-6"	4	4'-0"	7	17'-9"	3	12'-4"	4'-4"	21'-10"	7	13'-8"	7'-2"	10'-2"	10'-8"	20'-10"	14'-9"	15'-7"	3	12'-8"	4'-5"	17'-1"	14	3'-9"	6"	7'-3"	#5	14'-6"	6'-8"	4'-2"
6 x 4	10	2'-6"	4	4'-0"	7	21'-9"	4	16'-4"	4'-4"	25'-10"	9	15'-8"	7'-2"	11'-2"	11'-8"	22'-10"	16'-9"	19'-9"	4	16'-9"	4'-5"	21'-2"	18	4'-9"	6"	8'-3"	#6	18'-7"	6'-8"	5'-2"
7 x 3	8	2'-6"	4	4'-0"	8	17'-9"	3	12'-4"	4'-4"	21'-10"	7	14'-8"	8'-2"	11'-2"	11'-8"	22'-10"	15'-9"	15'-7"	3	12'-8"	4'-5"	17'-1"	14	3'-9"	6"	7'-3"	#5	14'-6"	7'-8"	4'-2"
7 x 4	10	2'-6"	4	4'-0"	8	21'-9"	4	16'-4"	4'-4"	25'-10"	9	16'-8"	8'-2"	12'-2"	12'-8"	24'-10"	17'-9"	19'-9"	4	16'-9"	4'-5"	21'-2"	18	4'-9"	6"	8'-3"	#6	18'-7"	7'-8"	5'-2"
8 x 4	10	2'-6"	4	4'-0"	9	21'-9"	4	16'-4"	4'-4"	25'-10"	9	17'-8"	9'-2"	13'-2"	13'-8"	26'-10"	18'-9"	19'-9"	4	16'-9"	4'-5"	21'-2"	18	4'-9"	6"	8'-3"	#6	18'-7"	8'-8"	5'-3"



BARS P

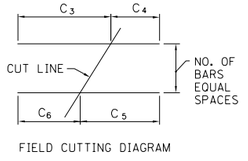


FIELD CUTTING DIAGRAM

BARS P1

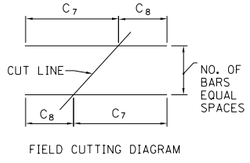
NOTE:

REINFORCEMENT BARS BENDING DIMENSIONS ARE OUT TO OUT.



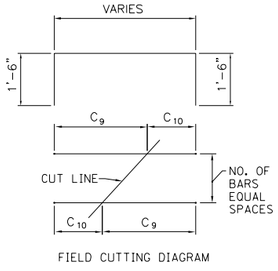
FIELD CUTTING DIAGRAM

BARS Q



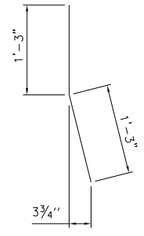
FIELD CUTTING DIAGRAM

BARS U

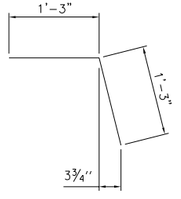


FIELD CUTTING DIAGRAM

BARS V

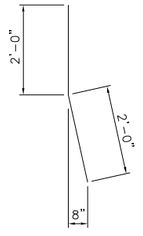


FOR BOX CULVERTS

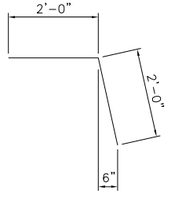


FOR PIPE ARCHES

DOWELS H



FOR BOX CULVERTS



FOR PIPE ARCHES

DOWELS J

SHEET 2 OF 2

APPROVED Jeff Ebersley CHIEF ENGINEER DATE 6-14-2006

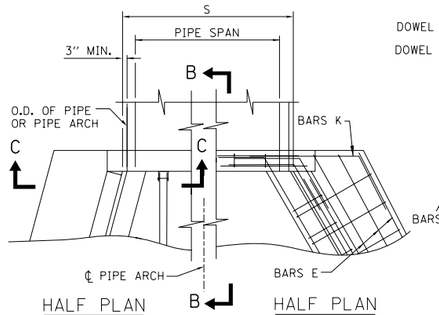
Illinois Tollway
Open Roads for a Faster Future

SAFETY END TREATMENT
FOR SINGLE CULVERTS
0° SKEW 4:1 SLOPE H ≤ 4'

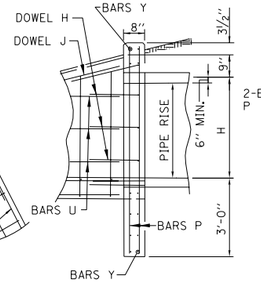
DATE 5-12-2005

STANDARD NO. SD 05-34A

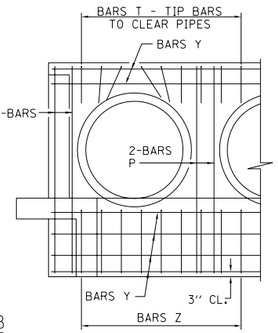
REVISIONS



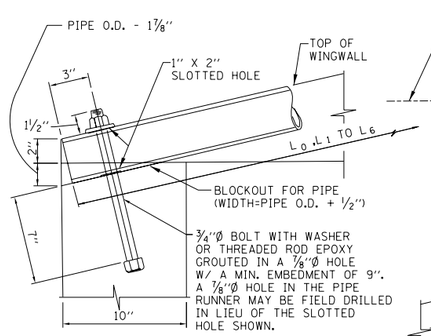
HALF PLAN SHOWING DIMENSIONS



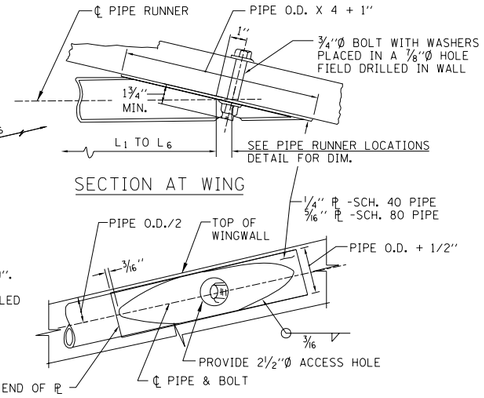
SECTION B-B



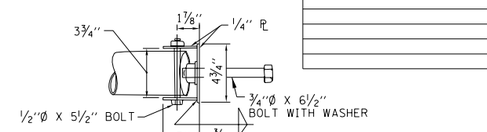
SECTION C-C



SECTION THRU TOEWALL



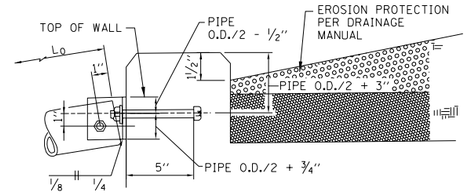
ELEVATION AT WING



PLAN AT HEADWALL

NOTE:

A ¾"Ø X 9½" BOLT WITH ADDITIONAL ℙ WASHER PLACED IN A ⅞"Ø HOLE DRILLED THROUGH THE HEADWALL OR A ¾"Ø X 8" THREADED ROD EPOXY GROUTED IN A ⅞"Ø HOLE WITH A MINIMUM EMBEDMENT OF 6⅝" MAY BE USED IN LIEU OF CAST-IN-PLACE BOLT SHOWN.

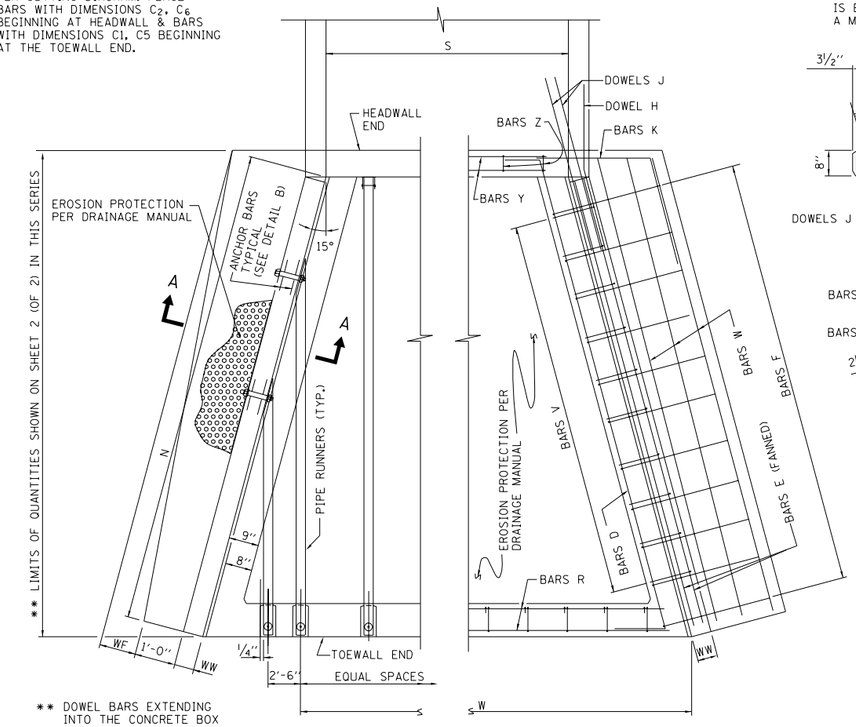


ELEVATION AT HEADWALL

FOR PIPE AND PIPE-ARCH CULVERTS

NOTE:

BAR F & V TO BE FIELD CUT PER CUTTING DIAGRAM. PLACE BARS WITH DIMENSIONS C2, C6 BEGINNING AT HEADWALL & BARS WITH DIMENSIONS C1, C5 BEGINNING AT THE TOEWALL END.



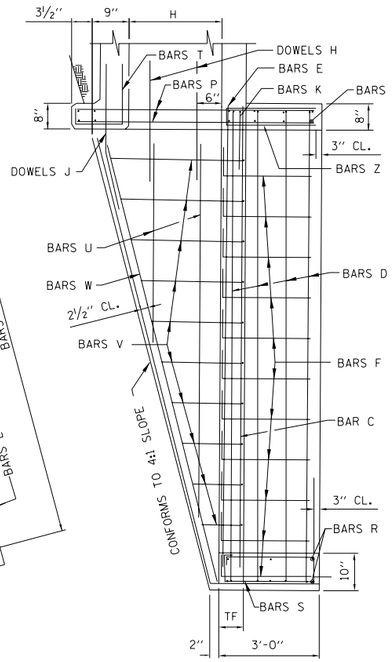
** DOWEL BARS EXTENDING INTO THE CONCRETE BOX CULVERT ARE INCLUDED IN THE QUANTITIES.

HALF PLAN SHOWING DIMENSIONS

HALF PLAN SHOWING REINFORCING BARS

NOTE:

DOWEL BAR J & H NOT REQUIRED WITH EXISTING BOX CULVERTS PROVIDING THE REINFORCING FROM THE EXIST. BOX IS EXTENDED INTO THE NEW CONCRETE A MIN. OF 1'-3".



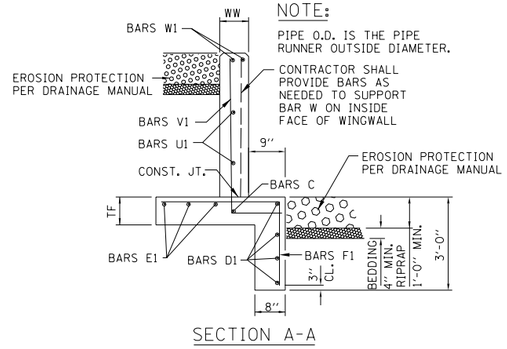
ELEVATION PARALLEL TO BARREL

S = DESIGN SPAN
H = DESIGN HEIGHT

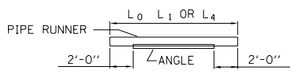
FOR BOX CULVERTS

NOTE:

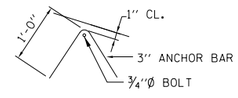
PIPE O.D. IS THE PIPE RUNNER OUTSIDE DIAMETER.



SECTION A-A



DETAIL A

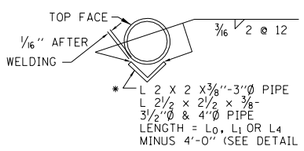


ANCHOR BARS

CONTRACTOR SHALL PROVIDE 2 #3 ANCHOR BARS PER SIDEWALL BOLT

DETAIL B

PIPE RUNNER DETAILS



NOTE:

* WHERE L_0 OR L_1 EXCEEDS THE FOLLOWING LENGTH THE PIPE RUNNER SHALL BE STRENGTHENED OVER MIDSPAN AS SHOWN.

PIPE	LENGTH
3"Ø, SCH. 40	12'-8"
3½"Ø, SCH. 40	17'-3"
3½"Ø, SCH. 80	22'-1"
4"Ø, SCH. 40	22'-6"
4"Ø, SCH. 80	29'-4"

GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS SI.
2. ALL EXPOSED CONCRETE EDGES SHALL HAVE A ¾" × 45° CHAMFER. CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF ONE FOOT BELOW FINISHED GROUND LEVEL. COVER FROM THE FACE OF CONCRETE TO THE FACE OF REINFORCEMENT BARS SHALL BE 2", UNLESS OTHERWISE SHOWN.
3. CONCRETE QUANTITIES SHOWN ON SHEET 2 (OF 2) IN THIS SERIES ARE FOR REINFORCED CONCRETE BOX CULVERT SECTIONS AND ADDITIONAL CONCRETE REQUIRED IN HEADWALLS FOR PIPE OR ARCH CULVERT SECTIONS SHALL BE ADDED TO THESE QUANTITIES.
4. THIS STANDARD MAY BE USED FOR CULVERTS WITH SKEW OF 0° ± 7.5°.
5. DESIGN: SAFETY PIPE RUNNERS ARE DESIGNED FOR A TRANSVERSING LOAD OF 1,800 POUNDS AT YIELD AS RECOMMENDED BY RESEARCH REPORT 280-1, SAFETY TREATMENT OF ROADSIDE CROSS DRAINAGE STRUCTURES, TEXAS TRANSPORTATION INSTITUTE, MARCH 1981.

APPROVED Jeff Hanley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

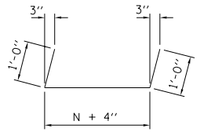
SAFETY END TREATMENT FOR SINGLE & MULTIPLE CULVERTS
0° SKEW 4:1 SLOPE H ≤ 8'

DATE 5-12-2005

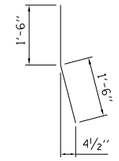
STANDARD NO. SD 05-34B

	TABLE OF DIMENSIONS					TABLE OF REINFORCING STEEL FOR 1 END																								
						BARS C 2 REQD.		BARS D 8-#4	BARS E #4			BARS F					DOWEL H #5 @ 12"		DOWEL J 4-#6	BARS K 2-#5	BARS U #4 @ 12"					BARS V #4 @ 12" CTS.					BARS W 4 REQD.	
H	L	WF	WW	TF	N	SIZE	LENGTH	LENGTH	NO.	LENGTH	SIZE	NO.	C_1	C_2	LENGTH	NO.	LENGTH	LENGTH	LENGTH	NO.	C_3	C_4	LENGTH	NO.	C_5	C_6	C_7	LENGTH	SIZE	LENGTH
3	14'-4"	3"	7"	7"	14'-10 1/8"	#4	15'-2"	17'-2"	4	16'-8"	#4	15	2'-0"	2'-2"	9'-4"	6	3'-0"	4'-6"	4'-0"	3	12'-8"	4'-5"	17'-1"	14	9"	3'-10"	1'-0"	6'-7"	#5	14'-11"
4	18'-4"	9"	7"	8"	18'-11 3/4"	#4	19'-4"	21'-4"	4	20'-10"	#4	19	2'-0"	2'-8"	9'-10"	8	3'-0"	4'-6"	4'-6"	4	16'-10"	4'-5"	21'-3"	18	10"	4'-11"	1'-0"	7'-9"	#6	19'-2"
5	22'-4"	1'-3"	7"	8"	23'-1 1/2"	#4	23'-6"	25'-6"	4	25'-0"	#4	23	2'-0"	3'-2"	10'-4"	10	3'-0"	4'-6"	5'-0"	5	20'-11"	4'-5"	25'-4"	22	10"	5'-11"	1'-0"	8'-9"	#6	23'-5"
6	26'-4"	1'-9"	7"	8 1/2"	27'-3 3/8"	#4	27'-7"	29'-4"	6	29'-1"	#5	27	2'-0"	3'-8"	10'-10"	12	3'-0"	4'-6"	5'-6"	6	25'-1"	4'-5"	29'-6"	26	10"	6'-11"	1'-0"	9'-9"	#6	27'-8"
7	30'-4"	2'-3"	7"	9"	31'-4 7/8"	#5	31'-9"	33'-9"	6	33'-3"	#5	31	2'-1"	4'-3"	11'-6"	14	3'-0"	4'-6"	6'-0"	7	29'-2"	4'-5"	33'-7"	30	11"	8'-0"	1'-0"	10'-11"	#6	31'-11"
8	34'-4"	2'-9"	8"	9 1/2"	35'-6 1/2"	#5	35'-10"	37'-10"	6	37'-4"	#6	35	2'-2"	4'-10"	12'-2"	16	3'-0"	4'-6"	6'-6"	8	33'-4"	4'-5"	37'-9"	34	11"	9'-0"	1'-1"	12'-1"	#6	36'-2"

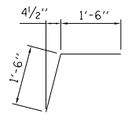
H	PIPE RUNNERS FOR ONE END						
	SIZE (DIA)	SCHEDULE	NO WINGWALL PIPES	L_1	L_2	L_3	LENGTH (FT.)
3'	3"	40	2	9'-11"	--	--	19.84
4'	3"	40	2	14'-0"	--	--	28.00
5'	3 1/2"	40	4	18'-1"	8'-6"	--	53.16
6'	3 1/2"	80	4	22'-3"	12'-7"	--	69.66
7'	4"	40	6	26'-4"	16'-9"	7'-2"	100.50
8'	4"	80	6	30'-6"	20'-10"	11'-7"	125.82



BARS D

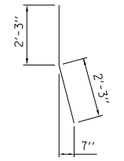


FOR BOX CULVERTS

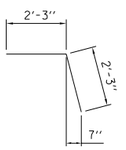


FOR PIPE CULVERTS

DOWEL H

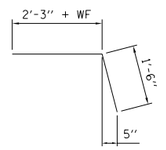


FOR BOX CULVERTS



FOR PIPE CULVERTS

DOWEL J



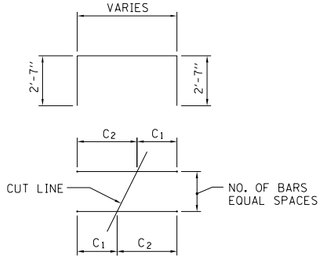
DOWEL K

	TABLE OF DIMENSIONS		TABLE OF REINFORCING STEEL FOR MINIMUM "S"									HEADWALL PIPE RUNNERS FOR MINIMUM "S"				QUANTITIES FOR MIN. "S" (SINGLE PIPE OR CONC. BOX CULVERT)				INCREASE IN QUANTITIES FOR 1' INCREASE IN "S"			
			(2) BARS Y 12-#5	(1) BARS Z #4 @ 12"		(2) BARS R 6-#5	(1) BARS S #4 @ 12"		(1) BARS T #4 @ 12"		(3) BARS P 8-#5												
H	S	W (4)	LENGTH	NO.	LENGTH	LENGTH	NO.	LENGTH	NO.	LENGTH	LENGTH	SIZE (DIA.)	SCHEDULE	NO.	L_0	LENGTH (FT.)	CONCRETE CU. YD.	REIN. BARS LBS.	RIPRAP DUMPED SQ. YD.	RIPRAP HAND-LAID SQ. YD.	CONCRETE CU. YD.	REIN. BARS Lbs.	RIPRAP DUMPED SQ. YD.	RIPRAP HAND-LAID SQ. YD.
3	≥ 9'	16'-8"	9'-10"	9	5'-4"	15'-10"	16	6'-10"	9	3'-0"	6'-8"	3"	40	4	14'-9"	59.00	6.8	863	16.6	7.4	0.19	29	1.50	0.17
4	≥ 9'	18'-9"	9'-10"	9	5'-4"	17'-11"	18	6'-10"	9	3'-0"	7'-8"	3"	40	4	18'-10"	75.33	9.1	1078	23.6	8.8	0.19	29	1.94	0.17
5	≥ 5'	16'-11"	5'-10"	5	5'-4"	16'-1"	16	6'-10"	5	3'-0"	8'-8"	3 1/2"	40	2	23'-0"	46.00	11.1	1163	22.0	9.6	0.19	29	2.39	0.17
6	≥ 6'	20'-1"	6'-10"	6	5'-4"	19'-3"	19	6'-10"	6	3'-0"	9'-8"	3 1/2"	80	3	27'-2"	81.51	13.9	1551	32.0	11.2	0.19	29	2.83	0.17
7	≥ 7'	23'-3"	7'-10"	7	5'-4"	22'-5"	22	6'-10"	7	3'-0"	10'-8"	4"	40	3	31'-3"	93.75	17.7	1869	43.8	12.7	0.19	29	3.28	0.17
8	≥ 8'	26'-4"	9'-10"	8	5'-4"	25'-6"	25	6'-10"	8	3'-0"	11'-8"	4"	80	4	35'-4"	141.33	22.4	2388	57.4	14.3	0.19	29	3.72	0.17

NUMBER OF HDWL PIPE RUNNERS FOR 1 END			
S	No	S	No
10'	4	23'	10
11'	5	24'	10
12'	5	25'	10
13'	6	26'	11
14'	6	27'	11
15'	6	28'	12
16'	7	29'	12
17'	7	30'	12
18'	8	31'	13
19'	8	32'	13
20'	8	33'	14
21'	9	34'	14
22'	9	35'	14

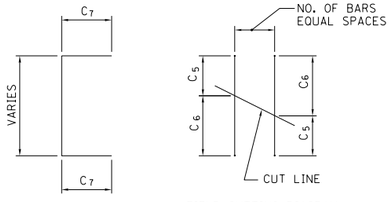
NOTE:

REINFORCEMENT BARS BENDING DIMENSIONS ARE OUT TO OUT.



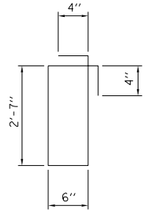
FIELD CUTTING DIAGRAM

BARS F

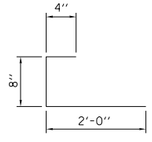


FIELD CUTTING DIAGRAM

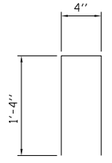
BARS V



BARS S

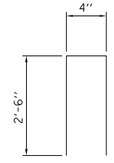


FOR BOX CULVERTS



FOR PIPE CULVERTS

BARS T



BARS Z

NOTES FOR TABLE OF DIMENSIONS:

(1) THE NUMBER OF BARS S, T AND Z SHALL BE INCREASED BY 1 FOR EACH 1 FOOT OF INCREASE IN DIMENSION "S".

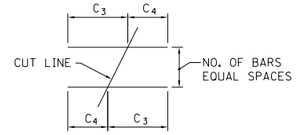
(2) THE LENGTH OF BARS R AND Y SHALL BE INCREASED BY 1 FOOT FOR EACH 1 FOOT OF INCREASE IN DIMENSION "S".

(3) THE NUMBER OF BARS P SHOWN ARE FOR SINGLE SPAN PIPES OR BOX CULVERTS. THIS NUMBER SHALL BE INCREASED BY 4 FOR EACH MULTIPLE OF PIPE OR BOX ADDED.

(4) THIS DIMENSION SHALL BE INCREASED BY 1 FOOT FOR EACH 1 FOOT INCREASE IN DIMENSION "S".

(5) THE LENGTH OF THIS BAR INCLUDES ONE 1'-6" MINIMUM LAP.

REVISIONS



FIELD CUTTING DIAGRAM

BARS U

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

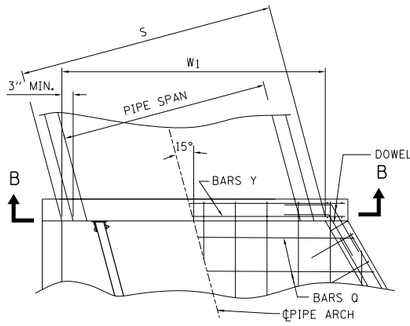
Illinois Tollway
Open Roads for a Faster Future

SAFETY END TREATMENT FOR SINGLE AND MULTIPLE CULVERTS 0° SKEW 4:1 SLOPE H ≤ 8'

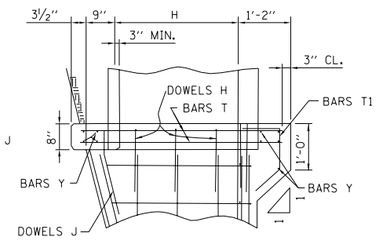
DATE 5-12-2005

STANDARD NO. SD 05-34B

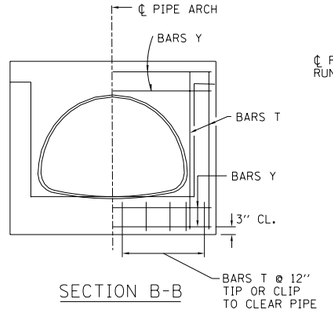
REVISIONS



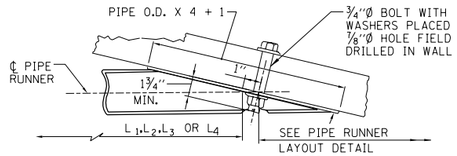
HALF PLAN
SHOWING DIMENSIONS



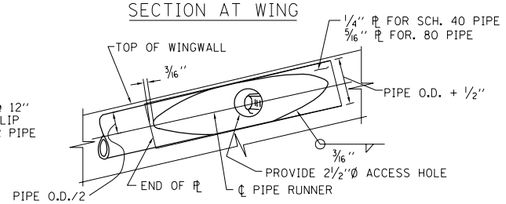
ELEVATION
PIPE ARCH DETAILS



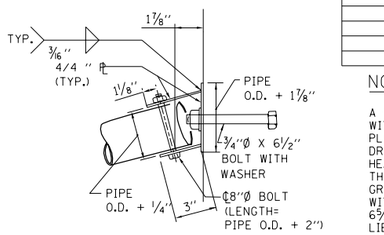
SECTION B-B



SECTION AT WING



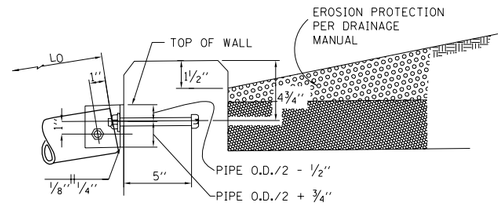
ELEVATION AT WING



PLAN AT HEADWALL

NOTE:

A ¾"Ø X 9½" BOLT WITH ADDITIONAL ℄ WASHER PLACED IN A ⅞"Ø HOLE DRILLED THROUGH THE HEADWALL OR A ¾"Ø x 8" THREADED ROD EPOXY GROUTED IN A ⅞"Ø HOLE WITH A MIN. EMBEDMENT OF 6⅝" MAY BE USED IN LIEU OF CAST-IN-PLACE BOLT SHOWN.



ELEVATION AT HEADWALL

NOTES:

BARS Q, V, AND V_1 ARE TO BE FIELD CUT PER CUTTING DIAGRAM. PLACE BARS WITH DIMENSIONS C_2 - C_3, C_9 - C_{12} BEGINNING AT HEADWALL AND BARS WITH DIMENSIONS C_1 - C_4, C_{10} - C_{11} BEGINNING AT THE TOEWALL END

NOTE:

BARS P1 ARE TO BE FIELD CUT PER CUTTING DIAGRAM PLACE BARS WITH DIMENSIONS C_6-C_7 BEGINNING AT TOEWALL END OF 30° WING AND BARS WITH DIMENSIONS C_5-C_8 BEGINNING PARALLEL THE BARS P.

NOTE:

DOWEL BAR J & H NOT REQUIRED WITH EXISTING BOX CULVERTS PROVIDING THE REINFORCING FROM THE EXIST. BOX IS EXTENDED INTO THE NEW CONCRETE A MIN. OF 1'-3".

NOTE:

PIPE O.D. IS THE PIPE RUNNER OUTSIDE DIAMETER

HALF PLAN
SHOWING DIMENSIONS

HALF PLAN
SHOWING REINFORCING BARS

SECTION C-C

SECTION THRU TOEWALL

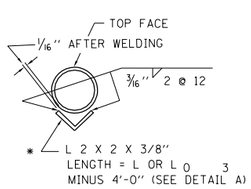
DETAIL A

ANCHOR BARS

CONTRACTOR SHALL PROVIDE 2-#3 ANCHOR BARS PER SIDEWALL BOLT.

DETAIL B

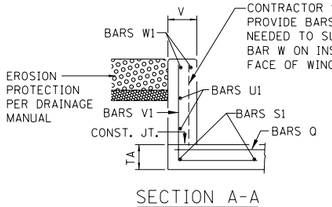
PIPE RUNNER DETAILS



NOTE:

* WHERE L_0, L_1, OR L_3 EXCEEDS THE FOLLOWING LENGTH, THE PIPE RUNNER SHALL BE STRENGTHENED OVER THE MIDSPAN AS SHOWN.

PIPE	LENGTH
3"Ø SCH 40	12'-8"
3"Ø SCH 80	15'-4"



SECTION A-A

GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS SI.
2. ALL EXPOSED CONCRETE EDGES SHALL HAVE A ¾" x 45° CHAMFER. CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF ONE FOOT BELOW FINISHED GROUND LEVEL. COVER FROM THE FACE OF CONCRETE TO THE FACE OF REINFORCEMENT BARS SHALL BE 2", UNLESS OTHERWISE SHOWN.
3. CONCRETE QUANTITIES SHOWN ON SHEET 2 (OF 2) IN THIS SERIES ARE FOR REINFORCED CONCRETE BOX CULVERT SECTIONS AND ADDITIONAL CONCRETE REQUIRED IN HEADWALLS FOR PIPE OR ARCH CULVERT SECTIONS SHALL BE ADDED TO THESE QUANTITIES.
4. THIS STANDARD MAY BE USED FOR CULVERTS WITH SKEW OF 0° ± 7.5°.
5. DESIGN: SAFETY PIPE RUNNERS ARE DESIGNED FOR A TRANSVERSING LOAD OF 1,800 POUNDS AT YIELD AS RECOMMENDED BY RESEARCH REPORT 280-1, SAFETY TREATMENT OF ROADSIDE CROSS DRAINAGE STRUCTURES, TEXAS TRANSPORTATION INSTITUTE, MARCH 1981.

BOX CULVERT DETAILS

S =DESIGN SPAN
H =DESIGN HEIGHT

APPROVED Jeff Daley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

SAFETY END TREATMENT
FOR SINGLE CULVERT
15° SKEW 4:1 SLOPE H ≤ 4'

DATE	STANDARD NO.
05-12-2005	SD 05-34C

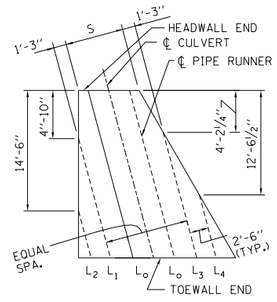
REVISIONS

CULVERT SIZE (FEET)	TABLE OF DIMENSIONS							PIPE RUNNERS FOR ONE END SIZE 3" DIA.							TABLE OF REINFORCING STEEL FOR ONE END											
								HEADWALL PIPE			WINGWALL PIPE - ONE PER EACH LENGTH SHOWN				DOWELS H #4 @ 12"				DOWELS J 2-#6 EACH WALL		BARS P #4 - EQUALLY SPACED		BARS P1 #4 @ 12"					
										LENGTH	0° WALL		30° WALL		30° WALL		0° WALL		30° WALL	0° WALL							
S X H	L	NR	V	W_1	W_2	WR	TA	SCH.	NO.	L_0	L_1	L_2	L_3	L_4	NO.	LENGTH	NO.	LENGTH	LENGTH	LENGTH	NO.	LENGTH	NO.	C_5	C_6	C_7	C_8	LENGTH
3 x 2	10'-10"	12'-6 1/8"	7"	3'-1 1/4"	9'-4 1/4"	6'-3"	6"	40	2	11'-5"	6'-3"	-	7'-0"	—	3	2'-6"	3	2'-6"	4'-0"	4'-0"	4	13'-9"	3	10'-2"	1'-6"	5'-0"	6'-8"	16'-10"
3 x 3	14'-10"	17'-1 1/2"	7"	3'-1 1/4"	11'-8"	8'-6 3/4"	6"	40	2	15'-8"	10'-6"	-	11'-3"	—	4	2'-6"	4	2'-6"	4'-0"	4'-0"	4	17'-9"	4	14'-2"	2'-0"	7'-3"	8'-11"	21'-4"
4 x 2	10'-10"	12'-6 1/8"	7"	4'-1 3/4"	10'-4 3/4"	6'-3"	6"	40	2	11'-5"	6'-3"	-	7'-0"	—	3	2'-6"	3	2'-6"	4'-0"	4'-0"	5	13'-9"	3	10'-2"	1'-6"	5'-0"	6'-8"	16'-10"
4 x 3	14'-10"	17'-1 1/2"	7"	4'-1 3/4"	12'-8 1/2"	8'-6 3/4"	6"	40	2	15'-8"	10'-6"	-	11'-3"	—	4	2'-6"	4	2'-6"	4'-0"	4'-0"	5	17'-9"	4	14'-2"	2'-0"	7'-3"	8'-11"	21'-4"
4 x 4	18'-10"	21'-9"	7"	4'-1 3/4"	15'-0 1/4"	10'-10 1/2"	6"	80	2	19'-11"	14'-9"	4'-6"	15'-6"	6'-7"	5	2'-6"	5	2'-6"	4'-0"	4'-0"	5	21'-9"	5	18'-2"	2'-5"	9'-5"	11'-2"	25'-9"
5 x 2	10'-10"	12'-6 1/8"	7"	5'-2 1/8"	11'-5 1/8"	6'-3"	6"	40	2	11'-5"	6'-3"	-	7'-0"	—	3	2'-6"	3	2'-6"	4'-0"	4'-0"	6	13'-9"	3	10'-2"	1'-6"	5'-0"	6'-8"	16'-10"
5 x 3	14'-10"	17'-1 1/2"	7"	5'-2 1/8"	13'-8 7/8"	8'-6 3/4"	6"	40	2	15'-8"	10'-6"	-	11'-3"	—	4	2'-6"	4	2'-6"	4'-0"	4'-0"	6	17'-9"	4	14'-2"	2'-0"	7'-3"	8'-11"	21'-4"
5 x 4	18'-10"	21'-9"	7"	5'-2 1/8"	16'-0 5/8"	10'-10 1/2"	6"	80	2	19'-11"	14'-9"	4'-6"	15'-6"	6'-7"	5	2'-6"	5	2'-6"	4'-0"	4'-0"	6	21'-9"	5	18'-2"	2'-5"	9'-5"	11'-2"	25'-9"
6 x 3	14'-10"	17'-1 1/2"	7"	6'-2 1/2"	14'-9 1/4"	8'-6 3/4"	6"	40	3	15'-8"	10'-6"	—	11'-3"	—	4	2'-6"	4	2'-6"	4'-0"	4'-0"	7	17'-9"	4	14'-2"	2'-0"	7'-3"	8'-11"	21'-4"
6 x 4	18'-10"	21'-9"	7"	6'-2 1/2"	17'-1"	10'-10 1/2"	6"	80	3	19'-11"	14'-9"	4'-6"	15'-6"	6'-7"	5	2'-6"	5	2'-6"	4'-0"	4'-0"	7	21'-9"	5	18'-2"	2'-5"	9'-5"	11'-2"	25'-9"
7 x 3	14'-10"	17'-1 1/2"	7"	7'-3"	15'-9 3/4"	8'-6 3/4"	6 1/2"	40	3	15'-8"	10'-6"	-	11'-3"	—	4	2'-6"	4	2'-6"	4'-0"	4'-0"	8	17'-9"	4	14'-2"	2'-0"	7'-3"	8'-11"	21'-4"
7 x 4	18'-10"	21'-9"	7"	7'-3"	18'-1 1/2"	10'-10 1/2"	6 1/2"	80	3	19'-11"	14'-9"	4'-6"	15'-6"	6'-7"	5	2'-6"	5	2'-6"	4'-0"	4'-0"	8	21'-9"	5	18'-2"	2'-5"	9'-5"	11'-2"	25'-9"
8 x 4	18'-10"	21'-9"	7"	8'-3 3/8"	19'-1 7/8"	10'-10 1/2"	7"	80	4	19'-11"	14'-9"	4'-6"	15'-6"	6'-7"	5	2'-6"	5	2'-6"	4'-0"	4'-0"	9	21'-9"	5	18'-2"	2'-5"	9'-5"	11'-2"	25'-9"

CULVERT SIZE (FEET)	TABLE OF REINFORCING STEEL FOR ONE END																													
	BARS O #4 @ 12"						BARS R 3-#4	BARS S 30° WALL 2-#4	BARS S1 0° WALL 2-#4	BARS T 8-#5	BARS U-ONE PER EACH LENGTH SHOWN #4 @ 12"				BARS U1 ONE PER EACH LENGTH SHOWN #4 @ 12"				BARS V #4 - EQUALLY SPACED						BARS V1 #4 - EQUALLY SPACED					
											30° WALL				0° WALL				30° WALL						0° WALL					
S X H	NO.	C_1	C_2	C_3	C_4	LENGTH	LENGTH	LENGTH	LENGTH	LENGTH	C_5	C_6	C_7	C_8	C_5	C_6	C_7	C_8	NO.	C_9	C_{10}	C_{11}	C_{12}	LENGTH	NO.	C_9	C_{10}	C_{11}	C_{12}	LENGTH
3 x 2	5	9'-7"	4'-4"	6'-8"	7'-3"	13'-11"	9'-10"	12'-8"	11'-4"	3'-3"	5'-0"	9'-8"	-	-	4'-4"	8'-4"	-	-	6	2'-9"	6"	1'-6"	1'-9"	6'-3"	5	2'-9"	6"	1'-6"	1'-9"	6'-3"
3 x 3	7	11'-10"	4'-4"	7'-9"	8'-5"	16'-2"	12'-2"	17'-4"	15'-4"	4'-3"	5'-0"	9'-8"	14'-3"	-	4'-4"	8'-4"	12'-4"	-	8	3'-9"	6"	2'-0"	2'-3"	7'-3"	7	3'-9"	6"	2'-0"	2'-3"	7'-3"
4 x 2	5	10'-7"	5'-5"	7'-8"	8'-4"	16'-0"	10'-10"	12'-8"	11'-4"	3'-3"	5'-0"	9'-8"	14'-3"	-	4'-4"	8'-4"	-	-	6	2'-9"	6"	1'-6"	1'-9"	6'-3"	5	2'-9"	6"	1'-6"	1'-9"	6'-3"
4 x 3	7	12'-11"	5'-5"	8'-10"	9'-6"	18'-4"	13'-2"	17'-4"	15'-4"	4'-3"	5'-0"	9'-8"	-	-	4'-4"	8'-4"	12'-4"	-	8	3'-9"	6"	2'-0"	2'-3"	7'-3"	7	3'-9"	6"	2'-0"	2'-3"	7'-3"
4 x 4	9	15'-2"	5'-5"	10'-0"	10'-7"	20'-7"	15'-6"	21'-11"	19'-4"	5'-3"	5'-0"	9'-8"	14'-3"	18'-10"	4'-4"	8'-4"	12'-4"	16'-4"	10	4'-9"	6"	2'-6"	2'-9"	8'-3"	9	4'-9"	6"	2'-6"	2'-9"	8'-3"
5 x 2	5	11'-8"	6'-5"	8'-7"	9'-3"	18'-1"	11'-11"	12'-8"	11'-4"	3'-3"	5'-0"	9'-8"	-	-	4'-4"	8'-4"	-	-	6	2'-9"	6"	1'-6"	1'-9"	6'-3"	5	2'-9"	6"	1'-6"	1'-9"	6'-3"
5 x 3	7	13'-11"	6'-5"	9'-10"	10'-6"	20'-4"	14'-2"	17'-4"	15'-4"	4'-3"	5'-0"	9'-8"	14'-3"	-	4'-4"	8'-4"	12'-4"	-	8	3'-9"	6"	2'-0"	2'-3"	7'-3"	7	3'-9"	6"	2'-0"	2'-3"	7'-3"
5 x 4	9	16'-3"	6'-5"	11'-0"	11'-8"	22'-8"	16'-6"	21'-11"	19'-4"	5'-3"	5'-0"	9'-8"	14'-3"	18'-10"	4'-4"	8'-4"	12'-4"	16'-4"	10	4'-9"	6"	2'-6"	2'-9"	8'-3"	9	4'-9"	6"	2'-6"	2'-9"	8'-3"
6 x 3	7	14'-11"	7'-5"	10'-10"	11'-6"	22'-4"	15'-3"	17'-4"	15'-4"	4'-3"	5'-0"	9'-8"	14'-3"	-	4'-4"	8'-4"	12'-4"	-	8	3'-9"	6"	2'-0"	2'-3"	7'-3"	7	3'-9"	6"	2'-0"	2'-3"	7'-3"
6 x 4	9	17'-3"	7'-5"	12'-0"	12'-8"	24'-8"	17'-6"	21'-11"	19'-4"	5'-3"	5'-0"	9'-8"	14'-3"	18'-10"	4'-4"	8'-4"	12'-4"	16'-4"	10	4'-9"	6"	2'-6"	2'-9"	8'-3"	9	4'-9"	6"	2'-6"	2'-9"	8'-3"
7 x 3	7	16'-0"	8'-6"	11'-11"	12'-1"	24'-6"	16'-3"	17'-4"	15'-4"	4'-3"	5'-0"	9'-8"	14'-3"	-	4'-4"	8'-4"	12'-4"	-	8	3'-9"	6"	2'-0"	2'-3"	7'-3"	7	3'-9"	6"	2'-0"	2'-3"	7'-3"
7 x 4	9	18'-4"	8'-6"	13'-1"	13'-9"	26'-10"	18'-7"	21'-11"	19'-4"	5'-3"	5'-0"	9'-8"	14'-3"	18'-10"	4'-4"	8'-4"	12'-4"	16'-4"	10	4'-9"	6"	2'-6"	2'-9"	8'-3"	9	4'-9"	6"	2'-6"	2'-9"	8'-3"
8 x 4	9	19'-4"	9'-6"	14'-1"	14'-9"	28'-10"	19'-7"	21'-11"	19'-4"	5'-3"	5'-0"	9'-8"	14'-3"	18'-10"	4'-4"	8'-4"	12'-4"	16'-4"	10	4'-9"	6"	2'-6"	2'-9"	8'-3"	9	4'-9"	6"	2'-6"	2'-9"	8'-3"

CULVERT SIZE (FEET)	TABLE OF REINFORCING STEEL FOR ONE END					
	2 BARS W		2 BARS W_1		BARS Y 8-#5	
	30° WALL		0° WALL			
S X H	SIZE	LENGTH	SIZE	LENGTH	LENGTH	
3 x 2	#5	11'-6"	#5	10'-4"	3'-11"	
3 x 3	#5	16'-2"	#5	14'-5"	3'-11"	
4 x 2	#5	11'-6"	#5	10'-4"	4'-11"	
4 x 3	#5	16'-2"	#5	14'-5"	4'-11"	
4 x 4	#6	20'-11"	#6	18'-7"	4'-11"	
5 x 2	#5	11'-6"	#5	10'-4"	6'-0"	
5 x 3	#5	16'-2"	#5	14'-5"	6'-0"	
5 x 4	#6	20'-11"	#6	18'-7"	6'-0"	
6 x 3	#5	16'-2"	#5	14'-5"	7'-0"	
6 x 4	#6	20'-11"	#6	18'-7"	7'-0"	
7 x 3	#5	16'-2"	#5	14'-5"	8'-1"	
7 x 4	#6	20'-11"	#6	18'-7"	8'-1"	
8 x 4	#6	20'-11"	#6	18'-7"	9'-1"	

TOTAL QUANTITIES ONE END			
CONC.	RE-BARS	PIPE RUNNERS	RIPRAP HAND-LAID
CU. YD.	LB.	FT.	SQ. YD.
3.1	373	36.09	5.3
4.7	526	53.08	6.8
3.4	399	36.09	5.5
5.1	558	53.08	7.0
7.2	779	81.17	8.5
3.7	426	36.09	5.7
5.5	589	53.08	7.1
7.6	816	81.17	8.6
5.9	621	53.08	7.3
8.1	853	81.17	8.8
6.5	655	53.08	7.5
8.9	892	81.17	9.0
9.8	929	81.17	9.1

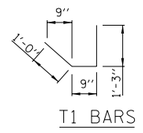


PIPE RUNNER LAYOUT

NOTE:

REINFORCEMENT BARS BENDING DIMENSIONS ARE OUT TO OUT.

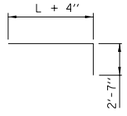
PIPE ARCH AND ELLIPTICAL PIPE CULVERTS



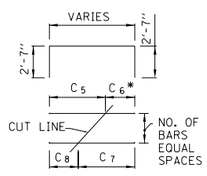
T1 BARS

FOR PIPE OR ELLIPTICAL PIPE CULVERTS SELECT APPROPRIATE "S" & "H" FROM SIZES SHOWN. ADD THE FOLLOWING ADDITIONAL BARS:
(a) 1 ADDITIONAL Y BAR
(b) #4-T1 BARS @ APPROX. 12" CTS. (NO. = S + 2)

THE WEIGHT OF THE ADDITIONAL BARS AND THE ADDITIONAL QUANTITY OF CONCRETE IN THE HEADWALL SHALL BE ADDED TO THE QUANTITIES SHOWN.

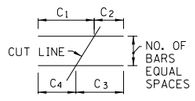


BARS P



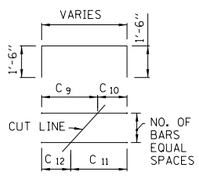
FIELD CUTTING DIAGRAM

BARS P1



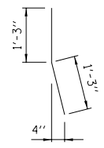
FIELD CUTTING DIAGRAM

BARS Q

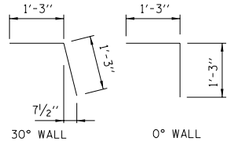


FIELD CUTTING DIAGRAM

BARS V AND V1

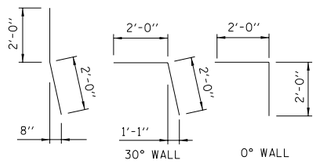


FOR BOX CULVERTS



FOR PIPE ARCHES

DOWELS H



FOR BOX CULVERTS FOR PIPE ARCHES

DOWELS J

APPROVED Jeff Daley CHIEF ENGINEER DATE 6-14-2006

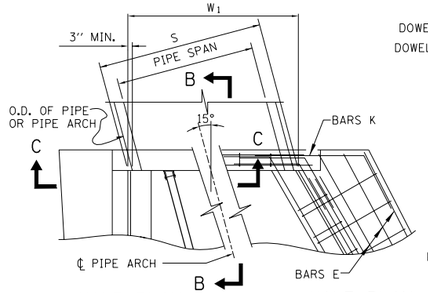
SHEET 2 OF 2

Illinois Tollway
Open Roads for a Faster Future

SAFETY END TREATMENT FOR SINGLE CULVERTS
15° SKEW 4:1 SLOPE H ≤ 4'

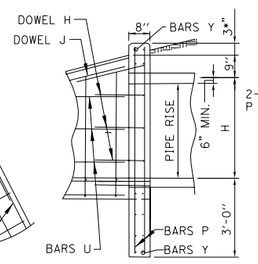
DATE	STANDARD NO.
05-12-2005	SD 05-34C

REVISIONS

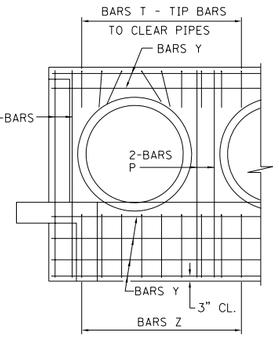


HALF PLAN SHOWING DIMENSIONS

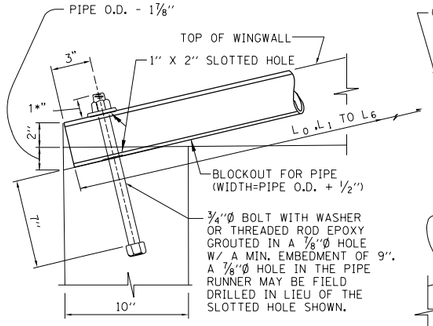
HALF PLAN SHOWING REINFORCING BARS



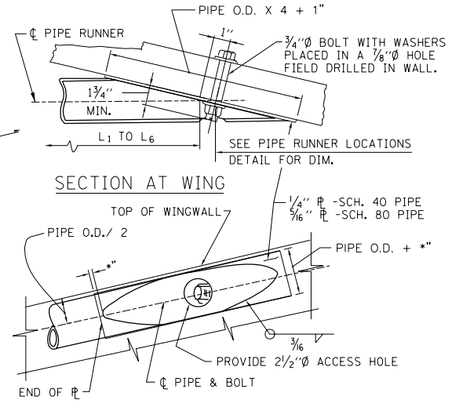
SECTION B-B



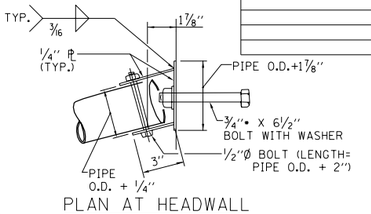
SECTION C-C



SECTION THRU TOEWALL



ELEVATION AT WING



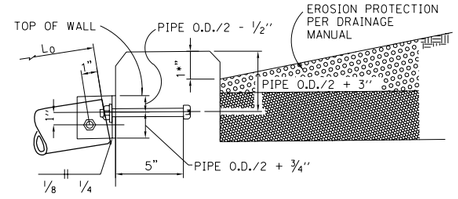
PLAN AT HEADWALL

NOTE:

A ¾"Ø X 9½" BOLT WITH ADDITIONAL ℄ WASHER PLACED IN A ⅞"Ø HOLE DRILLED THROUGH THE HEADWALL OR A ¾"Ø X 8" THREADED ROD EPOXY GROUTED IN A ⅞"Ø HOLE WITH A MINIMUM EMBEDMENT OF 6⅝" MAY BE USED IN LIEU OF CAST-IN-PLACE BOLT SHOWN.

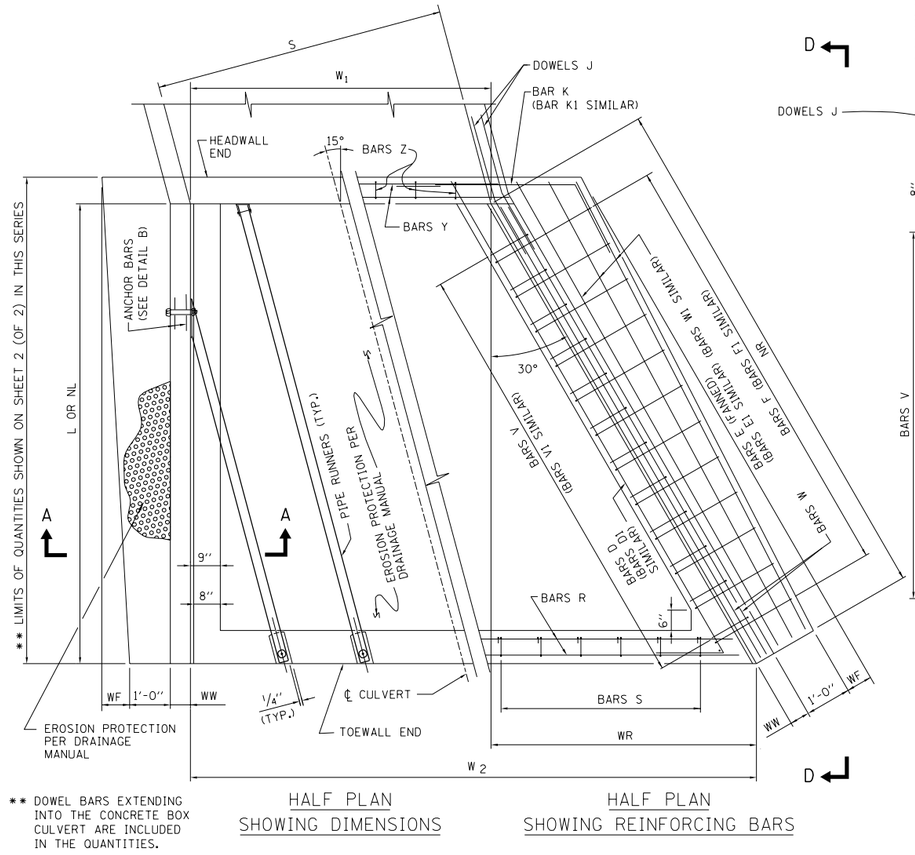
NOTE:

PIPE O.D. IS THE PIPE RUNNER OUTSIDE DIAMETER.



ELEVATION AT HEADWALL

FOR PIPE AND PIPE-ARCH CULVERTS



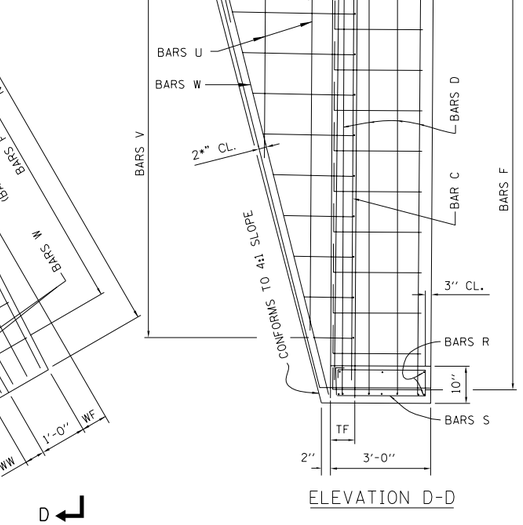
** DOWEL BARS EXTENDING INTO THE CONCRETE BOX CULVERT ARE INCLUDED IN THE QUANTITIES.

HALF PLAN SHOWING DIMENSIONS

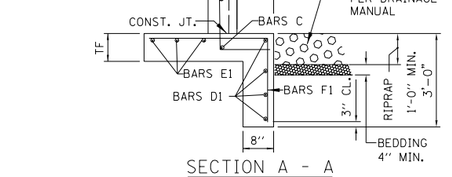
HALF PLAN SHOWING REINFORCING BARS

NOTE:

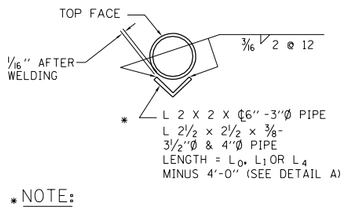
DOWEL BAR J & H NOT REQUIRED WITH EXISTING BOX CULVERTS PROVIDING THE REINFORCING FROM THE EXIST. BOX IS EXTENDED INTO THE NEW CONCRETE A MIN. OF 1'-3".



ELEVATION D-D



SECTION A - A

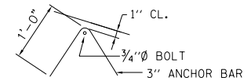


* NOTE:

WHERE L_0, L_1 OR L_4 EXCEEDS THE FOLLOWING LENGTH THE PIPE RUNNER SHALL BE STRENGTHENED OVER MIDSPAN AS SHOWN.

PIPE	LENGTH
3"Ø, SCH. 40	12'-8"
3½"Ø, SCH. 40	17'-3"
3½"Ø, SCH. 80	22'-1"
4"Ø, SCH. 40	22'-6"
4"Ø, SCH. 80	29'-4"

DETAIL A



ANCHOR BARS

CONTRACTOR SHALL PROVIDE 2-#3 ANCHOR BARS PER SIDEWALL BOLT

DETAIL B

PIPE RUNNER DETAILS

GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS SI.
2. ALL EXPOSED CONCRETE EDGES SHALL HAVE A ¾" x 45° CHAMFER. CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF ONE FOOT BELOW FINISHED GROUND LEVEL. COVER FROM THE FACE OF CONCRETE TO THE FACE OF REINFORCEMENT BARS SHALL BE 2", UNLESS OTHERWISE SHOWN.
3. CONCRETE QUANTITIES SHOWN ON SHEET 2 (OF 2) IN THIS SERIES ARE FOR REINFORCED CONCRETE BOX CULVERT SECTIONS AND ADDITIONAL CONCRETE REQUIRED IN HEADWALLS FOR PIPE OR ARCH CULVERT SECTIONS SHALL BE ADDED TO THESE QUANTITIES.
4. THIS STANDARD MAY BE USED FOR CULVERTS WITH SKEW OF 0° ± 7.5°.
5. DESIGN: SAFETY PIPE RUNNERS ARE DESIGNED FOR A TRANSVERSING LOAD OF 1,800 POUNDS AT YIELD AS RECOMMENDED BY RESEARCH REPORT 280-1, SAFETY TREATMENT OF ROADSIDE CROSS DRAINAGE STRUCTURES, TEXAS TRANSPORTATION INSTITUTE, MARCH 1981.

FOR BOX CULVERTS

S = DESIGN SPAN
H = DESIGN HEIGHT

SHEET 1 OF 2

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

SAFETY END TREATMENT FOR SINGLE & MULTIPLE CULVERTS
15° SKEW 4:1 SLOPE H ≤ 8'

DATE	STANDARD NO.
5-12-2005	SD 05-34D

REVISIONS

TABLE OF DIMENSIONS

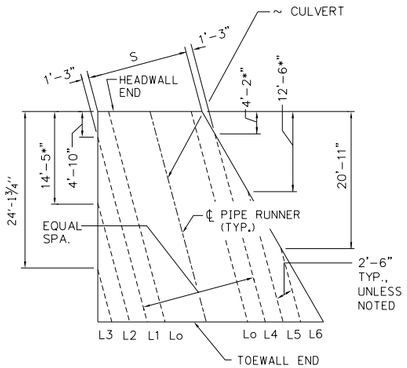
H	S	L	NL	NR	WW	W_1 (4)	W_2 (4)	WR	WF	TF
3′	9′	14′-4″	14′-4″	16′-6⅝″	7″	9′-3¾″	17′-7″	8′-3¼″	3″	7″
4′	9′	18′-4″	18′-4″	21′-2″	7″	9′-3¾″	19′-10¾″	10′-7″	9″	8″
5′	5′	22′-4″	22′-4″	25′-9½″	7″	5′-2″	18′-0¾″	12′-10¾″	1′-3″	8″
6′	6′	26′-4″	26′-4″	30′-4⅞″	7″	6′-2½″	21′-5″	15′-2½″	1′-9″	8½″
7′	7′	30′-4″	30′-4″	35′-0¼″	7″	7′-3″	24′-9″	17′-6″	2′-3″	9″
8′	8′	34′-4″	34′-4″	39′-7¾″	8″	8′-3½″	28′-1¼″	19′-9¾″	2′-9″	9½″

PIPE RUNNERS FOR ONE END

H	SIZE (DIA.)	SCHEDULE	WINGWALL PIPES - ONE PER EACH LENGTH SHOWN						HEADWALL PIPE			
			0° WALL			30° WALL						
			L_1	L_2	L_3	L_4	L_5	L_6	S	NO.	Lo	TOTAL LENGTH
3′	3″	40	10′-0″	-	-	10′-8″	-	-	9′	4	15′-1″	81.00
4′	3″	40	14′-3″	-	-	14′-11″	6′-2″	-	9′	4	19′-4″	112.50
5′	3½″	40	18′-6″	8′-3″	-	19′-2″	10′-5″	-	5′	2	23′-7″	103.33
6′	3½″	80	22′-9″	12′-6″	-	23′-5″	14′-8″	5′-9″	6′	3	28′-0″	162.25
7′	4″	40	27′-0″	16′-9″	6′-7″	27′-8″	18′-11″	10′-0″	7′	3	32′-3″	202.67
8′	4″	80	31′-3″	21′-0″	10′-10″	31′-11″	23′-2″	14′-3″	8′	4	36′-6″	277.25

NOTE:

REINFORCEMENT BAR BENDING DIMENSIONS ARE OUT TO OUT.



PIPE RUNNER LAYOUT

TABLE OF REINFORCING STEL FOR ONE END

H	1-BAR C 30° WALL		1-BAR C1 0° WALL		BAR D 4-#4 30° WALL	BAR D1 4-#4 0° WALL	#4-BARS E 30° WALL (6)		#4-BARS E1 0° WALL (6)	
	SIZE	LENGTH	SIZE	LENGTH	LENGTH	LENGTH	NO.	LENGTH	NO.	LENGTH
3′	#4	16′-11″	#4	14′-8″	18′-10″	16′-7″	2	16′-0″	2	16′-2″
4′	#4	21′-7″	#4	18′-8″	23′-6″	20′-7″	2	20′-4″	2	20′-2″
5′	#4	22′-2″	#4	22′-8″	24′-1″	24′-7″	2	24′-8″	2	24′-2″
6′	#4	30′-9″	#4	26′-8″	32′-8″	28′-7″	3	29′-0″	3	28′-2″
7′	#5	35′-5″	#5	30′-8″	37′-4″	32′-7″	3	33′-4″	3	32′-2″
8′	#5	40′-0″	#5	34′-8″	41′-11″	36′-7″	3	37′-8″	3	36′-2″

H	S	TOTAL QUANTITIES ONE END MINIMUM ″S″ CONC. CU. YD.	RE-BARS LBS.	RIPRAP DUMPED SQ. YD.	RIPRAP HAND-LAID SQ. YD.	INCREASE IN QUANTITIES FOR 1′ INCREASE IN ″S″ CONC. CU. YD.	RE-BARS LBS.	RIPRAP DUMPED SQ. YD.	RIPRAP HAND-LAID SQ. YD.
3′	9′	7.4	904	17.4	7.6	0.20	30	1.56	0.17
4′	9′	9.9	1132	24.8	9.1	0.20	30	2.03	0.17
5′	5′	11.7	1179	23.3	9.9	0.20	30	2.49	0.17
6′	6′	15.0	1587	33.9	11.6	0.20	30	2.95	0.17
7′	7′	18.7	1909	46.4	13.2	0.20	30	3.41	0.17
8′	8′	24.0	2441	60.8	14.9	0.20	30	3.88	0.17

TABLE OF REINFORCING STEL FOR ONE END

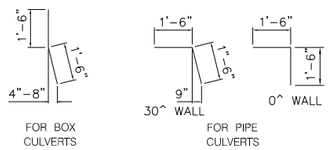
H	BARS F EQUALLY SPACED 30° WALL							BARS F1 EQUALLY SPACED 0° WALL							DOWELS H #5 @ 12″ 30° WALL		DOWELS H1 #5 @ 12″ 0° WALL		DOWELS J 4-#6 (5)	1-BAR K 30° WALL			1-BAR K1 0° WALL			2-BARS W 30° WALL		2-BARS W1 0° WALL	
	SIZE	NO.	C_1	C_2	C_3	C_4	LENGTH	SIZE	NO.	C_1	C_2	C_3	C_4	LENGTH	NO.	LENGTH	NO.	LENGTH	LENGTH	SIZE	C_5	LENGTH	SIZE	C_6	LENGTH	SIZE	LENGTH	SIZE	LENGTH
3′	#4	7	1′-11″	2′-1″	2′-0″	2′-0″	9′-2″	#4	7	1′-11″	2′-1″	2′-0″	2′-0″	9′-2″	3	3′-0″	3	3′-0″	4′-6″	#5	2′-4″	3′-10″	#5	2′-3″	3′-9″	#5	16′-4″	#5	14′-6″
4′	#4	9	1′-11″	2′-7″	2′-3″	2′-3″	9′-8″	#4	9	1′-11″	2′-7″	2′-3″	2′-3″	9′-8″	4	3′-0″	4	3′-0″	4′-6″	#5	2′-11″	4′-5″	#5	2′-9″	4′-3″	#6	21′-1″	#6	18′-7″
5′	#4	11	1′-11″	3′-1″	2′-6″	2′-6″	10′-2″	#4	11	1′-11″	3′-1″	2′-6″	2′-6″	10′-2″	5	3′-0″	5	3′-0″	4′-6″	#5	3′-6″	5′-0″	#5	3′-3″	4′-9″	#6	25′-10″	#6	22′-9″
6′	#5	13	1′-11″	3′-8″	2′-9″	2′-10″	10′-9″	#5	13	1′-11″	3′-6″	2′-8″	2′-9″	10′-7″	6	3′-0″	6	3′-0″	4′-6″	#5	4′-1″	5′-7″	#5	3′-9″	5′-3″	#6	30′-7″	#6	26′-11″
7′	#5	15	2′-0″	4′-3″	3′-1″	3′-2″	11′-5″	#5	15	2′-0″	4′-1″	3′-0″	3′-1″	11′-3″	7	3′-0″	7	3′-0″	4′-6″	#5	4′-10″	6′-4″	#5	4′-4″	5′-10″	#6	35′-3″	#6	31′-0″
8′	#6	18	2′-1″	4′-10″	3′-5″	3′-6″	12′-1″	#6	17	2′-1″	4′-8″	3′-4″	3′-5″	11′-11″	8	3′-0″	8	3′-0″	4′-6″	#5	5′-6″	7′-0″	#5	4′-11″	6′-5″	#6	40′-0″	#6	35′-2″

TABLE OF REINFORCING STEEL FOR ONE END

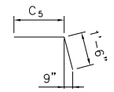
H	BARS U- ONE PER EACH LENGTH SHOWN #4 @ 12″ 30° WALL								BARS U1 - ONE PER EACH LENGTH SHOWN #4 @ 12″ 0° WALL								BARS V #4-EQUALLY SPACED 30° WALL							BARS V1 #4-EQUALLY SPACED 0° WALL						
	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	NO.	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	LENGTH	NO.	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	LENGTH
3′	5′-1″	9′-8″	14′-3″	-	-	-	-	-	4′-4″	8′-4″	12′-4″	-	-	-	-	-	8	3′-10″	9″	2′-2″	2′-5″	1′-0″	6′-7″	7	3′-10″	9″	2′-2″	2′-5″	1′-0″	6′-7″
4′	5′-1″	9′-8″	14′-3″	18′-11″	-	-	-	-	4′-4″	8′-4″	12′-4″	16′-4″	-	-	-	-	11	4′-11″	10″	2′-9″	3′-0″	1′-0″	7′-9″	9	4′-11″	10″	2′-9″	3′-0″	1′-0″	7′-9″
5′	5′-1″	9′-8″	14′-3″	18′-11″	23′-6″	-	-	-	4′-4″	8′-4″	12′-4″	16′-4″	20′-4″	-	-	-	13	5′-11″	10″	3′-3″	3′-6″	1′-0″	8′-9″	11	5′-11″	10″	3′-3″	3′-6″	1′-0″	8′-9″
6′	5′-1″	9′-8″	14′-3″	18′-11″	23′-6″	28′-1″	-	-	4′-4″	8′-4″	12′-4″	16′-4″	20′-4″	24′-4″	-	-	15	6′-11″	10″	3′-9″	4′-0″	1′-0″	9′-9″	13	6′-11″	10″	3′-9″	4′-0″	1′-0″	9′-9″
7′	5′-1″	9′-8″	14′-3″	18′-11″	23′-6″	28′-1″	32′-9″	-	4′-4″	8′-4″	12′-4″	16′-4″	20′-4″	24′-4″	28′-4″	-	17	8′-0″	11″	4′-4″	4′-7″	1′-0″	10′-11″	15	8′-0″	11″	4′-4″	4′-7″	1′-0″	10′-11″
8′	5′-1″	9′-8″	14′-3″	18′-11″	23′-6″	28′-1″	32′-9″	37′-4″	4′-4″	8′-4″	12′-4″	16′-4″	20′-4″	24′-4″	28′-4″	32′-4″	20	9′-0″	11″	4′-10″	5′-1″	1′-1″	12′-1″	17	9′-0″	11″	4′-10″	5′-1″	1′-1″	12′-1″

TABLE OF REINFORCING STEEL FOR MINIMUM ″ 3′ - ONE END

H	S	BARS Y 12-#5 (2) LENGTH	BARS R 6-#5 (2) LENGTH	BARS Z #4 @ 12″ (1) NO.	BARS Z #4 @ 12″ (1) LENGTH	BARS S #4 @ 12″ (1) NO.	BARS S #4 @ 12″ (1) LENGTH	BARS T #4 @ 12″ (1) NO.	BARS T #4 @ 12″ (1) LENGTH	BARS P 8-#5 (3) LENGTH
3′	≥9′	12′-2″	16′-8″	10	5′-4″	16	6′-10″	10	3′-0″	6′-8″
4′	≥9′	12′-2″	19′-0″	10	5′-4″	18	6′-10″	10	3′-0″	7′-8″
5′	≥5′	6′-0″	17′-2″	6	5′-4″	16	6′-10″	6	3′-0″	8′-8″
6′	≥6′	7′-0″	20′-6″	7	5′-4″	20	6′-10″	7	3′-0″	9′-8″
7′	≥7′	7′-11″	23′-10″	8	5′-4″	23	6′-10″	8	3′-0″	10′-8″
8′	≥8′	8′-11″	27′-3″	9	5′-4″	26	6′-10″	9	3′-0″	11′-8″



DOWELS H AND H1

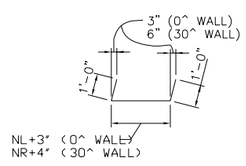


BARS K

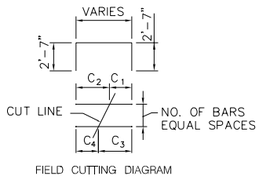
NUMBER OF HEADWALL PIPE RUNNERS FOR 1 END			
S	NO.	S	NO.
10′	4	23′	10
11′	5	24′	10
12′	5	25′	10
13′	6	26′	11
14′	6	27′	11
15′	6	28′	12
16′	7	29′	12
17′	7	30′	12
18′	8	31′	13
19′	8	32′	13
20′	8	33′	14
21′	9	34′	14
22′	9	35′	14

NOTES FOR TABLES:

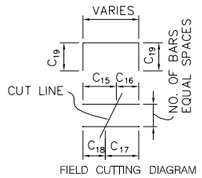
1. THE NUMBER OF BARS S, T AND Z SHALL BE INCREASED BY 1 FOR EACH 1 FOOT OF INCREASE IN DIMENSION ″W_1″
2. THE LENGTH OF BARS R AND Y SHALL BE INCREASED BY 1′-½″ FOR EACH 1 FOOT OF INCREASE IN DIMENSION ″S″
3. THE NUMBER OF BARS P SHOWN ARE FOR SINGLE SPAN PIPES OR BOX CULVERTS. THIS NUMBER SHALL BE INCREASED BY 4 FOR EACH MULTIPLE OF PIPE OR BOX ADDED.
4. THIS DIMENSION SHALL BE INCREASED BY 1′-½″ INCHES FOR EACH 1 FOOT INCREASE IN DIMENSION ″S″.
5. 2 BARS FOR 30° WALL, 2 BARS FOR 0° WALL
6. THE LENGTH OF THIS BAR INCLUDES ONE 1′-6″ MINIMUM LAP.



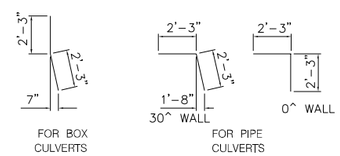
BARS D



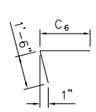
BARS F AND F1



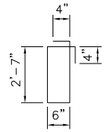
BARS V AND V1



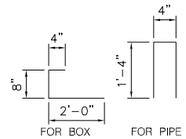
DOWELS J



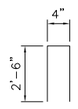
BARS K1



BARS S



BARS T



BARS Z

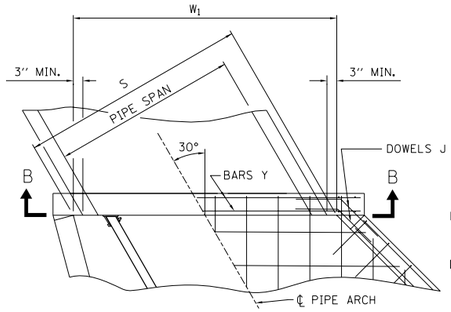
SHEET 2 OF 2

APPROVED Jeff Mackey CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

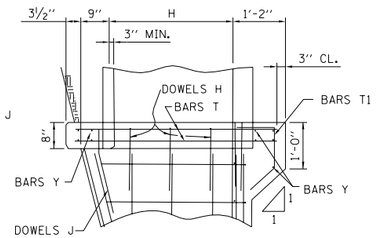
SAFETY END TREATMENT FOR SINGLE & MULTIPLE CULVERTS 15° SKEW 4:1 SLOPE H ≤ 8′

DATE	STANDARD NO.
5-12-2005	SD 05-34D



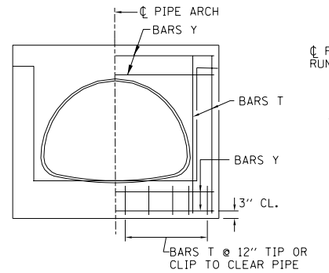
HALF PLAN

SHOWING DIMENSIONS



HALF PLAN

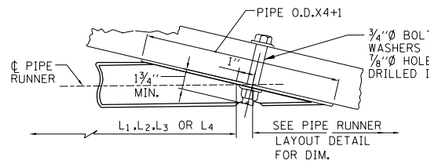
SHOWING REINFORCING BARS



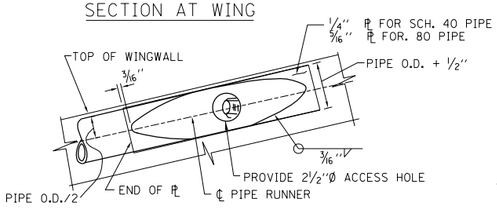
ELEVATION

PIPE ARCH DETAILS

SECTION B-B



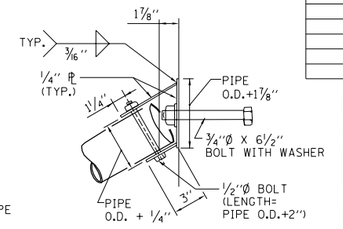
SECTION AT WING



ELEVATION AT WING

NOTE:

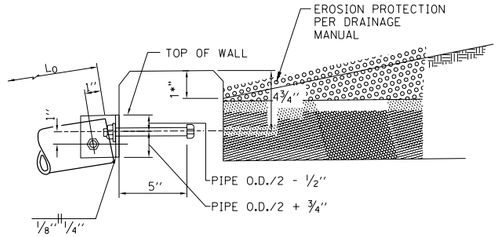
PIPE O.D. IS THE PIPE
RUNNER OUTSIDE DIAMETER



NOTE:

A ¾"Ø X 9½" BOLT WITH ADDITIONAL ℙ WASHER PLACED IN A ⅞"Ø HOLE DRILLED THROUGH THE HEADWALL OR A ¾"Ø x 8" THREADED ROD EPOXY GROUTED IN A ⅞"Ø HOLE WITH A MIN. EMBEDMENT OF 6⅜" MAY BE USED IN LIEU OF CAST-IN-PLACE BOLT SHOWN.

PLAN AT HEADWALL



ELEVATION AT HEADWALL

NOTE:

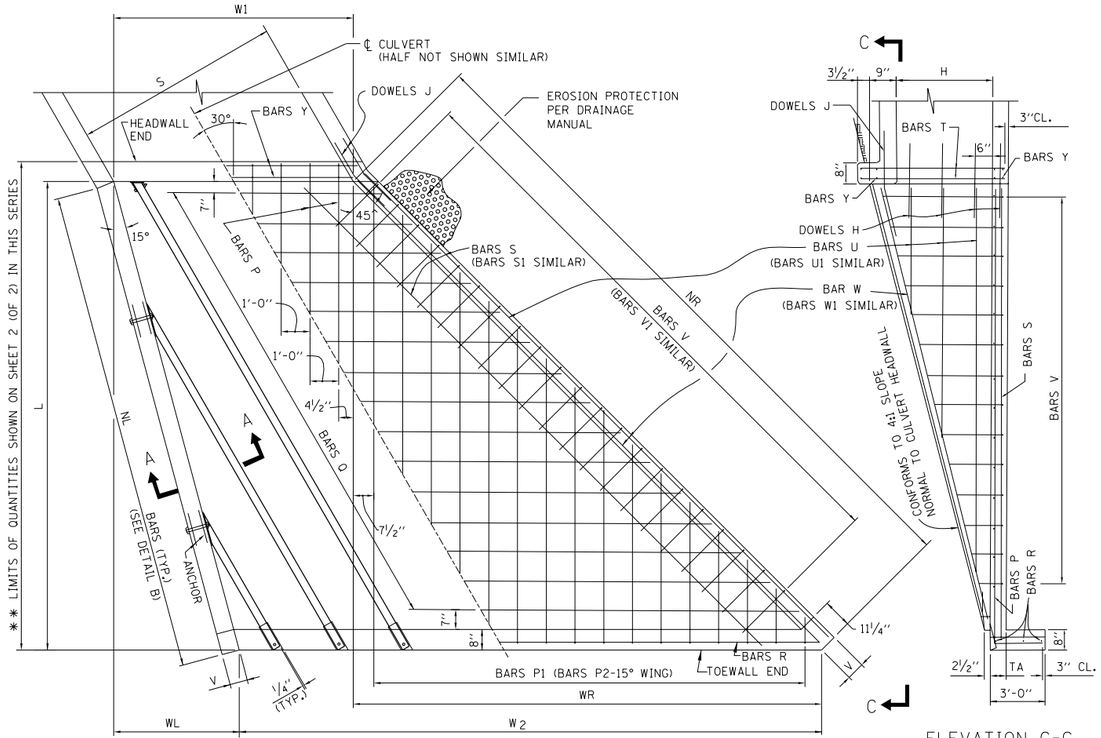
DOWEL BAR J & H NOT REQUIRED WITH EXISTING BOX CULVERTS PROVIDING THE REINFORCING FROM THE EXIST. BOX IS EXTENDED INTO THE NEW CONCRETE A MIN. OF 1'-3".

NOTE:

BARS Q, V AND V_1 ARE TO BE FIELD CUT PER CUTTING DIAGRAM. PLACE BARS WITH DIMENSIONS C_2-C_3 AND C_9-C_{12} BEGINNING AT HEADWALL AND BARS WITH DIMENSIONS C_1-C_4 AND C_{10}-C_{11} BEGINNING AT THE TOEWALL END.

NOTE:

BARS P1 ARE TO BE FIELD CUT PER CUTTING DIAGRAM. PLACE BARS WITH DIMENSIONS C_6-C_7 BEGINNING AT THE TOEWALL END OF 45° WINGWALL AND BARS WITH DIMENSIONS C_5 -C_8 BEGINNING PARALLEL TO THE P BARS. PLACE BARS P2 PARALLEL TO THE P BARS BEGINNING WITH THE SHORTEST BARS AT THE HEADWALL END OF THE 15° WINGWALL.



HALF PLAN

SHOWING DIMENSIONS

HALF PLAN

SHOWING REINFORCING BARS

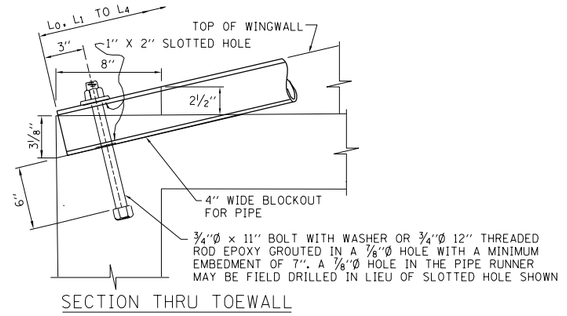
ELEVATION C-C

** DOWEL BARS EXTENDING INTO THE CONCRETE BOX CULVERT ARE INCLUDED IN THE QUANTITIES.

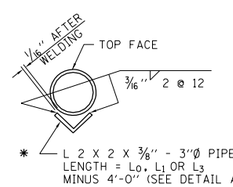
BOX CULVERT DETAILS

S = DESIGN SPAN

H = DESIGN HEIGHT



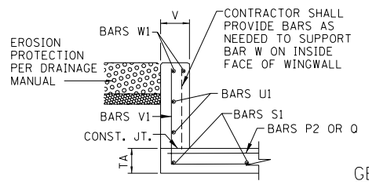
SECTION THRU TOEWALL



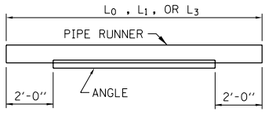
* NOTE:

WHERE Lo , L_1 , OR L_3 EXCEEDS THE FOLLOWING LENGTH, THE PIPE RUNNER SHALL BE STRENGTHENED OVER THE MIDSPAN AS SHOWN.

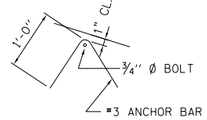
PIPE	LENGTH
3" Ø SCH 40	12'-8"
3" Ø SCH 80	15'-4"



SECTION A - A



DETAIL A



ANCHOR BARS

CONTRACTOR SHALL PROVIDE 2-#3 ANCHOR BARS PER SIDEWALL BOLT.

DETAIL B

PIPE RUNNER DETAILS

GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS SI.
2. ALL EXPOSED CONCRETE EDGES SHALL HAVE A ¾" x 45° CHAMFER. CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF ONE FOOT BELOW FINISHED GROUND LEVEL. COVER FROM THE FACE OF CONCRETE TO THE FACE OF REINFORCEMENT BARS SHALL BE 2", UNLESS OTHERWISE SHOWN.
3. CONCRETE QUANTITIES SHOWN ON SHEET 2 (OF 2) IN THIS SERIES ARE FOR REINFORCED CONCRETE BOX CULVERT SECTIONS AND ADDITIONAL CONCRETE REQUIRED IN HEADWALLS FOR PIPE OR ARCH CULVERT SECTIONS SHALL BE ADDED TO THESE QUANTITIES.
4. THIS STANDARD MAY BE USED FOR CULVERTS WITH SKEW OF 0° ± 7.5°.
5. DESIGN: SAFETY PIPE RUNNERS ARE DESIGNED FOR A TRANSVERSING LOAD OF 1,800 POUNDS AT YIELD AS RECOMMENDED BY RESEARCH REPORT 280-1, SAFETY TREATMENT OF ROADSIDE CROSS DRAINAGE STRUCTURES, TEXAS TRANSPORTATION INSTITUTE, MARCH 1981.

REVISIONS

APPROVED Jeff Daley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

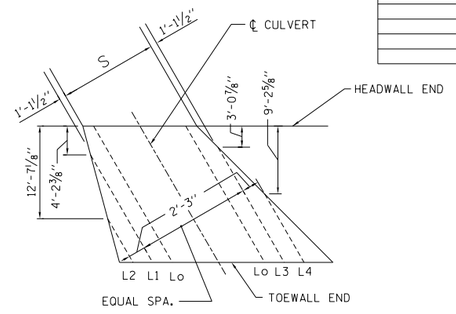
SAFETY END TREATMENT
FOR SINGLE CULVERT
30° SKEW 4:1 SLOPE H ≤ 4'

DATE	STANDARD NO.
5-12-2005	SD 05-34E

REVISIONS

CULVERT SIZE (FEET)	TABLE OF DIMENSIONS								
S X H	L	NL	NR	V	W_1	W_2	WL	WR	TA
3 x 2	10'-10"	11'-2⅝"	15'-3⅞"	7"	3'-5⅝"	11'-4¾"	2'-10⅞"	10'-10"	6"
3 x 3	14'-10"	15'-4¼"	20'-11¾"	7"	3'-5⅝"	14'-3⅞"	3'-11¾"	14'-10"	6"
4 x 2	10'-10"	11'-2⅝"	15'-3⅞"	7"	4'-7⅜"	12'-6½"	2'-10⅞"	10'-10"	6"
4 x 3	14'-10"	15'-4¼"	20'-11¾"	7"	4'-7⅜"	15'-5⅝"	3'-11¾"	14'-10"	6"
4 x 4	18'-10"	19'-6"	26'-7⅝"	7"	4'-7⅜"	18'-4⅞"	5'-0½"	18'-10"	6"
5 x 2	10'-10"	11'-2⅝"	15'-3⅞"	7"	5'-9¼"	13'-8⅜"	2'-10⅞"	10'-10"	6"
5 x 3	14'-10"	15'-4¼"	20'-11¾"	7"	5'-9¼"	16'-7½"	3'-11¾"	14'-10"	6"
5 x 4	18'-10"	19'-6"	26'-7⅝"	7"	5'-9¼"	19'-6¾"	5'-0½"	18'-10"	6"
6 x 3	14'-10"	15'-4¼"	20'-11¾"	7"	6'-11⅛"	17'-9⅜"	3'-11¾"	14'-10"	6"
6 x 4	18'-10"	19'-6"	26'-7⅝"	7"	6'-11⅛"	20'-8⅝"	5'-0½"	18'-10"	6"
7 x 3	14'-10"	15'-4¼"	20'-11¾"	7"	8'-1"	18'-11¼"	3'-11¾"	14'-10"	6½"
7 x 4	18'-10"	19'-6"	26'-7⅝"	7"	8'-1"	21'-10½"	5'-0½"	18'-10"	6½"
8 x 4	18'-10"	19'-6"	26'-7⅝"	7"	9'-2⅞"	23'-0⅜"	5'-0½"	18'-10"	7"

SCHEDULE	PIPE RUNNERS FOR ONE END SIZE 3"•					
	HEADWALL PIPE		WINGWALL PIPE -ONE PER EACH LENGTH SHOWN			
			15° WALL		45° WALL	
	NO.	L_0	L_1	L_2	L_3	L_4
40	2	12'-9"	7'-10"	-	9'-1"	-
40	2	17'-5"	12'-6"	-	13'-10"	6'-7"
40	2	12'-9"	7'-8"	-	9'-1"	-
40	2	17'-5"	12'-5"	-	13'-10"	6'-7"
80	2	22'-2"	17'-3"	7'-4"	18'-9"	11'-4"
40	3	12'-9"	7'-8"	-	9'-0"	-
40	3	17'-9"	12'-5"	-	13'-9"	6'-6"
80	3	22'-2"	17'-1"	7'-4"	18'-7"	11'-4"
40	3	17'-5"	12'-5"	-	13'-9"	6'-6"
80	3	22'-2"	17'-1"	7'-2"	18'-5"	11'-2"
40	4	17'-5"	12'-5"	-	13'-9"	6'-6"
80	4	22'-2"	17'-1"	7'-2"	18'-5"	11'-2"
80	4	22'-2"	17'-1"	7'-2"	18'-5"	11'-2"



PIPE RUNNER LAYOUT

CULVERT SIZE (FEET)	TABLE OF REINFORCING STEEL FOR ONE END																										
	DOWELS H #4 @ 12" 2'-6" LG.		DOWELS J #4 @ 12" 2'-6" LG.		BARS P #4 @ 12"		BARS P1 #4 @ 12"						BARS P2 - ONE PER EACH LENGTH SHOWN #4 @ 12"						BARS Q #4 @ 12"						BARS R 3-#4	BARS S 45° WALL 2-#4	Bars S1 15° WALL 2-#4	BARS U - ONE PER EACH LENGTH SHOWN #4 @ 12"			
													LENGTH														45° WALL			
S X H	NO. *	NO. **	NO. *	NO.**	NO.	LENGTH	NO.	C_5	C_6	C_7	C_8	LENGTH	a_1	a_2	a_3	a_4	a_5	NO.	C_1	C_2	C_3	C_4	LENGTH	LENGTH	LENGTH	LENGTH	LENGTH	a_6	a_7	a_8	a_9
3 x 2	3	3	2	2	1	13'-9"	5	10'-6"	1'-6"	5'-6"	6'-6"	17'-2"	5'-4"	9'-1"	-	-	-	5	11'-6"	4'-11"	7'-10"	8'-7"	16'-5"	11'-10"	14'-10"	11'-0"	11'-0"	6'-2"	11'-10"	-	-
3 x 3	4	4	2	2	0	-	7	14'-6"	1'-6"	7'-6"	8'-6"	21'-2"	5'-4"	9'-1"	12'-10"	-	-	7	14'-5"	4'-11"	9'-4"	10'-0"	19'-4"	14'-9"	20'-6"	15'-2"	6'-2"	11'-10"	17'-6"	-
4 x 2	3	3	2	2	2	13'-9"	5	10'-6"	1'-6"	5'-6"	6'-6"	17'-2"	2'-3"	6'-0"	9'-9"	-	-	5	12'-8"	6'-1"	9'-0"	9'-9"	18'-9"	13'-0"	14'-10"	11'-0"	6'-2"	11'-10"	-	-
4 x 3	4	4	2	2	1	17'-9"	7	14'-6"	1'-6"	7'-6"	8'-6"	21'-2"	2'-3"	6'-0"	9'-9"	13'-6"	-	7	15'-7"	6'-1"	10'-6"	11'-2"	21'-8"	15'-11"	20'-6"	15'-2"	6'-2"	11'-10"	17'-6"	-
4 x 4	5	5	2	2	0	-	9	18'-6"	1'-6"	9'-6"	10'-6"	25'-2"	2'-3"	6'-0"	9'-9"	13'-6"	17'-3"	9	18'-6"	6'-1"	11'-11"	12'-8"	24'-7"	18'-10"	26'-2"	19'-4"	6'-2"	11'-10"	17'-6"	23'-1"
5 x 2	3	3	2	2	3	13'-9"	5	10'-6"	1'-6"	5'-6"	6'-6"	17'-2"	2'-10"	6'-7"	10'-4"	-	-	5	13'-10"	7'-3"	10'-2"	10'-11"	21'-1"	14'-2"	14'-10"	11'-0"	6'-2"	11'-10"	-	-
5 x 3	4	4	2	2	2	17'-9"	7	14'-6"	1'-6"	7'-6"	8'-6"	21'-2"	2'-10"	6'-7"	10'-4"	14'-0"	-	7	16'-9"	7'-3"	11'-8"	12'-4"	24'-0"	17'-1"	20'-6"	15'-2"	6'-2"	11'-10"	17'-6"	-
5 x 4	5	5	2	2	1	21'-9"	9	18'-6"	1'-6"	9'-6"	10'-6"	25'-2"	2'-10"	6'-7"	10'-4"	14'-0"	17'-9"	9	19'-8"	7'-3"	13'-1"	13'-10"	26'-11"	20'-0"	26'-2"	19'-4"	6'-2"	11'-10"	17'-6"	23'-1"
6 x 3	4	4	2	2	3	17'-9"	7	14'-6"	1'-6"	7'-6"	8'-6"	21'-2"	3'-4"	7'-1"	10'-10"	14'-7"	-	7	17'-11"	8'-4"	12'-9"	13'-6"	26'-3"	18'-3"	20'-6"	15'-2"	6'-2"	11'-10"	17'-6"	-
6 x 4	5	5	2	2	2	21'-9"	9	18'-6"	1'-6"	9'-6"	10'-6"	25'-2"	3'-4"	7'-1"	10'-10"	14'-7"	18'-3"	9	20'-10"	8'-4"	14'-3"	14'-11"	29'-2"	21'-2"	26'-2"	19'-4"	6'-2"	11'-10"	17'-6"	23'-1"
7 x 3	4	4	2	2	4	17'-9"	7	14'-6"	1'-6"	7'-6"	8'-6"	21'-2"	4'-0"	7'-9"	11'-5"	15'-2"	-	7	19'-1"	9'-6"	13'-11"	14'-8"	28'-7"	19'-5"	20'-6"	15'-2"	6'-2"	11'-10"	17'-6"	-
7 x 4	5	5	2	2	3	21'-9"	9	18'-6"	1'-6"	9'-6"	10'-6"	25'-2"	4'-0"	7'-9"	11'-5"	15'-2"	19'-0"	9	22'-0"	9'-6"	15'-5"	16'-1"	31'-6"	22'-4"	26'-2"	19'-4"	6'-2"	11'-10"	17'-6"	23'-1"
8 x 4	5	5	2	2	5	21'-9"	9	18'-6"	1'-6"	9'-6"	10'-6"	25'-2"	4'-6"	8'-3"	12'-0"	15'-9"	-	9	23'-1"	10'-8"	16'-6"	17'-3"	33'-9"	23'-6"	26'-2"	19'-4"	6'-2"	11'-10"	17'-6"	23'-1"

CULVERT SIZE (FEET)	TABLE OF REINFORCING STEEL FOR ONE END																							
	BARS U1 - ONE PER EACH LENGTH SHOWN #4 @ 12"				BARS V #4 @ 12"						BARS V1 #4 @ 12"						2 BARS W 45° WALL		2 BARS W1 15° WALL		BARS Y 8-#5	BARS T 8-#5
	15° WALL				45° WALL						15° WALL											
S X H	a_{10}	a_{11}	a_{12}	a_{13}	No.	C_9	C_{10}	C_{11}	C_{12}	LENGTH	No.	C_9	C_{10}	C_{11}	C_{12}	LENGTH	SIZE	LENGTH	SIZE	LENGTH	LENGTH	LENGTH
3 x 2	4'-6"	8'-7"	-	-	7	2'-9"	6"	1'-6"	1'-9"	6'-3"	5	2'-9"	6"	1'-6"	1'-9"	6'-3"	#5	14'-5"	#5	10'-8"	4'-4"	3'-2"
3 x 3	4'-6"	8'-7"	12'-9"	-	10	3'-9"	6"	2'-0"	2'-3"	7'-3"	7	3'-9"	6"	2'-0"	2'-3"	7'-3"	#5	20'-2"	#5	14'-11"	4'-4"	4'-2"
4 x 2	4'-6"	8'-7"	-	-	7	2'-9"	6"	1'-6"	1'-9"	6'-3"	5	2'-9"	6"	1'-6"	1'-9"	6'-3"	#5	14'-5"	#5	10'-8"	5'-6"	3'-2"
4 x 3	4'-6"	8'-7"	12'-9"	-	10	3'-9"	6"	2'-0"	2'-3"	7'-3"	7	3'-9"	6"	2'-0"	2'-3"	7'-3"	#5	20'-2"	#5	14'-11"	5'-6"	4'-2"
4 x 4	4'-6"	8'-7"	12'-9"	16'-11"	13	4'-9"	6"	2'-6"	2'-9"	8'-3"	9	4'-9"	6"	2'-6"	2'-9"	8'-3"	#6	25'-11"	#6	19'-1"	5'-6"	5'-2"
5 x 2	4'-6"	8'-7"	-	-	7	2'-9"	6"	1'-6"	1'-9"	6'-3"	5	2'-9"	6"	1'-6"	1'-9"	6'-3"	#5	14'-5"	#5	10'-8"	6'-8"	3'-2"
5 x 3	4'-6"	8'-7"	12'-9"	-	10	3'-9"	6"	2'-0"	2'-3"	7'-3"	7	3'-9"	6"	2'-0"	2'-3"	7'-3"	#5	20'-2"	#5	14'-11"	6'-8"	4'-2"
5 x 4	4'-6"	8'-7"	12'-9"	16'-11"	13	4'-9"	6"	2'-6"	2'-9"	8'-3"	9	4'-9"	6"	2'-6"	2'-9"	8'-3"	#6	25'-11"	#6	19'-1"	6'-8"	5'-2"
6 x 3	4'-6"	8'-7"	12'-9"	-	10	3'-9"	6"	2'-0"	2'-3"	7'-3"	7	3'-9"	6"	2'-0"	2'-3"	7'-3"	#5	20'-2"	#5	14'-11"	7'-10"	4'-2"
6 x 4	4'-6"	8'-7"	12'-9"	16'-11"	13	4'-9"	6"	2'-6"	2'-9"	8'-3"	9	4'-9"	6"	2'-6"	2'-9"	8'-3"	#6	25'-11"	#6	19'-1"	7'-10"	5'-2"
7 x 3	4'-6"	8'-7"	12'-9"	-	10	3'-9"	6"	2'-0"	2'-3"	7'-3"	7	3'-9"	6"	2'-0"	2'-3"	7'-3"	#5	20'-2"	#5	14'-11"	9'-0"	4'-2"
7 x 4	4'-6"	8'-7"	12'-9"	16'-11"	13	4'-9"	6"	2'-6"	2'-9"	8'-3"	9	4'-9"	6"	2'-6"	2'-9"	8'-3"	#6	25'-11"	#6	19'-1"	9'-0"	5'-2"
8 x 4	4'-6"	9'-0"	12'-9"	16'-11"	13	4'-9"	6"	2'-6"	2'-9"	8'-3"	9	4'-9"	6"	2'-6"	2'-9"	8'-3"	#6	25'-11"	#6	19'-1"	10'-2"	5'-2"

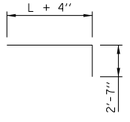
TOTAL QUANTITIES ONE END			
CONC.	RE-BARS	PIPE RUNNERS	RIPRAP HAND-LAID
CU. YD.	LB.	FT.	SQ. YD.
3.4	391	41.67	5.9
5.4	573	67.17	7.6
3.8	423	41.67	6.1
5.8	610	67.17	7.8
8.3	867	97.83	9.5
4.1	453	54.17	6.3
6.2	646	84.42	8.0
8.8	909	119.83	9.7
6.6	682	84.42	8.2
9.2	951	119.83	9.9
7.4	719	101.67	8.4
10.2	995	141.84	10.1
11.2	1038	141.84	10.3

NOTE:

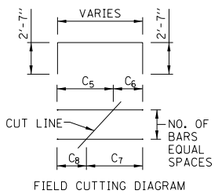
REINFORCEMENT BAR BENDING DIMENSIONS ARE OUT TO OUT.

* 45° WALL

** 15° WALL

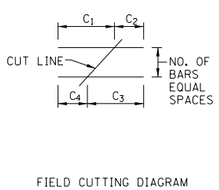


BARS P



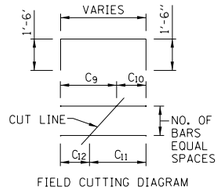
FIELD CUTTING DIAGRAM

BARS P1



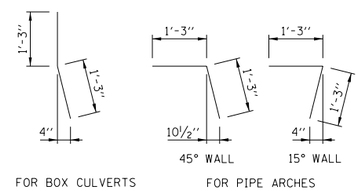
FIELD CUTTING DIAGRAM

BARS Q



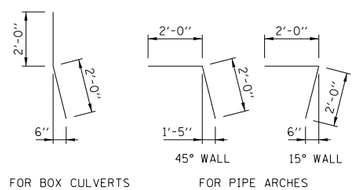
FIELD CUTTING DIAGRAM

BARS V AND V1



FOR BOX CULVERTS FOR PIPE ARCHES

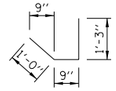
DOWELS H



FOR BOX CULVERTS FOR PIPE ARCHES

DOWELS J

PIPE ARCH AND ELLIPTICAL PIPE CULVERTS



FOR PIPE OR ELLIPTICAL PIPE CULVERTS SELECT APPROPRIATE " S " & " H " FROM SIZES SHOWN. ADD THE FOLLOWING ADDITIONAL BARS:

(a) 1 ADDITIONAL Y BAR
(b) #4 - T1 BARS @ APPROX. 12" CTS. (NO. = S+2)

T1 BARS

THE WEIGHT OF THE ADDITIONAL BARS AND THE ADDITIONAL QUANTITY OF CONCRETE IN THE HEADWALL SHALL BE ADDED TO THE QUANTITIES SHOWN.

SHEET 2 OF 2

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

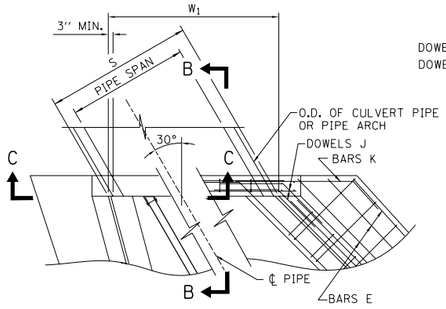
Illinois Tollway
Open Roads for a Faster Future

SAFETY END TREATMENT FOR SINGLE CULVERTS 30° SKEW 4:1 SLOPE H ≤ 4'

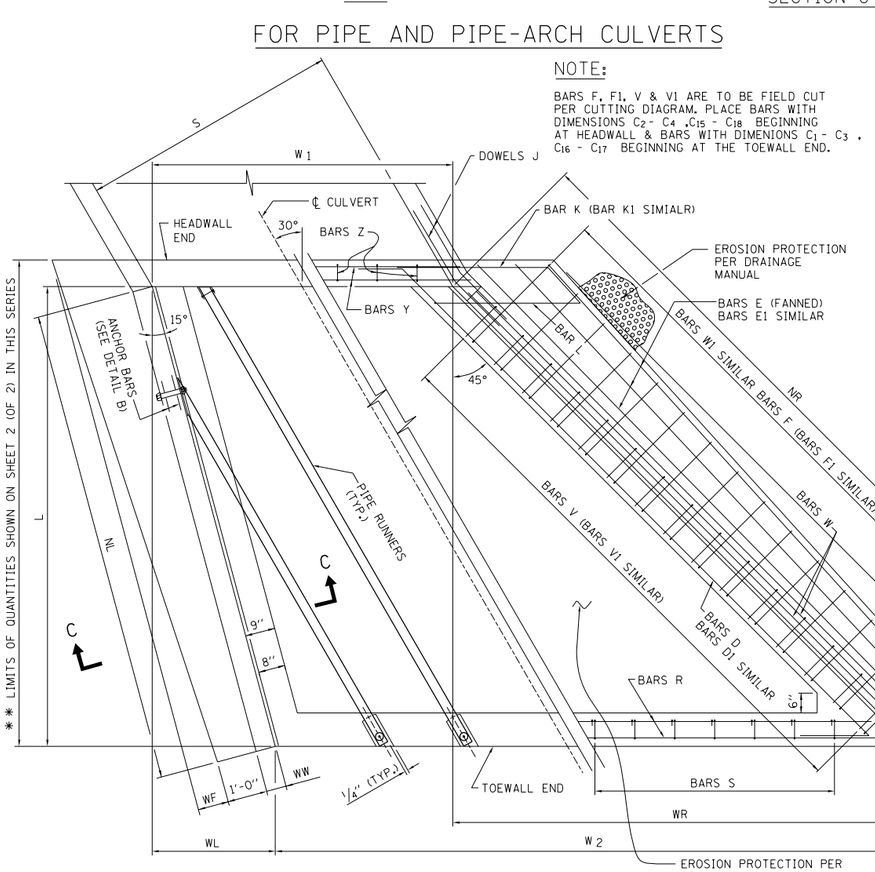
DATE 5-12-2005

STANDARD NO. SD 05-34E

REVISIONS



HALF PLAN
SHOWING DIMENSIONS

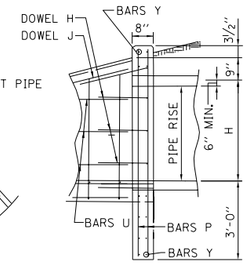


HALF PLAN
SHOWING REINFORCING BARS

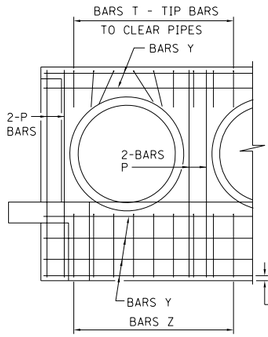
* * DOWEL BARS EXTENDING INTO THE CONCRETE BOX CULVERT ARE INCLUDED IN THE QUANTITIES.

S = DESIGN SPAN H = DESIGN HEIGHT

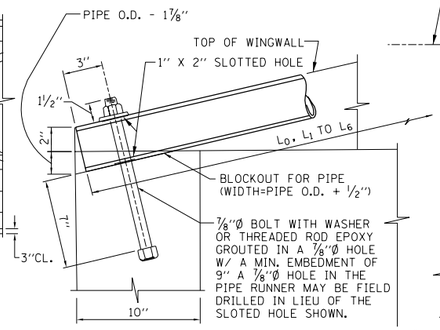
FOR BOX CULVERTS



SECTION B-B



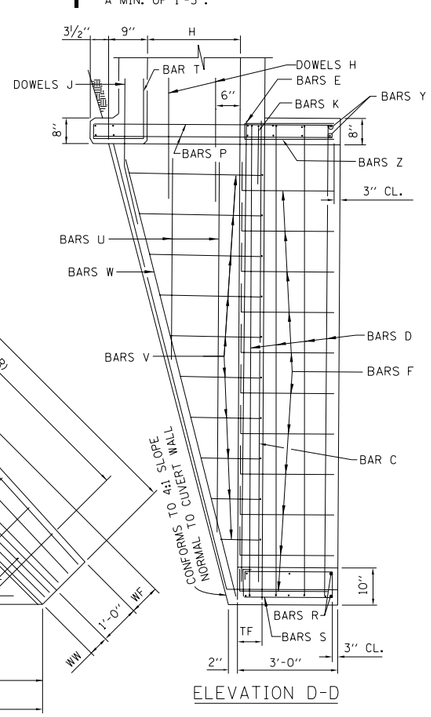
SECTION C-C



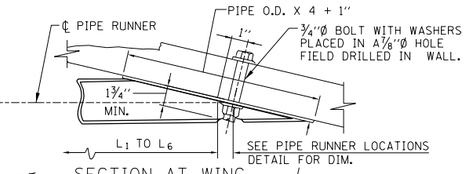
SECTION THRU TOEWALL

NOTE:

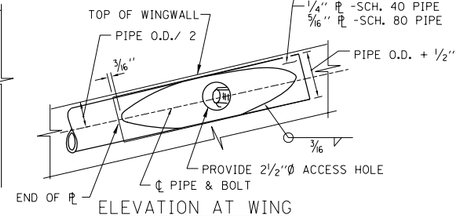
DOWEL BAR J & H NOT REQUIRED WITH EXISTINGBOX CULVERTS PROVIDING THE REINFORCING FROM THE EXIST. BOX IS EXTENDED INTO THE NEW CONCRETE A MIN. OF 1'-3".



ELEVATION D-D



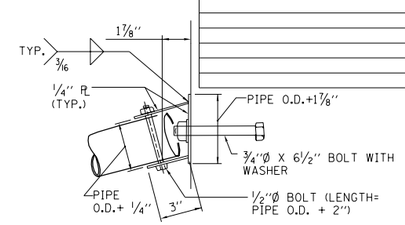
SECTION AT WING



ELEVATION AT WING

NOTE:

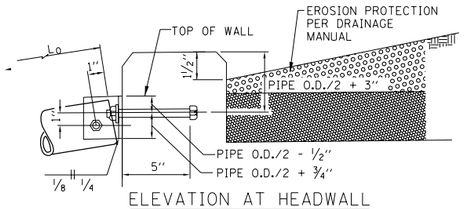
PIPE O.D. IS THE PIPE RUNNER OUTSIDE DIAMETER.



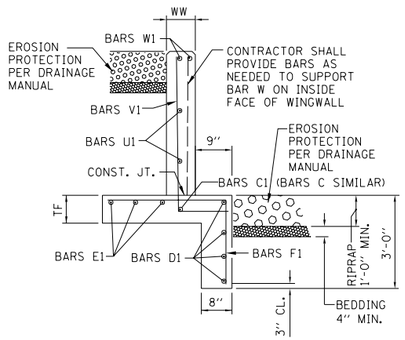
PLAN AT HEADWALL

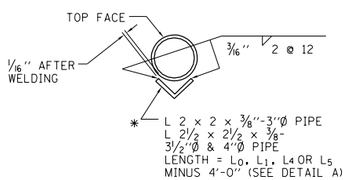
NOTE:

A ¾" Ø x 9½ BOLT WITH ADDITIONAL P WASHER PLACED IN A ⅞" Ø HOLE DRILLED THROUGH THE HEADWALL OR A ¾" Ø x 8" THREADED ROD EPOXY GROUTED IN A ⅞"Ø HOLE WITH A MINIMUM EMBEDMENT OF 6⅝" MAY BE USED IN LIEU OF CAST-IN-PLACE BOLT SHOWN.



ELEVATION AT HEADWALL

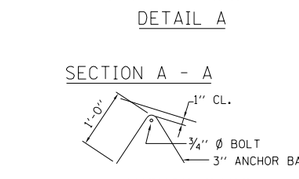




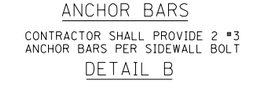
* NOTE:

WHERE L_0, L_1, L_4 OR L_5 EXCEEDS THE FOLLOWING LENGTH THE PIPE RUNNER SHALL BE STRENGTHENED OVER MIDSPAN AS SHOWN.

PIPE	LENGTH
3"Ø. SCH. 40	12'-8"
3"Ø. SCH. 80	15'-4"
3½"Ø. SCH. 80	22'-1"
4"Ø. SCH. 80	29'-4"



DETAIL A



ANCHOR BARS

CONTRACTOR SHALL PROVIDE 2 #3 ANCHOR BARS PER SIDEWALL BOLT

DETAIL B

PIPE RUNNER DETAILS

GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS SI.
2. ALL EXPOSED CONCRETE EDGES SHALL HAVE A ¾" × 45° CHAMFER. CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF ONE FOOT BELOW FINISHED GROUND LEVEL. COVER FROM THE FACE OF CONCRETE TO THE FACE OF REINFORCEMENT BARS SHALL BE 2", UNLESS OTHERWISE SHOWN.
3. CONCRETE QUANTITIES SHOWN ON SHEET 2 (OF 2) IN THIS SERIES ARE FOR REINFORCED CONCRETE BOX CULVERT SECTIONS AND ADDITIONAL CONCRETE REQUIRED IN HEADWALLS FOR PIPE OR ARCH CULVERT SECTIONS SHALL BE ADDED TO THESE QUANTITIES.
4. THIS STANDARD MAY BE USED FOR CULVERTS WITH SKEW OF 0° ± 7.5°.
5. DESIGN: SAFETY PIPE RUNNERS ARE DESIGNED FOR A TRANSVERSING LOAD OF 1,800 POUNDS AT YIELD AS RECOMMENDED BY RESEARCH REPORT 280-1, SAFETY TREATMENT OF ROADSIDE CROSS DRAINAGE STRUCTURES, TEXAS TRANSPORTATION INSTITUTE, MARCH 1981.

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

SAFETY END TREATMENT FOR SINGLE & MULTIPLE CULVERTS 30° SKEW, 4:1 H≤8' & S=VARIES

DATE	STANDARD NO.
5-12-2005	SD 05-34F

REVISIONS

TABLE OF DIMENSIONS

H	S	L	NL	NR	WW	W_1 (4.)	W_2 (4.)	WL	WR	WF	TF
3′	9′	14′-4″	14′-10 1/8″	20′-3 3/4″	7″	10′-4 3/4″	20′-10 5/8″	3′-10 1/8″	14′-4″	3″	7″
4′	9′	18′-4″	18′-11 3/4″	25′-11 1/8″	7″	10′-4 3/4″	23′-9 3/4″	4′-11″	18′-4″	9″	8″
5′	5′	22′-4″	23′-1 1/2″	31′-7″	7″	5′-9 1/4″	22′-1 1/2″	5′-11 3/4″	22′-4″	1′-3″	8″
6′	6′	26′-4″	27′-3 1/8″	37′-2 7/8″	7″	6′-11 1/8″	26′-2 1/2″	7′-5/8″	26′-4″	1′-9″	8 1/2″
7′	7′	30′-4″	31′-4 7/8″	42′-10 3/4″	7″	8′-1″	30′-3 1/2″	8′-1 1/2″	30′-4″	2′-3″	9″
8′	8′	34′-4″	35′-6 1/2″	48′-6 5/8″	8″	9′-2 7/8″	34′-4 1/2″	9′-2 3/8″	34′-4″	2′-9″	9 1/2″

TOTAL QUANTITIES ONE END MINIMUM "S"				INCREASE IN QUANTITIES FOR 1′ INCREASE IN "S"			
CONC. CU. YD.	RE-BARS LBS.	RIPRAP DUMPED SQ. YD.	RIPRAP HAND-LAID SQ. YD.	CONC. CU. YD.	RE-BARS LBS.	RIPRAP DUMPED SQ. YD.	RIPRAP HAND-LAID SQ. YD.
7.5	1006	20.3	8.6	0.22	33	1.73	0.19
10.3	1265	29.1	10.2	0.22	33	2.25	0.19
12.2	1373	28.2	11.2	0.22	33	2.76	0.19
15.8	1851	40.9	13.0	0.22	33	3.28	0.19
20.7	2326	55.9	14.9	0.22	33	3.79	0.19
36.7	2953	73.2	16.8	0.22	33	4.30	0.19

NOTE:

REINFORCEMENT BARS BENDING DIMENSIONS ARE OUT TO OUT.

PIPE RUNNERS FOR ONE END

H	SIZE (DIA.)	SCHEDULE	WINGWALL PIPES - ONE PER EACH LENGTH SHOWN								HEADWALL PIPES			TOTAL LENGTH
			15° WALL			45° WALL								
			L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	S	No.	L_0	
3′	3″	40	11′-11″	-	-	13′-3″	6′-0″	-	-	-	9′	4	16′-10″	97.50
4′	3″	80	16′-8″	-	-	18′-0″	10′-9″	-	-	-	9′	4	21′-7″	130.59
5′	3 1/2″	80	21′-4″	11′-6″	-	22′-8″	15′-5″	8′-2″	-	-	5′	3	26′-4″	156.72
6′	3 1/2″	80	26′-1″	16′-2″	-	27′-9″	20′-2″	12′-11″	5′-8″	-	6′	3	31′-0″	199.91
7′	4″	80	30′-10″	20′-11″	11′-0″	32′-2″	24′-9″	17′-8″	10′-9″	-	7′	4	35′-9″	288.75
8′	4″	80	35′-9″	25′-8″	15′-9″	36′-10″	29′-7″	22′-4″	15′-1″	7′-10″	8′	4	40′-6″	348.43

TABLE OF REINFORCING STEEL FOR ONE END

H	1-BAR C 45° WALL		1-BAR C1 15° WALL		BAR D 4-#4 45° WALL	BAR D1 4-#4 15° WALL	#4-BARS E 45° WALL (6.)		#4-BARS E1 15° WALL (6.)	
	SIZE	LENGTH	SIZE	LENGTH	LENGTH	LENGTH	NO.	LENGTH	NO.	LENGTH
3′	#4	20′-8″	#4	15′-3″	22′-9″	17′-2″	2	17′-0″	2	21′-4″
4′	#4	26′-4″	#4	19′-5″	28′-5″	21′-4″	2	21′-1″	2	27′-0″
5′	#4	32′-0″	#4	23′-7″	34′-1″	25′-6″	2	25′-3″	2	32′-8″
6′	#4	37′-8″	#4	27′-8″	39′-9″	29′-7″	3	29′-4″	3	38′-4″
7′	#5	44′-10″ (6.)	#5	31′-10″	46′-11″ (6.)	33′-9″	3	33′-6″	3	44′-0″
8′	#5	50′-6″ (6.)	#5	36′-0″	52′-6″ (6.)	37′-10″	3	37′-7″	3	49′-8″

TABLE OF REINFORCING STEEL FOR ONE END

H	BARS F EQUALLY SPACED 45° WALL							BARS L 45° WALL				BARS F1 EQUALLY SPACED 15° WALL							DOWELS H #5 @ 12″ 45° WALL		DOWELS H #5 @ 12″ 15° WALL		DOWELS J 4 - #6 (5.)	1-BAR K 45° WALL			1-BAR K1 15° WALL			2-BARS W 45° WALL		2-BARS W1 15° WALL	
	SIZE	NO.	C_1	C_2	C_3	C_4	LENGTH	SIZE	NO.	C_0	LENGTH	SIZE	NO.	C_1	C_2	C_3	C_4	LENGTH	NO.	LENGTH	NO.	LENGTH	LENGTH	SIZE	C_5	LENGTH	SIZE	C_6	LENGTH	SIZE	LENGTH	SIZE	LENGTH
3′	#4	10	1′-11″	2′-2″	2′-0″	2′-1″	9′-3″	#4	-	--	--	#4	8	1′-11″	2′-2″	2′-0″	2′-1″	9′-3″	3	3′-0″	3	3′-0″	4′-6″	#5	3′-1″	4′-7″	#5	2′-3″	3′-9″	#5	19′-11″	#5	14′-11″
4′	#4	12	1′-11″	2′-8″	2′-3″	2′-4″	9′-9″	#4	1	3′-10″	6′-5″	#4	10	1′-11″	2′-8″	2′-3″	2′-4″	9′-9″	4	3′-0″	4	3′-0″	4′-6″	#5	3′-10″	5′-4″	#5	2′-10″	4′-4″	#6	25′-8″	#6	19′-2″
5′	#4	15	1′-11″	3′-2″	2′-6″	2′-7″	10′-3″	#4	2	4′-6″	7′-1″	#4	12	1′-11″	3′-2″	2′-6″	2′-7″	10′-3″	5	3′-0″	5	3′-0″	4′-6″	#5	4′-6″	6′-0″	#5	3′-4″	4′-10″	#6	31′-5″	#6	23′-5″
6′	#5	18	1′-11″	3′-8″	2′-9″	2′-10″	10′-9″	#5	2	5′-3″	7′-10″	#5	14	1′-11″	3′-8″	2′-9″	2′-10″	10′-9″	6	3′-0″	6	3′-0″	4′-6″	#5	5′-3″	6′-9″	#5	3′-11″	5′-5″	#6	37′-2″	#6	27′-8″
7′	#5	20	2′-0″	4′-3″	3′-1″	3′-2″	11′-5″	#5	3	6′-0″	8′-7″	#5	16	2′-0″	4′-2″	3′-1″	3′-1″	11′-4″	7	3′-0″	7	3′-0″	4′-6″	#5	6′-0″	7′-6″	#5	4′-5″	5′-11″	#7	44′-2″ (6.)	#7	31′-11″
8′	#6	23	2′-1″	4′-10″	3′-5″	3′-6″	12′-1″	#6	3	6′-9″	9′-4″	#6	18	2′-1″	4′-8″	3′-4″	3′-5″	11′-11″	8	3′-0″	8	3′-0″	4′-6″	#5	6′-9″	8′-3″	#5	5′-0″	6′-6″	#7	50′-0″ (6.)	#7	36′-2″

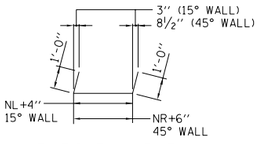
TABLE OF REINFORCING STEEL FOR ONE END

H	BARS U- ONE PER EACH LENGTH SHOWN #4 @ 12″ 45° WALL								BARS U1 - ONE PER EACH LENGTH SHOWN #4 @ 12″ 15° WALL								BARS V #4-EQUALLY SPACED 45° WALL							BARS V1 #4-EQUALLY SPACED 15° WALL						
	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14} (6)	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	NO.	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	LENGTH	NO.	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	LENGTH
3′	6′-2″	11′-9″	17′-5″	--	--	--	--	--	4′-6″	8′-7″	12′-9″	--	--	--	--	--	10	3′-11″	9″	2′-3″	2′-5″	1′-0″	6′-8″	7	3′-11″	9″	2′-3″	2′-5″	1′-0″	6′-8″
4′	6′-2″	11′-9″	17′-5″	23′-1″	--	--	--	--	4′-6″	8′-7″	12′-9″	16′-11″	--	--	--	--	13	5′-0″	10″	2′-10″	3′-0″	1′-0″	7′-10″	9	5′-0″	10″	2′-10″	3′-0″	1′-0″	7′-10″
5′	6′-2″	11′-9″	17′-5″	23′-1″	28′-9″	--	--	--	4′-6″	8′-7″	12′-9″	16′-11″	21′-0″	--	--	--	15	6′-0″	10″	3′-4″	3′-6″	1′-0″	8′-10″	11	6′-0″	10″	3′-4″	3′-6″	1′-0″	8′-10″
6′	6′-2″	11′-9″	17′-5″	23′-1″	28′-9″	34′-5″	--	--	4′-6″	8′-7″	12′-9″	16′-11″	21′-0″	25′-2″	--	--	18	7′-0″	10″	3′-10″	4′-0″	1′-0″	9′-10″	14	7′-0″	10″	3′-10″	4′-0″	1′-0″	9′-10″
7′	6′-2″	11′-9″	17′-5″	23′-1″	28′-9″	34′-5″	40′-0″	--	4′-6″	8′-7″	12′-9″	16′-11″	21′-0″	25′-2″	29′-4″	--	21	8′-1″	11″	4′-5″	4′-7″	1′-0″	11′-0″	16	8′-1″	11″	4′-5″	4′-7″	1′-0″	11′-0″
8′	6′-2″	11′-9″	17′-5″	23′-1″	28′-9″	34′-5″	40′-0″	47′-3″	4′-6″	8′-7″	12′-9″	16′-11″	21′-0″	25′-2″	29′-4″	33′-5″	24	9′-1″	11″	4′-11″	5′-1″	1′-1″	12′-2″	18	9′-1″	11″	4′-11″	5′-1″	1′-1″	12′-2″

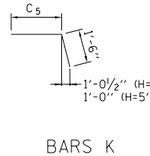
NUMBER OF HEADWALL PIPE RUNNERS FOR 1 END			
S	NO.	S	NO.
10′	5	23′	11
11′	5	24′	11
12′	6	25′	12
13′	6	26′	12
14′	7	27′	12
15′	7	28′	13
16′	8	29′	13
17′	8	30′	14
18′	8	31′	14
19′	9	32′	15
20′	9	33′	15
21′	10	34′	16
22′	10	35′	16

TABLE OF REINFORCING STEEL FOR MINIMUM "S" - ONE END

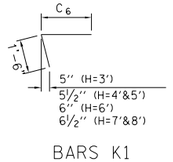
H	S	BARS Y 12-#5 (2.) LENGTH	BARS R 6-#5 (2.) LENGTH	BARS Z #4@12″ (1.) No.	BARS Z #4@12″ (1.) LENGTH	BARS S #4@12″ (1.) No.	BARS S #4@12″ (1.) LENGTH	BARS T #4@12″ (1.) No.	BARS T #4@12″ (1.) LENGTH	BARS P 8-#5 (3.) LENGTH
3′	≥9′	11′-4″	19′-10″	10	5′-4″	20	6′-10″	10	3′-0″	6′-8″
4′	≥9′	11′-4″	22′-10″	10	5′-4″	23	6′-10″	10	3′-0″	7′-8″
5′	≥5′	6′-9″	21′-1″	6	5′-4″	21	6′-10″	6	3′-0″	8′-8″
6′	≥6′	7′-10″	25′-2″	7	5′-4″	25	6′-10″	7	3′-0″	9′-8″
7′	≥7′	9′-1″	29′-3″	8	5′-4″	30	6′-10″	8	3′-0″	10′-8″
8′	≥8′	10′-4″	33′-4″	9	5′-4″	34	6′-10″	9	3′-0″	11′-8″



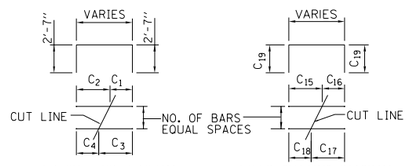
BARS D AND D1



BARS K

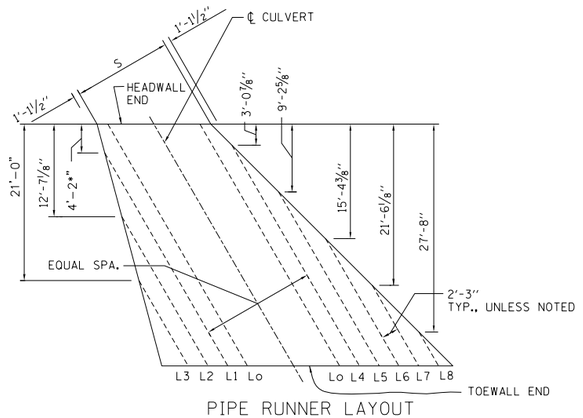


BARS K1

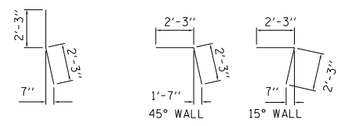


BARS F AND F1

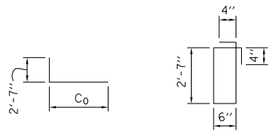
BARS V AND V1



PIPE RUNNER LAYOUT

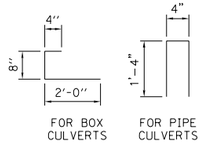


DOWELS J

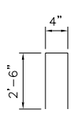


BARS S

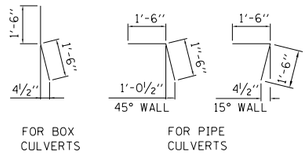
BARS L



BARS T



BARS Z



DOWELS H

NOTES FOR TABLES:

1. THE NUMBER OF BARS S, T AND Z SHALL BE INCREASED BY 1 FOR EACH 1 FOOT OF INCREASE IN DIMENSION "W1".
2. THE LENGTH OF BARS R AND Y SHALL BE INCREASED BY 1′-1 7/8″ FOR EACH 1 IF INCREASE IN DIMENSION "S".
3. THE NUMBER OF BARS P SHOWN ARE FOR SINGLE SPAN PIPES OR BOX CULVERTS. THIS NUMBER SHALL BE INCREASED BY 4 FOR EACH MULTIPLE OF PIPE OR BOX ADDED.
4. THIS DIMENSION SHALL BE INCREASED BY 1′-1 7/8″ INCHES FOR EACH 1 FOOT INCREASE IN DIMENSION "S".
5. 2 BARS FOR 15° WALL, 2 BARS FOR 45° WALL.
6. THE LENGTH OF THIS BAR INCLUDES ONE 1′-6″ MINIMUM LAP.

APPROVED Jeff Daley CHIEF ENGINEER DATE 6-14-2006

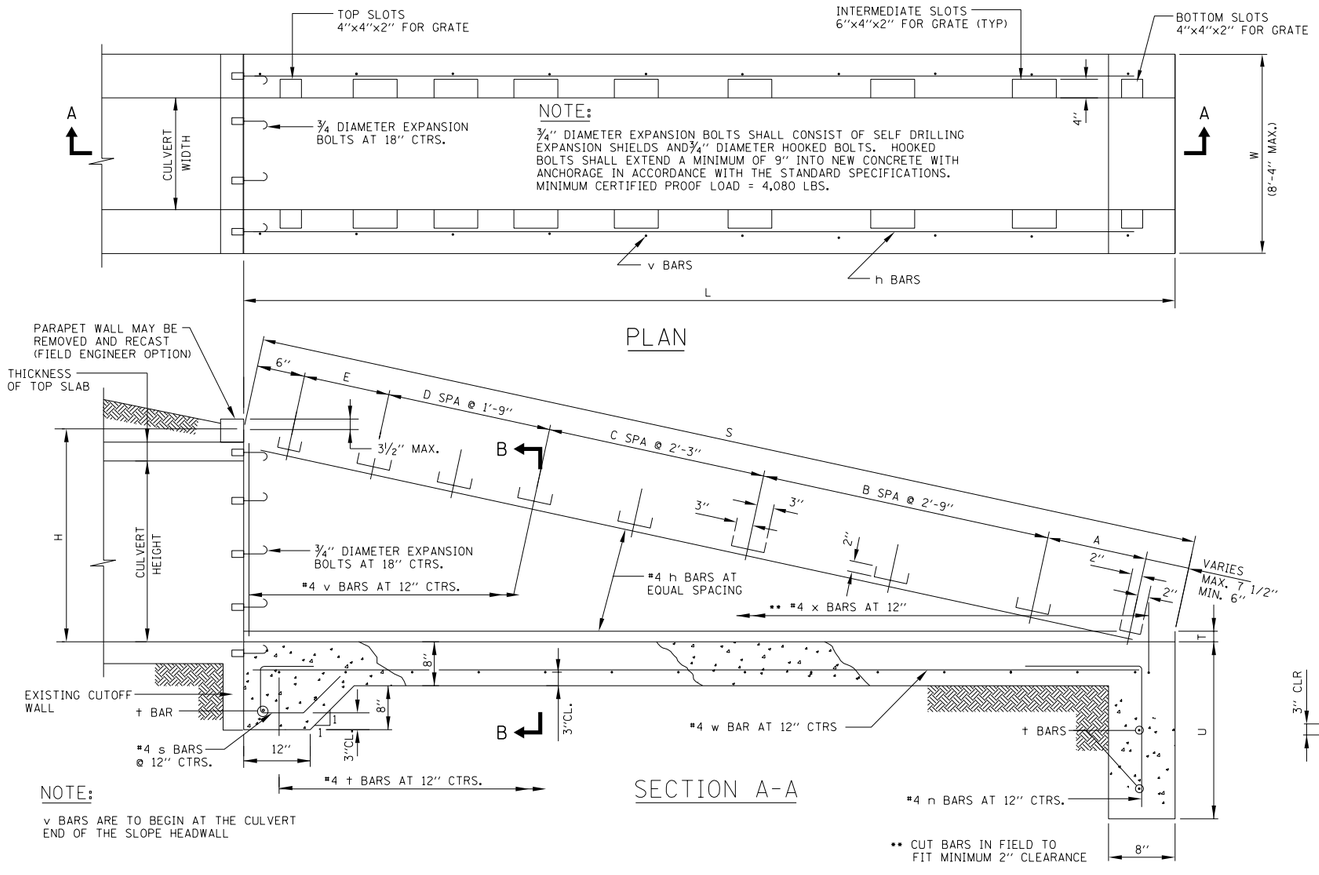
Illinois Tollway
Open Roads for a Faster Future

SAFETY END TREATMENT FOR SINGLE & MULTIPLE CULVERTS 30° SKEW 4:1 H≤ 8′ & S=VARIES

DATE 5-12-2005

STANDARD NO. SD 05-34F

REVISIONS

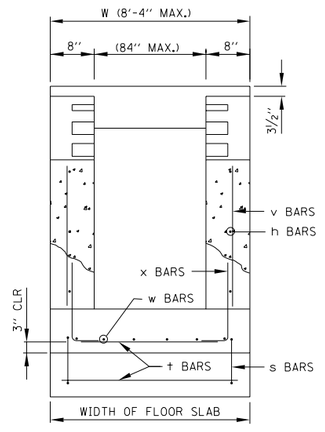


PLAN

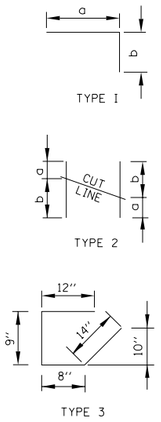
NOTE:

v BARS ARE TO BEGIN AT THE CULVERT END OF THE SLOPE HEADWALL

SECTION A-A



SECTION B-B
SINGLE BOX ≤ 84"



DIMENSIONS AND QUANTITIES IN TWO WINGWALLS 4 : 1 SLOPE

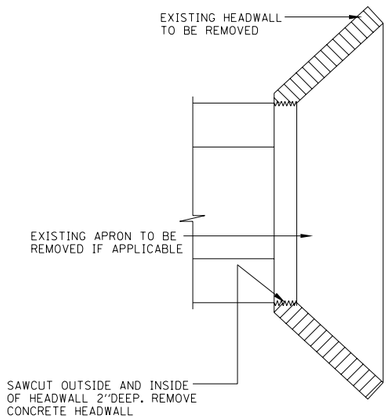
CULVERT HEIGHT	DIMENSIONS							NO. OF SPACES			CONC. HDWLS CLASS SI CY •	REINF. STEEL LBS. •
	H	L	S	T	U	A	E	B	C	D		
36"	3'-8"	14'-0"	14'-5⅛"	2"	2'-8"	2'-2"	2'-2"	-	4	-	1.33	211
42"	4'-3"	16'-4"	16'-10"	2"	3'-2"	2'-8"	2'-2"	4	-	-	1.78	285
48"	4'-9"	18'-4"	18'-10¾"	2"	3'-2"	2'-2"	2'-2"	-	6	-	2.23	333
54"	5'-3"	20'-4"	20'-11½"	2"	3'-6"	2'-2"	2'-2"	4	2	-	2.72	411
60"	5'-10"	22'-8"	23'-4⅜"	2"	3'-6"	2'-2"	2'-2"	-	8	-	3.36	504

TABLE OF BARS IN ONE WINGWALL 4 : 1 SLOPE

NO. 4 REINFORCING BARS						
CULVERT HEIGHT	MARK	TYPE	NO. REQ'D	LENGTH	a	b
36"	4 h 36	STR.	4	13'-8"		
	3/4" EXP BLT	---	3	---		
	4 v 36	2	7	5'-6"	2'-0"	3'-6"
	4 x 36	1	15	4'-4"	2'-2"	2'-2"
42"	4 h 42	STR.	5	16'-0"		
	3/4" EXP BLT	---	4	---		
	4 v 42	2	10	6'-0"	1'-11"	4'-1"
	4 x 42	1	17	4'-4"	2'-2"	2'-2"
48"	4 h 48	STR.	5	18'-0"		
	3/4" EXP BLT	---	4	---		
	4 v 48	2	12	6'-5"	1'-10"	4'-7"
	4 x 48	1	19	4'-4"	2'-2"	2'-2"
54"	4 h 54	STR.	6	20'-0"		
	3/4" EXP BLT	---	4	---		
	4 v 54	2	14	6'-11"	1'-10"	5'-1"
	4 x 54	1	21	4'-4"	2'-2"	2'-2"
60"	4 h 60	STR.	7	22'-4"		
	3/4" EXP BLT	---	5	---		
	4 v 60	2	16	7'-7"	1'-11"	5'-8"
	4 x 60	1	23	4'-4"	2'-2"	2'-2"

GENERAL NOTES:

1. ALL EXPOSED CONCRETE EDGES SHALL HAVE A ¾" X 45° CHAMFER. CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF ONE FOOT BELOW FINISHED GROUND LEVEL. COVER FROM THE FACE OF CONCRETE TO FACE OF REINFORCEMENT BARS SHALL BE 2" UNLESS OTHERWISE SHOWN.
2. CONCRETE QUANTITIES SHOWN ARE FOR REINFORCED CONCRETE BOX CULVERT HEADWALLS.
3. THE COST OF REQUIRED EXCAVATION, BACKFILLING, REMOVAL AND DISPOSAL OF EXCESS MATERIAL, AND RESTORATION SHALL BE CONSIDERED INCLUDED IN THE UNIT PRICES FOR HEADWALL TYPE IV PAY ITEMS
4. PAY ITEMS ARE IDENTIFIED BY AN ASTERISK (•).



REMOVAL DETAIL

TABLE OF BARS IN SLAB 4 : 1 SLOPE
(PER FT. OF FLOOR SLAB WIDTH)

CULVERT HEIGHT	MARK	TYPE	NO. REQ'D	LENGTH	a	b	REINF. LBS. •	CY. CONC.•
36"	4 n 36	1	1	4'-1"	2'-1"	2'-0"	27	.45
	4 w 36	STR.	1	13'-8"				
	4 † 36	STR	18	W-(0'-4")				
	¾" EXP BLT	---	0.67	---				
	4 s 36	3	1	3'-7"				
42"	4 n 42	1	1	4'-7"	2'-7"	2'-0"	32	.53
	4 w 42	STR.	1	16'-0"				
	4 † 42	STR	20	W-(0'-4")				
	¾" EXP BLT	---	0.67	---				
	4 s 42	3	1	3'-7"				
48"	4 n 48	1	1	4'-7"	2'-7"	2'-0"	33	.58
	4 w 48	STR.	1	18'-0"				
	4 † 48	STR	22	W-(0'-4")				
	¾" EXP BLT	---	0.67	---				
	4 s 48	3	1	3'-7"				
54"	4 n 54	1	1	4'-11"	2'-11"	2'-0"	37	.64
	4 w 54	STR.	1	20'-0"				
	4 † 54	STR	24	W-(0'-4")				
	¾" EXP BLT	---	0.67	---				
	4 s 54	3	1	3'-7"				
60"	4 n 60	1	1	4'-11"	2'-11"	2'-0"	39	.70
	4 w 60	STR.	1	22'-4"				
	4 † 60	STR	26	W-(0'-4")				
	¾" EXP BLT	---	0.67	---				
	4 s 60	3	1	3'-7"				

NOTES:

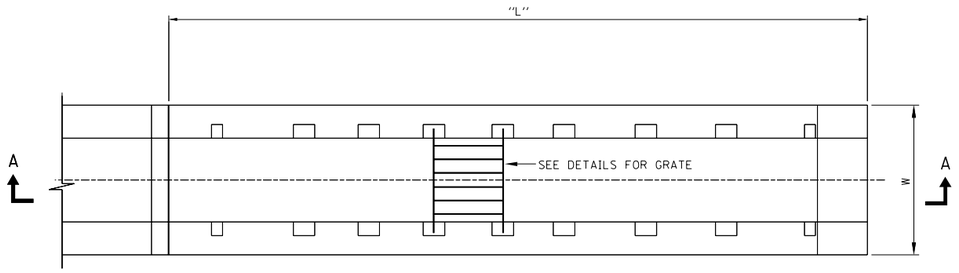
1. TYPE 2 "v" BARS SHALL BE ORDERED FULL LENGTH AND CUT IN THE FIELD. THE REMAINING PORTION OF THE "v" BARS SHALL BE USED IN THE OTHER WALL.
2. THE LONG LEG OF THE "n" BAR SHALL BE VERTICAL.

APPROVED Jeff Mosley CHIEF ENGINEER DATE 6-14-2006

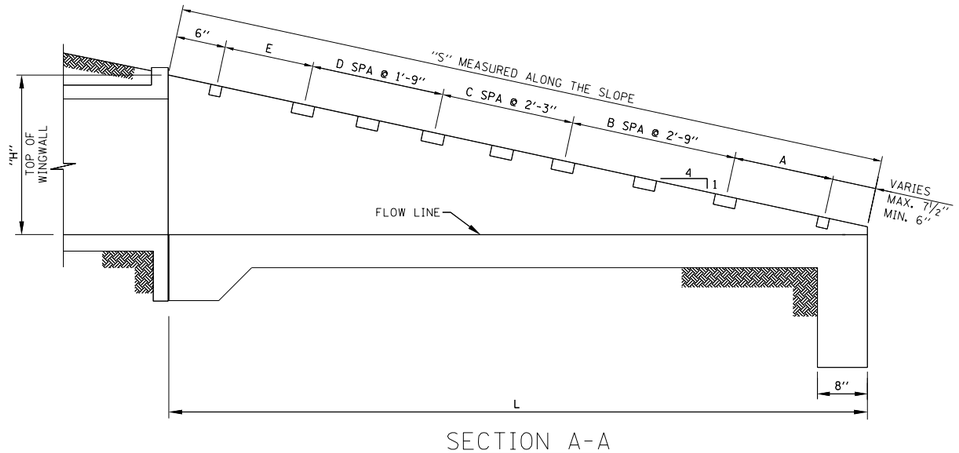
Illinois Tollway
Open Roads for a Faster Future

HEADWALL TYPE IV
BOX CULVERT ≤ 84" WIDTH

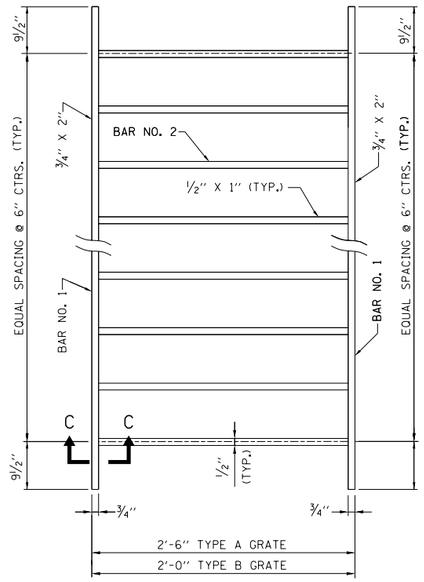
DATE	STANDARD NO.
5-12-2005	SD 05-35A



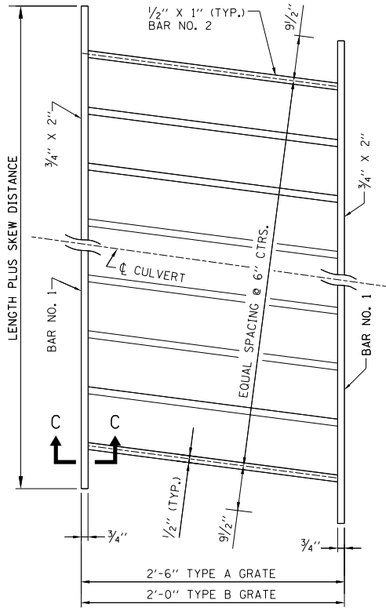
PLAN VIEW (NO SKEW)
SINGLE BOX CULVERT ≤ 84'' WIDE



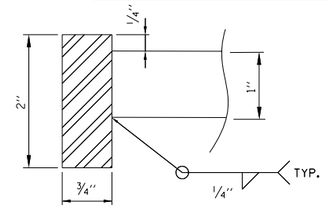
SECTION A-A
END TREATMENT - MULTIPLE OR SINGLE
BOX CULVERT



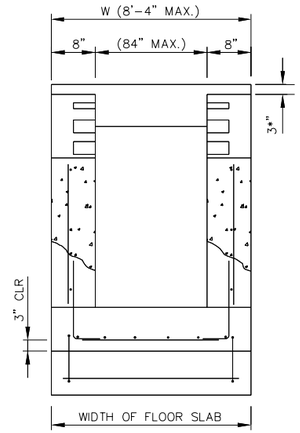
GRATE DETAILS
(NO SKEW)



GRATE DETAILS
(WITH SKEW)



SECTION C-C



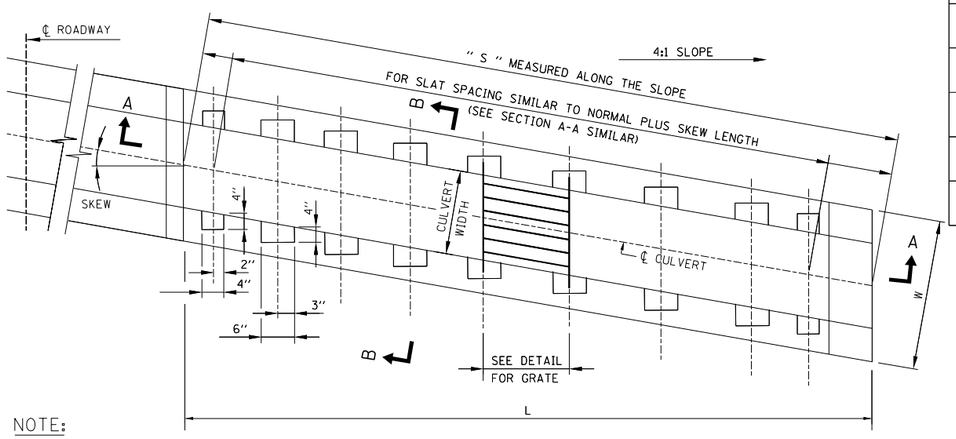
SECTION B-B
SINGLE BOX ≤ 84''

GRATE DIMENSIONS AND QUANTITIES
IN ONE HEADWALL TYPE IV
BASED ON A 1 FOOT WIDTH, 4 : 1 SLOPE, AND NO SKEW

CULVERT HEIGHT	GRATES		BARS FOR ONE GRATE				HEADWALL GRATES (LBS.) •
			BAR NO. 1		BAR NO. 2		
	NUMBER REQUIRED	TYPE REQ'D.	BARS REQ'D.	LENGTH	BARS REQ'D.	LENGTH	EACH GRATE
36''	6	B	2	W-0.75	$\frac{W-1.33}{0.5}$ -1	1'-10½''	16.6W - 19.3
42''	5	A	2	W-0.75	$\frac{W-1.33}{0.5}$ -1	2'-4½''	18.3W - 22.4
	1	B	2			1'-10½''	16.6W - 19.3
48''	8	B	2	W-0.75	$\frac{W-1.33}{0.5}$ -1	1'-10½''	16.6W - 19.3
54''	4	A	2	W-0.75	$\frac{W-1.33}{0.5}$ -1	2'-4½''	18.3W - 22.4
	4	B	2			1'-10½''	16.6W - 19.3
60''	10	B	2	W-0.75	$\frac{W-1.33}{0.5}$ -1	1'-10½''	16.6W - 19.3

DIMENSIONS FOR '' S '' -- SLOPE 4 : 1
FOR VARIOUS CULVERT SIZES AND SKEWS

CULVERT HEIGHT	NO SKEW	≤ 10°	10° ≤ 20°	20° ≤ 30°
36''	14'-5⅛''	14'- 7¾''	15'- 4¼''	16'-8''
42''	16'- 10''	17'- 1''	17'- 11''	19'-5¼''
48''	18'- 10¾''	19'- 2¼''	20'-1¼''	21'-10''
54''	20'- 11½''	21'- 3⅜''	22'-3⅝''	24'-2⅜''
60''	23'- 4⅜''	23'- 8¾''	24'-10⅜''	26'-11¾''



PLAN VIEW
SKEW ORIENTATION

NOTE:

REINFORCEMENT BARS AND GRATE SPACING ARE SIMILAR TO BOX CULVERT AT NORMAL (NO SKEW).

GENERAL NOTES:

1. ALL TABLE DIMENSIONS AND QUANTITIES ARE FOR SINGLE BOX CULVERT HEADWALLS. TO ADAPT ANY OF THESE TABLES FOR DOUBLE BOX CULVERTS, DOUBLE THE NUMBER OF GRATES REQUIRED AND ADD AN ADDITIONAL WALL. (WALL THICKNESS SHALL BE SAME AS THE CENTER WALL THICKNESS OF THE BOX CULVERT)
2. FOR QUANTITY CALCULATIONS DIMENSION "W" SHALL BE MEASURED IN FEET.
3. QUANTITIES FOR SKEWED HEADWALLS NOT SHOWN.
4. PAY ITEMS ARE IDENTIFIED BY AN ASTERISK (•).

REVISIONS

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

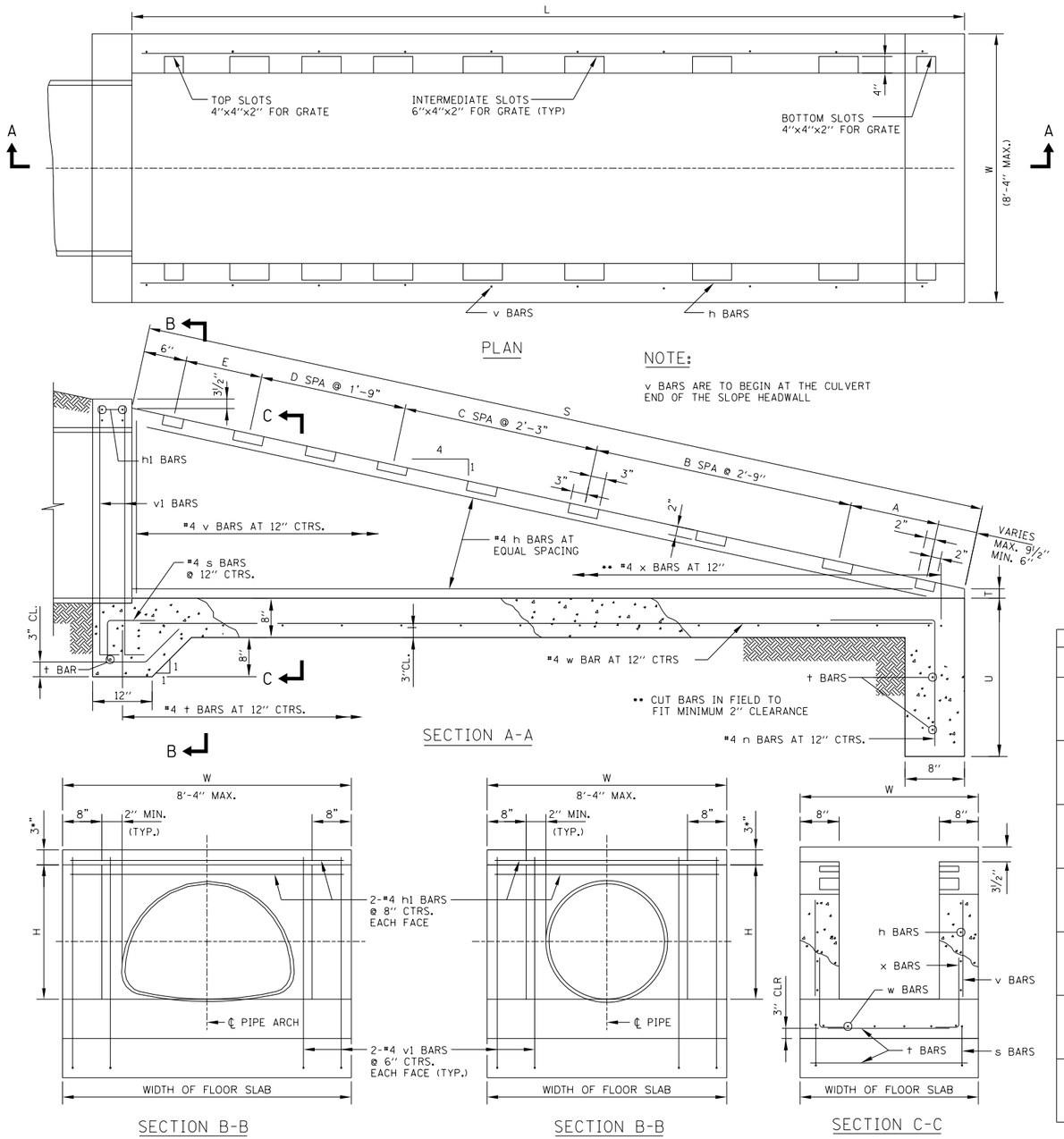
Illinois Tollway
Open Roads for a Faster Future

STEEL GRATE FOR
HEADWALL TYPE IV
BOX CULVERT ≤ 84'' WIDTH

DATE 5-12-2005

STANDARD NO. SD 04-35B

REVISIONS



PLAN

NOTE:

v BARS ARE TO BEGIN AT THE CULVERT END OF THE SLOPE HEADWALL

SECTION A-A

SECTION B-B

ELIPTICAL PIPE OR PIPE-ARCH

SECTION B-B

CIRCULAR PIPE

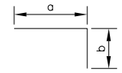
SECTION C-C

DIMENSIONS AND QUANTITIES IN TWO WINGWALLS 4 : 1 SLOPE

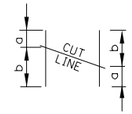
PIPE-ARCH ELLIPTICAL PIPE (SPAN ≤ 77")	CIRCULAR PIPE (DIAMETER)	DIMENSIONS							NO. OF SPACES			CONC. HDWLS. CLASS SI CY. •	REINF. STEEL LBS. •
		H	L	S	T	U	A	E	B	C	D		
RISE ≤ 30"		3'-2"	12'-0"	12'-4½"	2"	2'-8"	2'-2"	2'-2"	-	3	-	.98	171
RISE ≤ 36"		3'-8"	14'-0"	14'-5⅛"	2"	2'-8"	2'-2"	2'-2"	-	4	-	1.33	211
RISE ≤ 42"		4'-3"	16'-4"	16'-10"	2"	3'-2"	2'-8"	2'-2"	4	-	-	1.78	285
RISE ≤ 48"		4'-9"	18'-4"	18'-10¾"	2"	3'-2"	2'-2"	2'-2"	-	6	-	2.23	333
RISE ≤ 54"	54"	5'-3"	20'-4"	20'-11½"	2"	3'-6"	2'-2"	2'-2"	4	2	-	2.72	411
RISE ≤ 60"	60"	5'-10"	22'-8"	23'-4¾"	2"	3'-6"	2'-2"	2'-2"	-	8	-	3.36	504
	66"	6'-4"	24'-8"	25'-5⅛"	2"	3'-6"	2'-2"	2'-2"	4	4	-	3.96	561

GENERAL NOTES:

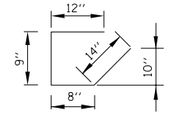
1. TYPE 2 "v" BARS SHALL BE ORDERED FULL LENGTH, AND CUT IN THE FIELD. THE REMAINING PORTION OF THE "v" BARS SHALL BE USED IN THE OTHER WALL.
2. THE LONG LEG OF THE "n" BARS SHALL BE VERTICAL.
3. PAY ITEMS ARE IDENTIFIED BY AN ASTERISK (•).



TYPE 1



TYPE 2



TYPE 3

TABLE OF BARS IN SLAB 4 : 1 SLOPE (PER FT. OF FLOOR SLAB WIDTH)

H	MARK	TYPE	NO. REQ'D	LENGTH	a	b	REINF. LBS.•	CY. CONC.•
3'-2"	4 h1	STR.	4	W-(0'-4")				
	4 v1	1	8	5'-0"	4'-4"	8"		
	4 n	1	1	4'-1"	2'-1"	2'-0"	52	.38
	4 w	STR.	1	12'-1"				
	4 t	STR	14	W-(0'-4")				
	4 s	3	1	3'-7"				
3'-8"	4 h1	STR.	4	W-(0'-4")				
	4 v1	1	8	5'-6"	4'-10"	8"		
	4 n	1	1	4'-1"	2'-1"	2'-0"	58	.43
	4 w	STR.	1	13'-8"				
	4 t	STR	18	W-(0'-4")				
	4 s	3	1	3'-7"				
4'-3"	4 h1	STR.	4	W-(0'-4")				
	4 v1	1	8	6'-1"	5'-5"	8"	FIL	FIL
	4 n	1	1	4'-7"	2'-7"	2'-0"	65	.50
	4 w	STR.	1	16'-0"				
	4 t	STR	20	W-(0'-4")				
	4 s	3	1	3'-7"				
4'-9"	4 h1	STR.	4	W-(0'-4")				
	4 v1	1	8	6'-7"	5'-11"	8"		
	4 n	1	1	4'-7"	2'-7"	2'-0"	88	.55
	4 w	STR.	1	18'-0"				
	4 t	STR	22	W-(0'-4")				
	4 s	3	1	3'-7"				
5'-3"	4 h1	STR.	4	W-(0'-4")				
	4 v1	1	8	7'-1"	6'-5"	8"		
	4 n	1	1	4'-11"	2'-11"	2'-0"	76	.60
	4 w	STR.	1	20'-0"				
	4 t	STR	24	W-(0'-4")				
	4 s	3	1	3'-7"				
5'-10"	4 h1	STR.	4	W-(0'-4")				
	4 v1	1	8	7'-8"	7'-0"	8"		
	4 n	1	1	4'-11"	2'-11"	2'-0"	82	.66
	4 w	STR.	1	22'-4"				
	4 t	STR	26	W-(0'-4")				
	4 s	3	1	3'-7"				
6'-4"	4 h1	STR.	4	W-(0'-4")				
	4 v1	1	8	8'-2"	7'-6"	8"	87	.71
	4 n	1	1	4'-11"	2'-11"	2'-0"		
	4 w	STR.	1	24'-4"				
	4 t	STR	28	W-(0'-4")				
	4 s	3	1	3'-7"				

TABLE OF BARS IN ONE WINGWALL 4 : 1 SLOPE

NO. 4 REINFORCING BARS						
H	MARK	TYPE	NO. REQ'D	LENGTH	a	b
3'-2"	4 h	STR.	4	11"-8"		
	4 v	2	5	5'-0"	2'-0"	3'-0"
	4 x	1	13	4'-4"	2'-2"	2'-2"
3'-8"	4 h	STR.	4	13"-8"		
	4 v	2	7	5'-6"	2'-0"	3'-6"
	4 x	1	15	4'-4"	2'-2"	2'-2"
4'-3"	4 h	STR.	5	16'-0"		
	4 v	2	10	6'-0"	1'-11"	4'-1"
	4 x	1	17	4'-4"	2'-2"	2'-2"
4'-9"	4 h	STR.	5	18'-0"		
	4 v	2	12	6'-5"	1'-10"	4'-7"
	4 x	1	19	4'-4"	2'-2"	2'-2"
5'-3"	4 h	STR.	6	20'-0"		
	4 v	2	14	6'-11"	1'-10"	5'-1"
	4 x	1	21	4'-4"	2'-2"	2'-2"
5'-10"	4 h	STR.	7	22'-4"		
	4 v	2	16	7'-7"	1'-11"	5'-8"
	4 x	1	23	4'-4"	2'-2"	2'-2"
6'-4"	4 h	STR.	7	24'-4"		
	4 v	2	18	8'-1"	1'-11"	6'-2"
	4 x	1	25	4'-4"	2'-2"	2'-2"

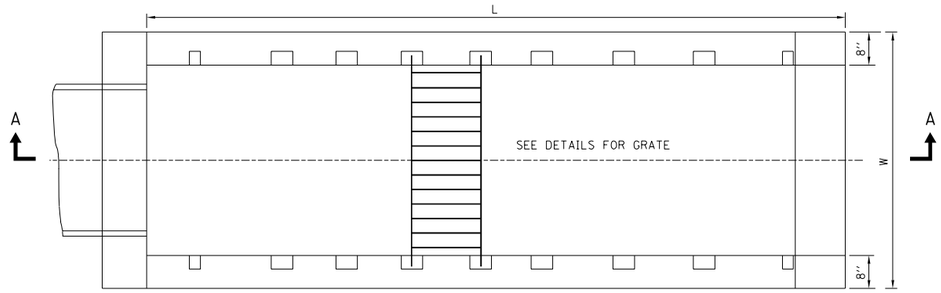
APPROVED Jeff Mosley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

HEADWALL TYPE IV
PIPE & PIPE-ARCH CULVERT

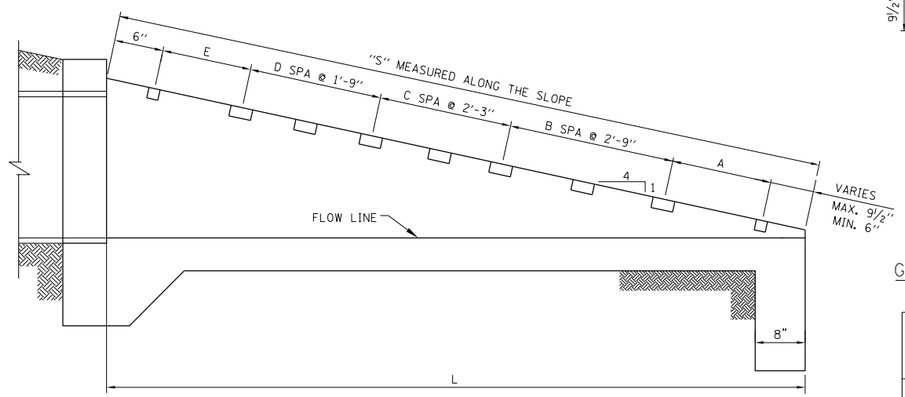
DATE 5-12-2005

STANDARD NO. SD 05-35C



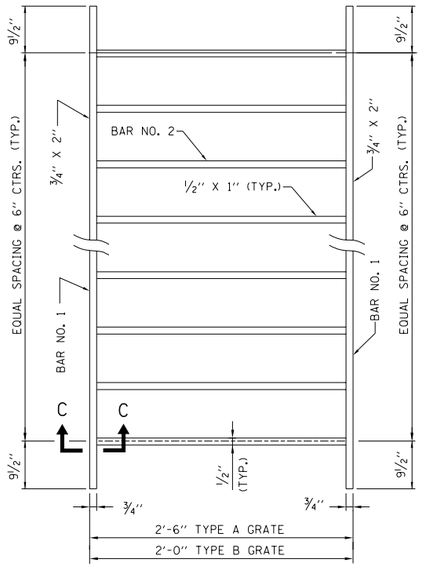
PLAN VIEW (NO SKEW)

SINGLE BOX CULVERT ℄ 84" WIDE

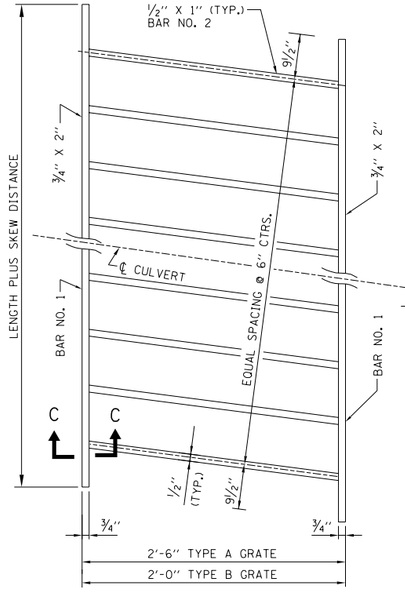


SECTION A-A

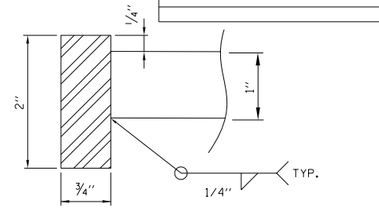
END TREATMENT - MULTIPLE OR SINGLE BOX CULVERT



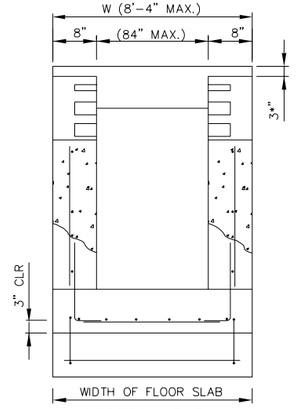
GRATE DETAILS (WITH SKEW)



GRATE DETAILS (WITH SKEW)



SECTION C-C



SECTION B-B

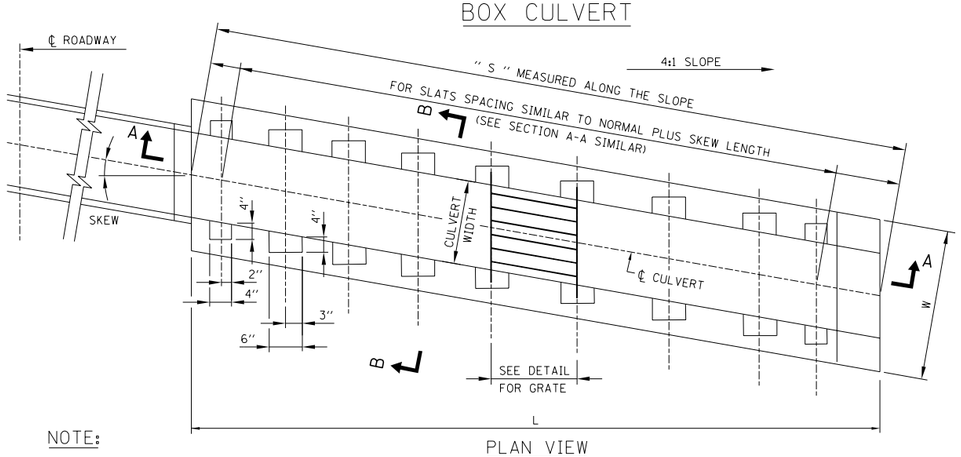
SINGLE BOX ≤ 84"

GRATE DIMENSIONS AND QUANTITIES IN ONE HEADWALL TYPE IV
BASED ON A 1 FOOT WIDTH, 4 : 1 SLOPE AND SKEW

H	GRATES		BARS FOR ONE GRATE				HEADWALL GRATES (LBS.) •
			BAR NO. 1		BAR NO. 2		
	NUMBER REQUIRED	TYPE REQ'D.	BARS REQ'D.	LENGTH	BARS REQ'D.	LENGTH	EACH GRATE
3'-2"	5	B	2	W-.75	$\frac{W-1.33}{0.5}$ -1	1'-10½"	16.6W - 19.3
3'-8"	6	B	2	W-.75	$\frac{W-1.33}{0.5}$ -1	1'-10½"	16.6W - 19.3
4'-3"	5	A	2	W-.75	$\frac{W-1.33}{0.5}$ -1	2'-4½"	18.3W - 22.4
	1	B	2			1'-10½"	16.6W - 19.3
4'-9"	8	B	2	W-.75	$\frac{W-1.33}{0.5}$ -1	1'-10½"	16.6W - 19.3
5'-3"	4	A	2	W-.75	$\frac{W-1.33}{0.5}$ -1	2'-4½"	18.3W - 22.4
	4	B	2			1'-10½"	16.6W - 19.3
5'-10"	10	B	2	W-.75	$\frac{W-1.33}{0.5}$ -1	1'-10½"	16.6W - 19.3
6'-4"	4	A	2	W-.75	$\frac{W-1.33}{0.5}$ -1	2'-4½"	18.3W - 22.4
	6	B	2			1'-10½"	16.6W - 19.3

DIMENSIONS FOR " S " - SLOPE 4 : 1
FOR VARIOUS CULVERT SIZES AND SKEWS

H	NO SKEW	≤ 10°	10° ≤ 20°	20° ≤ 30°
3'-2"	12'-4½"	12'-6¾"	13'-2"	14'-3⅜"
3'-8"	14'-5¼"	14'-7¾"	15'-4¼"	16'-8"
4'-3"	16'-10"	17'-1"	17'-11"	19'-5¼"
4'-9"	18'-10¾"	19'-2¼"	20'-1¼"	21'-10"
5'-3"	20'-11½"	21'-3⅜"	22'-3⅝"	24'-2¾"
5'-10"	23'-4⅜"	23'-8¾"	24'-10⅜"	26'-11¾"
6'-4"	25'-5⅛"	25'-9¾"	27'-0⅝"	29'-4¼"



PLAN VIEW

SKEW ORIENTATION

NOTE:

REINFORCEMENT BARS AND GRATE SPACING ARE SIMILAR TO BOX CULVERT AT NORMAL (NO SKEW).

GENERAL NOTES:

1. ALL EXPOSED CONCRETE EDGES SHALL HAVE A ¾" X 45° CHAMFER. CHAMFER ON VERTICAL EDGES SHALL BE CONTINUED A MINIMUM OF ONE FOOT BELOW FINISHED GROUND LEVEL. COVER FROM THE FACE OF CONCRETE TO FACE OF REINFORCEMENT BARS SHALL BE 2" UNLESS OTHERWISE SHOWN.
2. CONCRETE QUANTITIES SHOWN ARE FOR CIRCULAR PIPES, PIPE ARCHES AND ELLIPTICAL PIPE CULVERT HEADWALLS.
3. FOR QUANTITY CALCULATIONS DIMENSION "W" SHALL BE MEASURED IN FEET.
4. QUANTITIES FOR SKEWED HEADWALLS NOT SHOWN.
5. PAY ITEMS ARE IDENTIFIED BY AN ASTERISK (•).

REVISIONS

APPROVED Jeff Mosley CHIEF ENGINEER DATE 6-14-2006

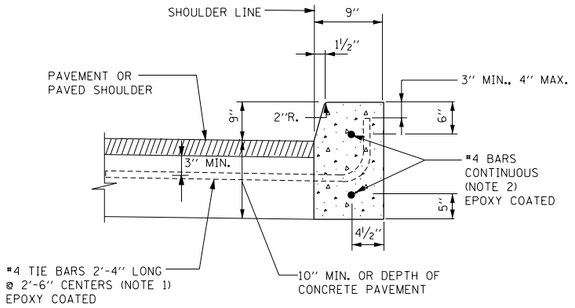
Illinois Tollway
Open Roads for a Faster Future

STEEL GRATE FOR HEADWALL TYPE IV PIPE & PIPE-ARCH CULVERTS

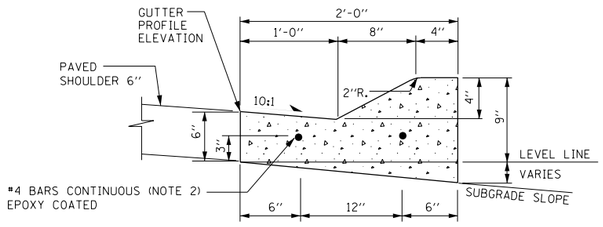
DATE 5-12-2005

STANDARD NO. SD 05-35D

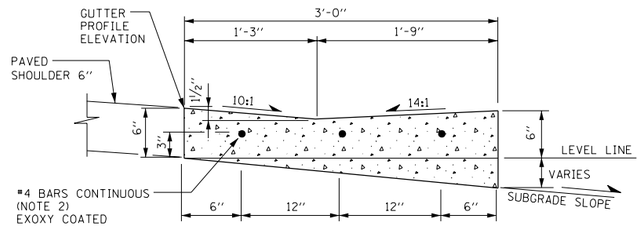
REVISIONS



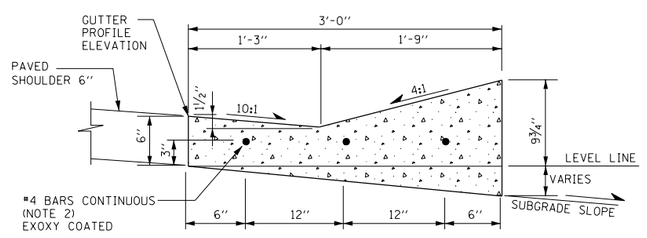
TYPE ''C'' CURB



TYPE G-2 GUTTER



TYPE G-3, MODIFIED GUTTER



TYPE G-3 GUTTER

NOTES:

1. CURBS OR CURB AND GUTTERS CONSTRUCTED ADJACENT TO PROPOSED P.C.C. PAVEMENTS OR P.C.C. SHOULDERS SHALL HAVE #4 TIE BARS AS DETAILED. CURB AND GUTTERS CONSTRUCTED ADJACENT TO AN EXISTING P.C.C. PAVEMENT OR P.C.C. BASE COURSE SHALL HAVE #4 TIE BARS, DRILLED AND GROUTED INTO THE EXISTING CONCRETE WITH AN APPROVED EPOXY GROUT. CURB AND GUTTERS CONSTRUCTED ADJACENT TO EXISTING P.C.C. SHOULDERS SHALL BE PROVIDED WITH TIE BARS IF SPECIFIED AND DETAILED IN THE PLANS.

2. WHEN CURBS OR CURB AND GUTTERS ARE CONSTRUCTED ADJACENT TO EXISTING OR PROPOSED P.C.C. PAVEMENT, P.C.C. BASE COURSE OR P.C.C. SHOULDERS CONTRACTION JOINTS AND EXPANSION JOINTS SHALL BE CONSTRUCTED IN THE CURBS OR CURB AND GUTTERS IN PROLONGATION WITH THE JOINTS IN ADJACENT PAVEMENT OR SHOULDER. EXPANSION JOINTS SHALL BE AS SPECIFIED AND DETAILED IN THE PLANS. REINFORCING BARS SHALL BE DISCONTINUED AT EXPANSION JOINTS.

3. CONSTRUCTION JOINT SHALL BE PROVIDED WITH #4 DEFORMED STEEL TIE BARS 2'-6'' LONG. THE BARS SHALL BE PLACED ON 9''+ CENTERS (MINIMUM 2 PER JOINT).

4. FOR CURB TRANSITIONS, THE CURB PORTION OF LEADING ENDS OF CURB OR CURB AND GUTTERS IN THE DIRECTION OF TRAFFIC SHALL BEGIN FLUSH WITH ADJACENT PAVEMENT OR SHOULDER SURFACE AND TRANSITION TO FULL HEIGHT AT THE RATE OF ONE INCH VERTICAL TO ONE FOOT HORIZONTAL. CURB HEIGHT AND SHAPE TRANSITIONS FROM ONE ABUTTING TYPE TO ANOTHER SHALL BE 3 FT. MIN. IN LENGTH.

5. FOR G-2 AND G-3 TRANSITION DETAILS SEE SD XX-4B (TYPE G-2 AND G-3 GUTTER TRANSITIONS).

6. G-3 GUTTER SHALL NOT BE CONSTRUCTED ALONG UNSHIELDED FILL SLOPES STEEPER THAN 6:1.

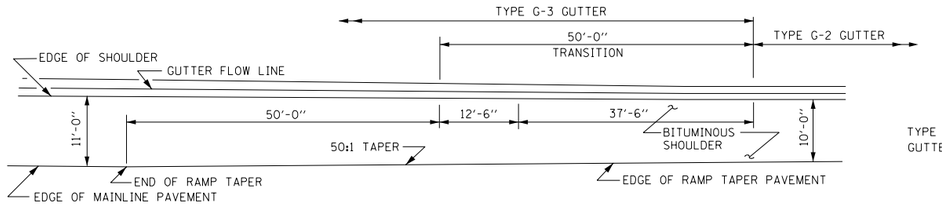
APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

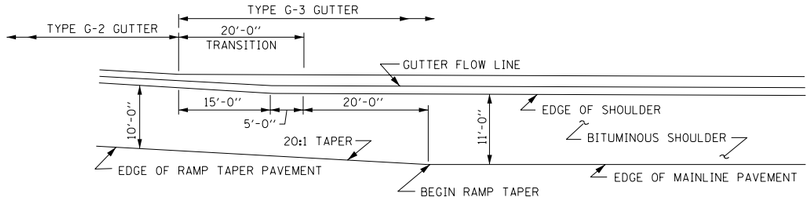
CURB, CURB AND GUTTER AND GUTTER DETAILS

DATE	STANDARD NO.
5-12-2005	SD 05-4A

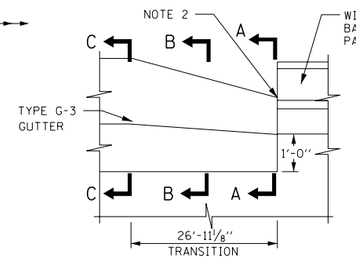
REVISIONS



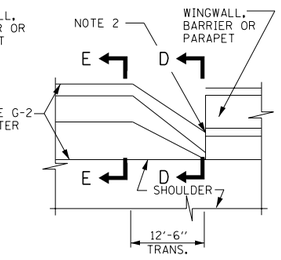
GUTTER TRANSITION AT ENTRANCE RAMP TERMINALS



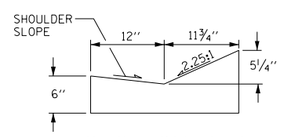
GUTTER TRANSITION AT EXIT RAMP TERMINALS



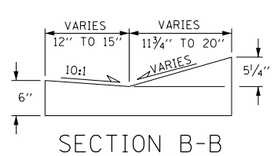
PLAN



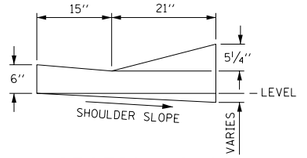
PLAN



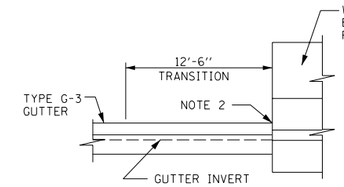
SECTION A-A



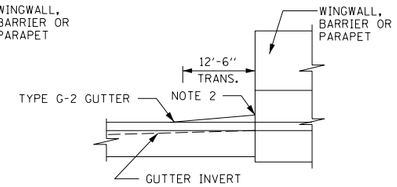
SECTION B-B



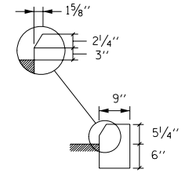
SECTION C-C
NORMAL TYPE G-3 GUTTER



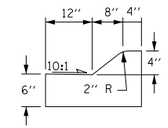
ELEVATIONS
TYPE G-3



ELEVATION
TYPE G-2



SECTION D-D



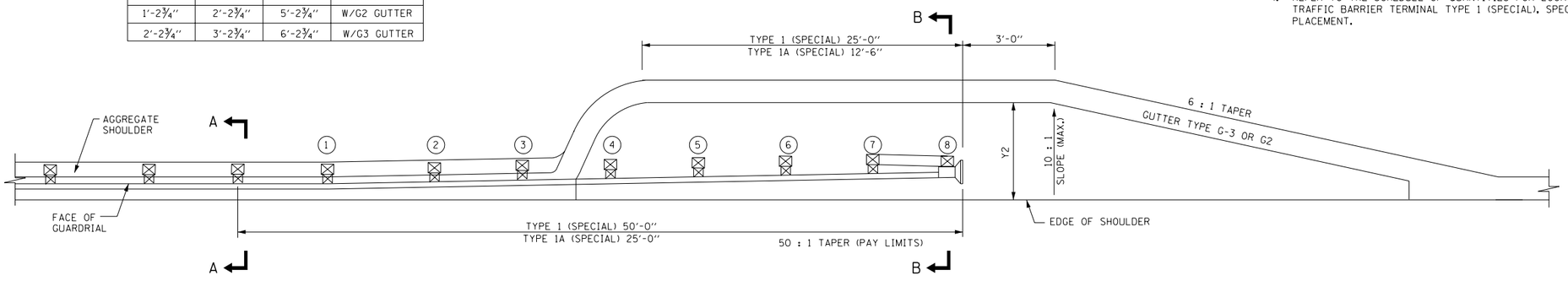
SECTION E-E
NORMAL TYPE G-2 GUTTER

GUTTER TRANSITIONS AT BRIDGE DEPARTURES

SECTION A-A

SECTION B-B

X	Y	Y2	CONDITION
1'-2¾"	2'-2¾"	5'-2¾"	W/G2 GUTTER
2'-2¾"	3'-2¾"	6'-2¾"	W/G3 GUTTER



GUTTER TRANSITION AT TANGENT TRAFFIC BARRIER TERMINAL, TYPE 1 & 1A (SPECIAL)

GUTTER TRANSITION NOTES:

1. TRANSITIONS SHALL BE PAID FOR PER LINEAR FOOT FOR CONCRETE GUTTER, TYPE G-3.
2. PROVIDE 1" EXPANSION JOINT WITH PREFORMED JOINT FILLER BETWEEN TRANSITION SECTION AND WINGWALL.
3. SEE STANDARD DRAWING SD XX-4C (TYPE G-2/G-3 GUTTER TRANSITION AT ANCHOR INSTALLATION TYPE 6) FOR G-3 GUTTER TRANSITION AT BRIDGE APPROACH.
4. REFER TO THE SCHEDULE OF QUANTITIES FOR LOCATIONS OF TRAFFIC BARRIER TERMINAL TYPE 1 (SPECIAL), SPECIAL PLACEMENT.

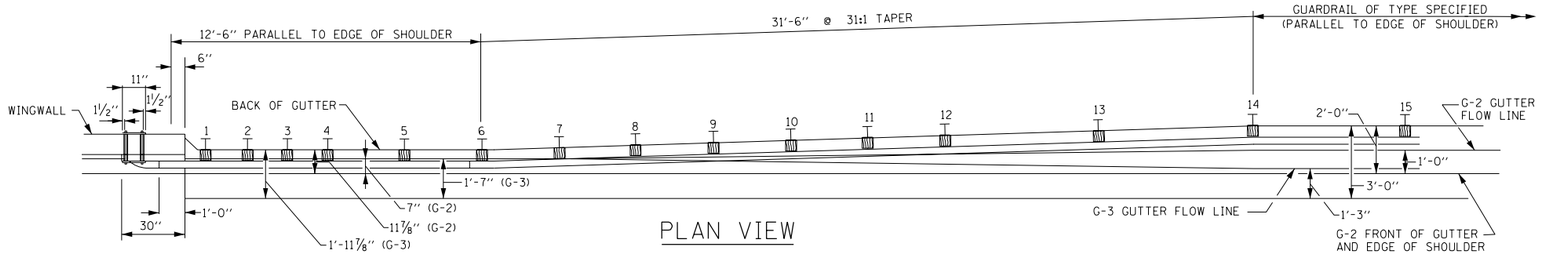
APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

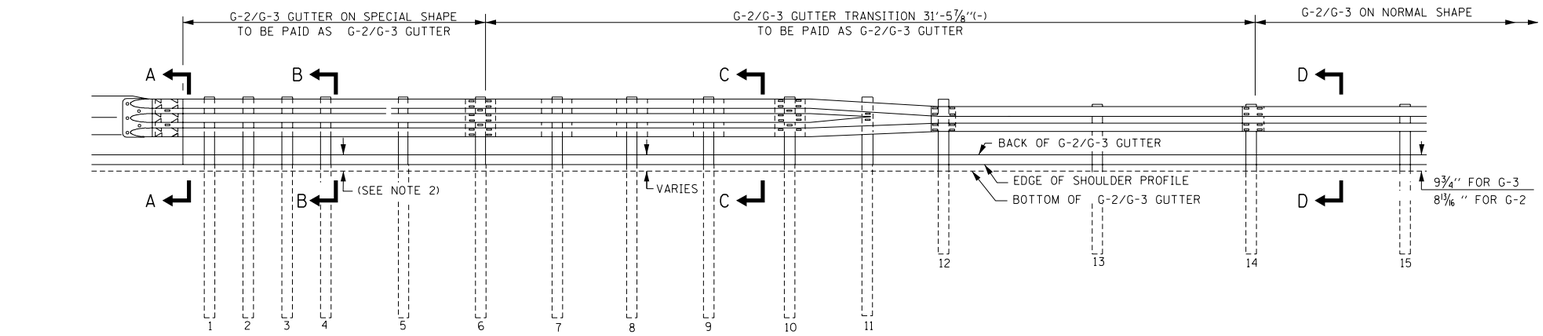
TYPE G-2 AND G-3 GUTTER TRANSITIONS

DATE	STANDARD NO.
5-12-2005	SD 05-4B

REVISIONS



PLAN VIEW



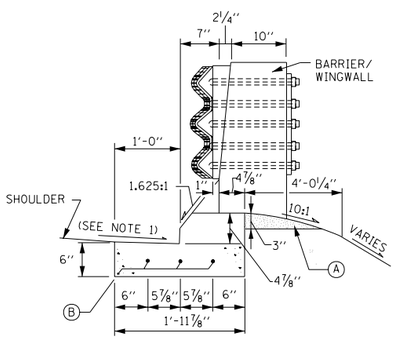
ELEVATION VIEW

GUTTER TRANSITION NOTES:

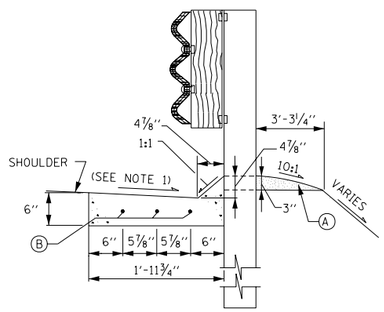
1. SLOPE TO MATCH ADJACENT SHOULDER SLOPE (TYPICALLY 4%).
2. THE TYPE G-2/G-3 GUTTER ON SPECIAL SHAPE AND TRANSITION SHALL BE PAID FOR PER LINEAL FOOT FOR CONCRETE GUTTER TYPE G-2/G-3.
3. PROVIDE 1" EXPANSION JOINT WITH PREFORMED JOINT FILLER BETWEEN TRANSITION SECTION AND WINGWALL OR BARRIER WALL.
4. INSTALLATION ON CURVED WINGWALLS SIMILAR.
5. FOR DETAILS OF ANCHOR INSTALLATION TYPE 6 SEE IDOT STANDARD 631031 (TRAFFIC BARRIER TERMINAL, TYPE 6).
6. GUTTER TRANSITIONS SHALL BE CONSTRUCTED TO FIT THE STANDARD LOCATION OF THE ANCHOR INSTALLATION TYPE 6.
7. THRIE BEAM RAIL SHALL BE BOLTED TO BLOCK AT ALL POSTS.

LEGEND

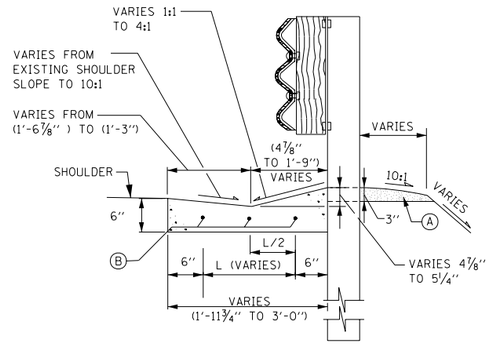
- (A) AGGREGATE SHOULDER SPECIAL
- (B) #4 EPOXY COTED REBAR



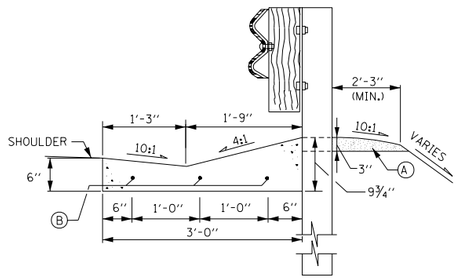
G-3 SECTION A-A



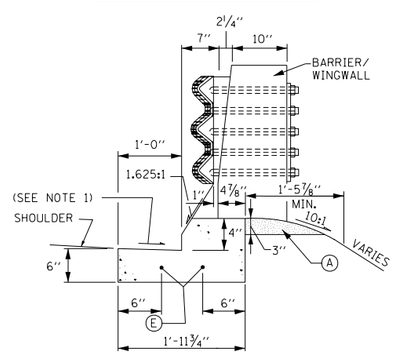
G-3 SECTION B-B



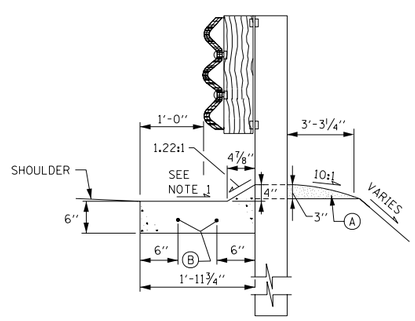
G-3 SECTION C-C



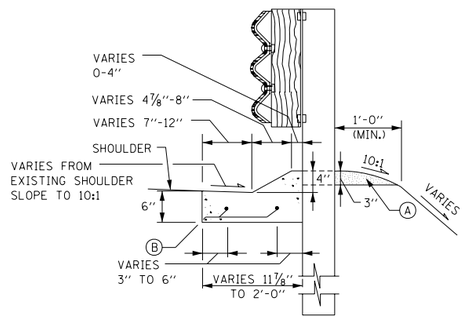
G-3 SECTION D-D



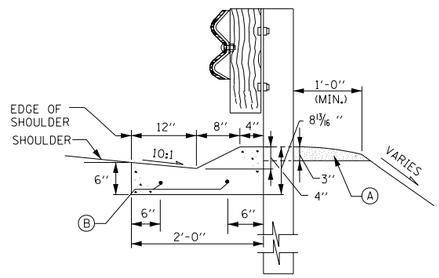
G-2 SECTION A-A



G-2 SECTION B-B



G-2 SECTION C-C



G-2 SECTION D-D

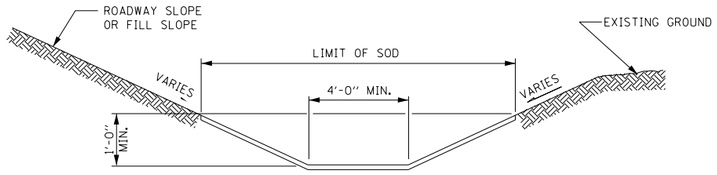
APPROVED Jeff Daley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

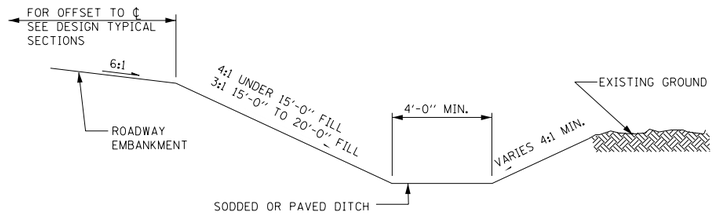
TYPE G-2/G-3 GUTTER TRANSITION AT ANCHOR INSTALLATION TYPE 6

DATE	STANDARD NO.
5-12-2005	SD 05-4C

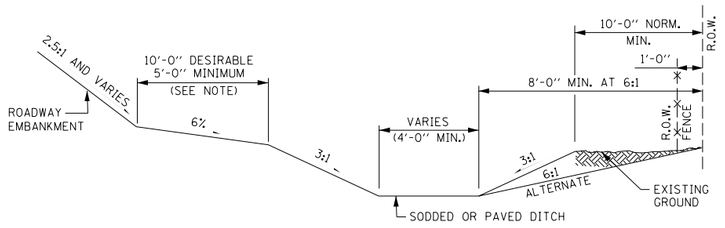
REVISIONS



SODDED DITCH



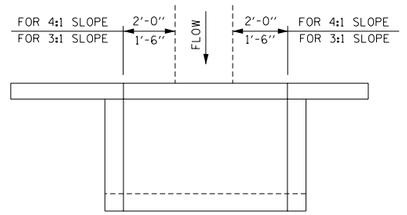
EMBANKMENT UNDER 20 FEET IN HEIGHT
TOE OF EMBANKMENT DITCHES



EMBANKMENT
OVER 20 FEET IN HEIGHT

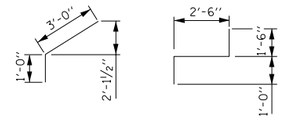
NOTES FOR EMBANKMENT DITCHES:

1. WIDTH AND SLOPE MAY VARY DEPENDING ON SOIL CONDITION OR R.O.W. REQUIREMENTS.
2. THESE SECTIONS APPLY TO A DESIRABLE SECTION FOR NEW CONSTRUCTION. HOWEVER, THE WIDTH AND SLOPES MAY VARY DEPENDING ON SOIL CONDITIONS OR R.O.W. CONSTRAINTS.

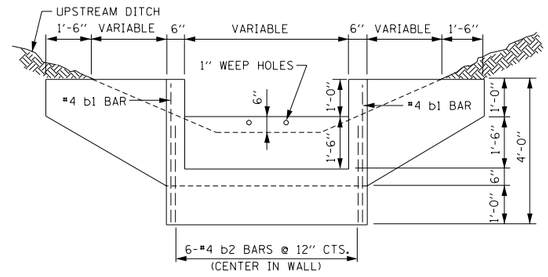


PLAN

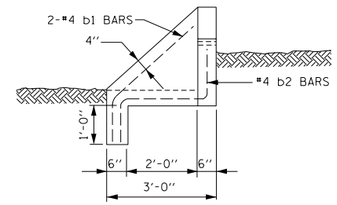
BAR TABLE				
MARK	SIZE	NO.	LENGTH	SHAPE
b1	#4	2	4'-0"	
b2	#4	6	5'-0"	



BAR b1 BAR b2



DOWNSTREAM ELEVATION



SIDE ELEVATION

CONCRETE DITCH CHECK

NOTES:

1. CONCRETE DITCH CHECKS ARE LIMITED TO SHIELDED AREAS, OR TO AREAS OUTSIDE THE CLEAR ZONE.

NOTE TO DSE

THIS BASE SHEET SHOWS TYPICAL NEW CONSTRUCTION BUT IT IS NOT A STANDARD DRAWING. IT REQUIRES COMPLETION BY THE DSE PRIOR TO INSERTION INTO A CONTRACT. MICROSTATION FILES ARE CONTAINED W/IN THE ICAPP MANUAL RESOURCE CD OR AVAILABLE FROM THE AUTHORITY. THE DSE SHALL ACCEPT THE RESPONSIBILITY OF THE DESIGN OF THIS SHEET UPON ITS COMPLETION & INSERTION INTO A CONTRACT. THIS "NOTE TO DSE" SHALL BE REMOVED BY THE DSE PRIOR TO INSERTION OF THE SHEET INTO THE PLAN SET.

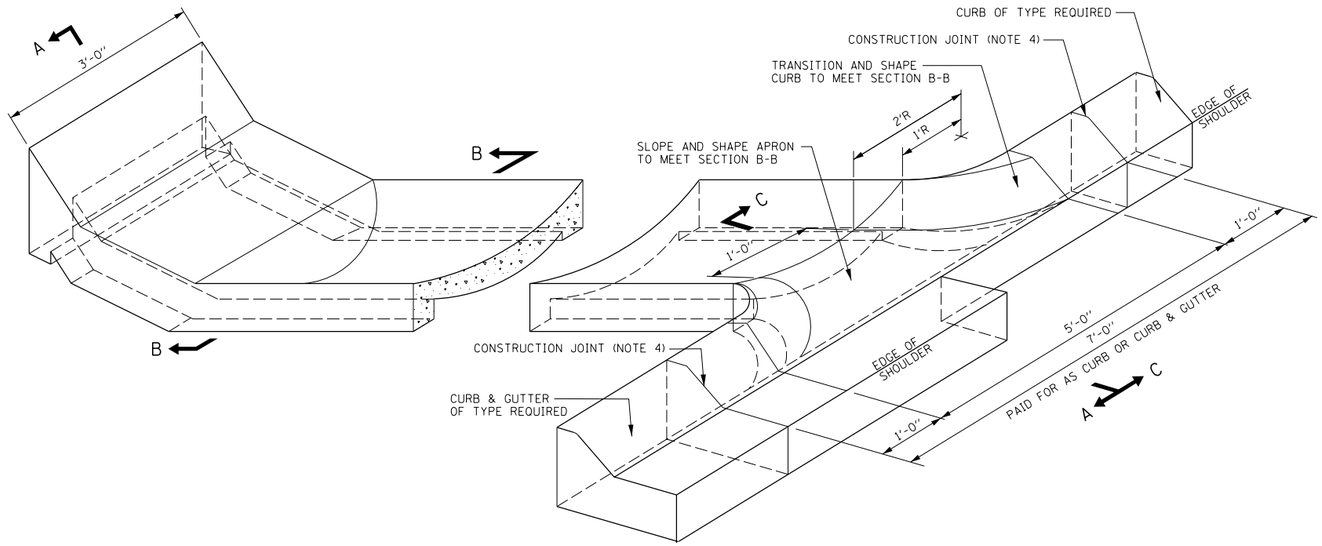
APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

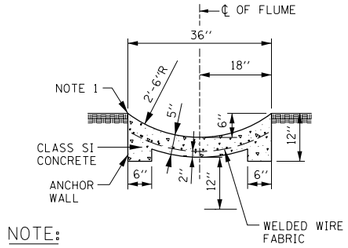
DITCHES, PAVED DITCH,
DITCH CHECK AND DITCH DIKE

DATE	STANDARD NO.
5-12-2005	BASE SHEET

REVISIONS



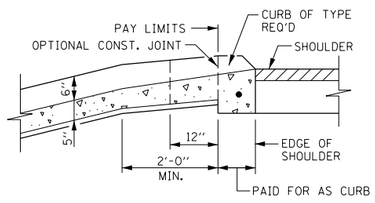
HALF PLAN



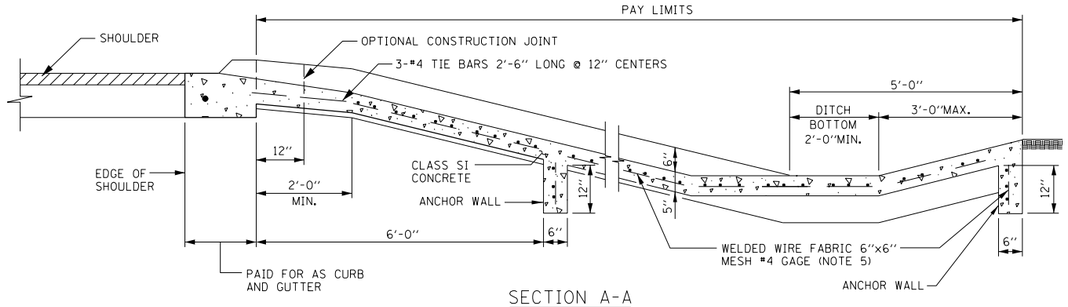
NOTE:

0.62 C.Y. CONCRETE / L.F.

SECTION B-B



SECTION C-C
ADJACENT TO CURB



SECTION A-A
ADJACENT TO CURB & GUTTER

NOTES:

1. CONCRETE FLUMES SHALL BE CONSTRUCTED FLUSH WITH THE ADJACENT EXISTING OR PROPOSED SURFACES.
2. CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
3. THE LOCATION OF THE ANCHOR WALL MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER.
4. #4 CONTINUOUS BARS OR #4 TIE BARS 2'-6" LONG AT 12" O/C SHALL BE PROVIDED AT ALL CONSTRUCTION JOINTS.
5. EXPANDED METAL FABRIC OF EQUIVALENT STRENGTH MAY BE USED IN LIEU OF WELDED WIRE FABRIC SUBJECT TO ENGINEER'S APPROVAL.

CONCRETE FLUME

APPROVED Jeff Haley CHIEF ENGINEER DATE 6-14-2006

Illinois Tollway
Open Roads for a Faster Future

CONCRETE FLUME

DATE	STANDARD NO.
5-12-2005	SD 05-6B