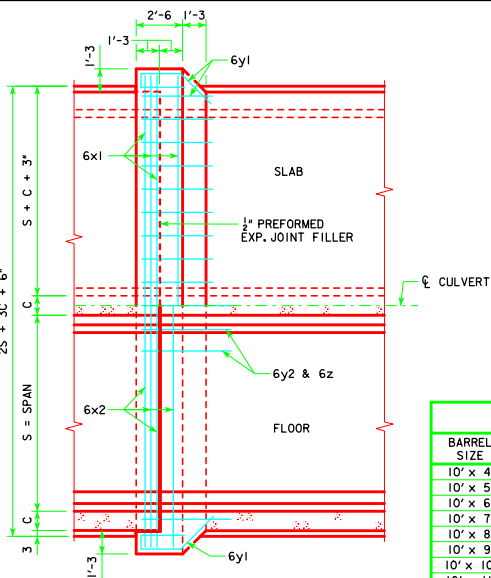


REVISED 07-13 - THE #9 BARS WERE ADDED TO NOTE NUMBER 7. ENGLISH DESIGNATED IN CULVERTS DESIGN MODEL 2-12 - THIS SHEET ISSUED 04-12.

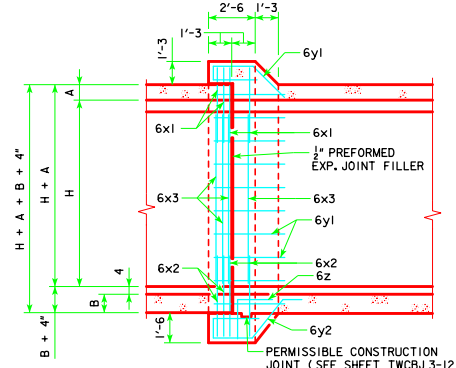


**PLAN VIEW**

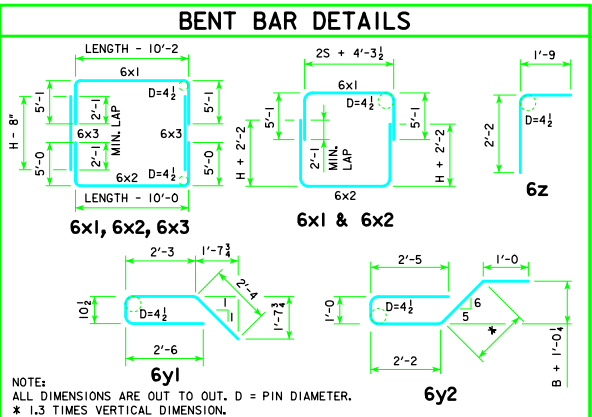
ESTIMATE OF QUANTITIES - ONE JOINT - 10' SPAN																													
BILL OF REINFORCING STEEL			10' x 4'		10' x 5'		10' x 6'		10' x 7'		10' x 8'		10' x 9'		10' x 10'		10' x 11'		10' x 12'										
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT						
6x1	SLAB & WALLS	[Shape]	4	34'-6"	207	4	34'-6"	207	4	34'-6"	207	4	34'-6"	207	4	34'-6"	207	4	35'-1"	211	4	35'-4"	212						
6x2	FLOOR & WALLS	[Shape]	4	36'-8"	220	4	38'-8"	232	4	34'-4"	206	4	34'-4"	206	4	34'-8"	208	4	34'-11"	210	4	35'-2"	211						
6x3	WALLS	[Shape]	--	--	--	--	--	--	8	5'-4"	64	8	6'-4"	76	8	7'-4"	88	8	8'-4"	100	8	9'-4"	112	8	10'-4"	124	8	11'-4"	136
6y1	TOP & SIDES	[Shape]	35	8'-0"	421	37	8'-0"	445	39	8'-0"	469	41	8'-0"	493	43	8'-0"	517	45	8'-0"	541	47	8'-0"	565	49	8'-0"	589	51	8'-0"	613
6y2	BOTTOM	[Shape]	23	9'-6"	328	23	9'-6"	328	23	9'-6"	328	23	9'-7"	331	23	9'-7"	331	23	9'-7"	331	23	9'-7"	331	23	9'-7"	331	23	9'-7"	331
6z	BOTTOM & FLOOR	[Shape]	23	3'-11"	135	23	3'-11"	135	23	3'-11"	135	23	3'-11"	135	23	3'-11"	135	23	3'-11"	135	23	3'-11"	135	23	3'-11"	135	23	3'-11"	135
TOTAL WEIGHT (LB)			1311		1347		1409		1448		1484		1520		1560		1600		1638		1676		1714		1752				
TOTAL CONCRETE (CY)			9.6		9.9		10.2		10.5		10.8		11.1		11.5		11.8		12.2		12.6		13.0		13.4				

ESTIMATE OF QUANTITIES - ONE JOINT - 12' SPAN																													
BILL OF REINFORCING STEEL			12' x 4'		12' x 5'		12' x 6'		12' x 7'		12' x 8'		12' x 9'		12' x 10'		12' x 11'		12' x 12'										
BAR	LOCATION	SHAPE	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT						
6x1	SLAB & WALLS	[Shape]	4	38'-6"	231	4	38'-6"	231	4	38'-6"	231	4	38'-6"	231	4	38'-6"	231	4	39'-1"	235	4	39'-4"	236						
6x2	FLOOR & WALLS	[Shape]	4	40'-8"	244	4	42'-8"	256	4	38'-4"	230	4	38'-4"	230	4	38'-8"	232	4	38'-11"	234	4	39'-2"	235						
6x3	WALLS	[Shape]	--	--	--	--	--	--	8	5'-4"	64	8	6'-4"	76	8	7'-4"	88	8	8'-4"	100	8	9'-4"	112	8	10'-4"	124	8	11'-4"	136
6y1	TOP & SIDES	[Shape]	39	8'-0"	469	41	8'-0"	493	43	8'-0"	517	45	8'-0"	541	47	8'-0"	565	49	8'-0"	589	51	8'-0"	613						
6y2	BOTTOM	[Shape]	27	9'-9"	395	27	9'-9"	395	27	9'-7"	389	27	9'-10"	399	27	9'-10"	399	27	9'-10"	399	27	9'-10"	399						
6z	BOTTOM & FLOOR	[Shape]	27	3'-11"	159	27	3'-11"	159	27	3'-11"	159	27	3'-11"	159	27	3'-11"	159	27	3'-11"	159	27	3'-11"	159						
TOTAL WEIGHT (LB)			1498		1534		1590		1636		1672		1708		1744		1780		1816		1852		1888		1924				
TOTAL CONCRETE (CY)			11.0		11.3		11.5		11.8		12.1		12.4		12.8		13.2		13.5		13.9		14.3		14.7				

CONCRETE PLACEMENT					
BARREL SIZE	BARREL DIMENSION			BELL JOINT QUANTITIES (CY)	
	A	B	C	FOOTING	WALLS
10' x 4'	12.5	14.5	9	4.665	1.047
10' x 5'	12.5	14.5	9	4.665	1.332
10' x 6'	12.5	14.5	9	4.665	1.618
10' x 7'	12.5	15	9	4.677	1.903
10' x 8'	13	15	9	4.677	2.189
10' x 9'	13	15	9	4.677	2.474
10' x 10'	12.5	15	10.5	4.741	2.760
10' x 11'	12.5	15	11.5	4.784	3.045
10' x 12'	12.5	15	12.5	4.827	3.331
12' x 4'	14.5	16.5	9	5.399	1.047
12' x 5'	14.5	16.5	9	5.399	1.332
12' x 6'	13	15	9	5.364	1.618
12' x 7'	14.5	17	9	5.411	1.903
12' x 8'	15	17	9	5.411	2.189
12' x 9'	15	17	9	5.411	2.474
12' x 10'	14.5	17	10.5	5.476	2.760
12' x 11'	14.5	17	11.5	5.518	3.045
12' x 12'	14.5	17	12.5	5.561	3.331



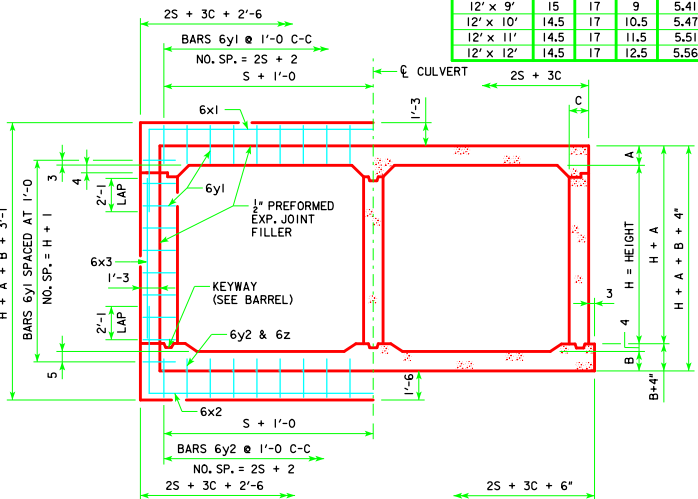
**LONGITUDINAL SECTION**



**BENT BAR DETAILS**

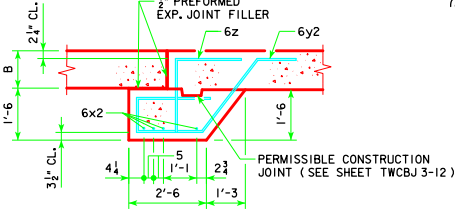
**NOTES:**

- DIMENSIONS AND QUANTITIES SHOWN ARE BASED ON SLAB, FLOOR, AND WALL THICKNESSES (A, B, AND C, RESPECTIVELY). VALUES FOR THESE DIMENSIONS, UNDER VARYING FILL CONDITIONS, CAN BE FOUND ON THE TWRCB CULVERT BARREL DETAIL SHEETS.
- CHANGE LENGTHS OF BARS 6x1, 6x2, 6z, AND ADJUST REINFORCING STEEL AND CONCRETE QUANTITIES ACCORDINGLY FOR SLAB, WALL AND FLOOR THICKNESSES OTHER THAN SHOWN.
- ALL BAR LENGTHS ARE ESTIMATED WITH A 2" CLEARANCE FROM CONCRETE EDGE TO OUTSIDE OF BAR, EXCEPT AS NOTED.
- MATERIAL AND CONSTRUCTION TO BE IN ACCORDANCE WITH THE CURRENT STANDARD SPECIFICATIONS OF I.D.O.T.
- SEE SHEET TWRCB G1-12 FOR GENERAL INFORMATION, SPECIFICATIONS AND DESIGN STRESSES.
- BARS 6x1 & 6x2 MAY BE FURNISHED IN TWO EQUAL LENGTHS ADDING 2'-3" TO THE OVERALL LENGTH TO OBTAIN A 2'-3" MIN. LAP. THE ABOVE IS TO BE PERFORMED AT NO ADDITIONAL COST TO THE CONTRACTING AUTHORITY.
- BARREL FLOOR BARS m1 & m9 ARE TO BE SHORTENED 6" IN LENGTH AT BELL JOINTS.



**JOINT DETAIL SECTION THRU BARREL**

**TOP & SIDES - BARS 6y1**



**BOTTOM - BARS 6y2 & 6z**

LATEST REVISION DATE

07-13

APPROVED BY BRIDGE ENGINEER

*Thomas E. M. Dwyer*

**Iowa Department of Transportation**  
Highway Division

STANDARD DESIGN

**TWIN REINFORCED CONCRETE BOX CULVERTS**

APRIL, 2012

**CULVERT BELL JOINTS**

10' & 12' SPANS

**TWCBJ 2-12**