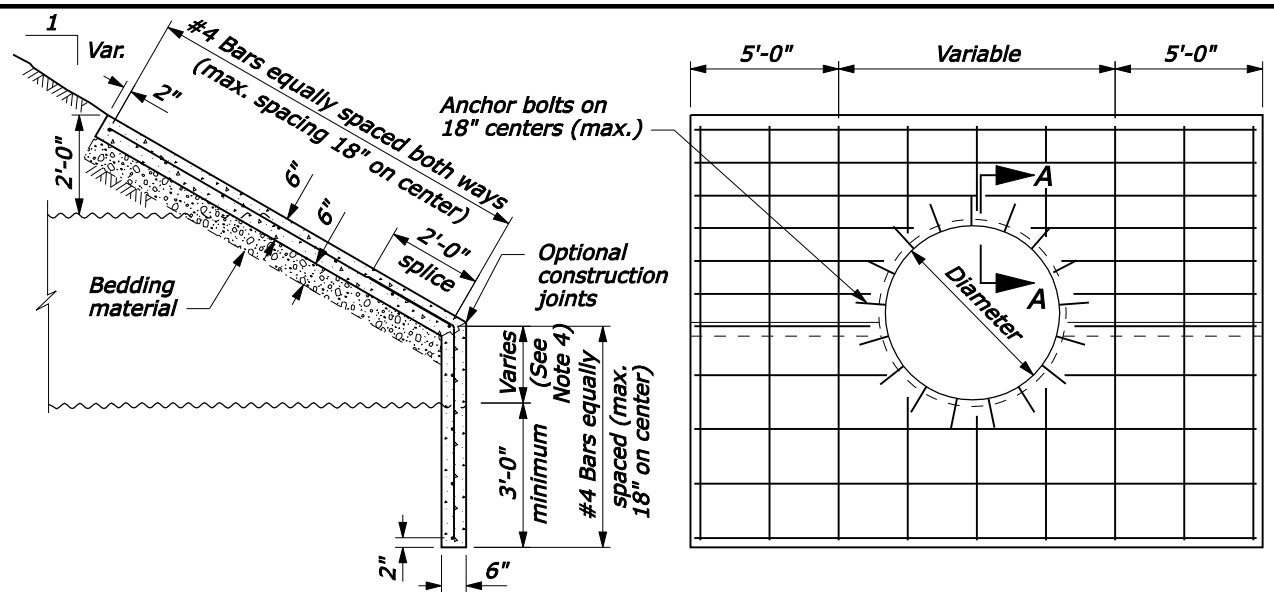
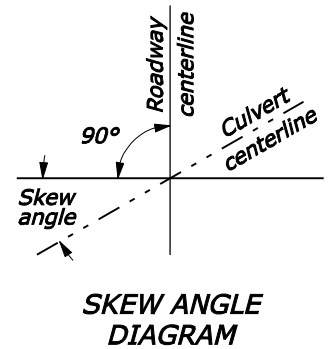


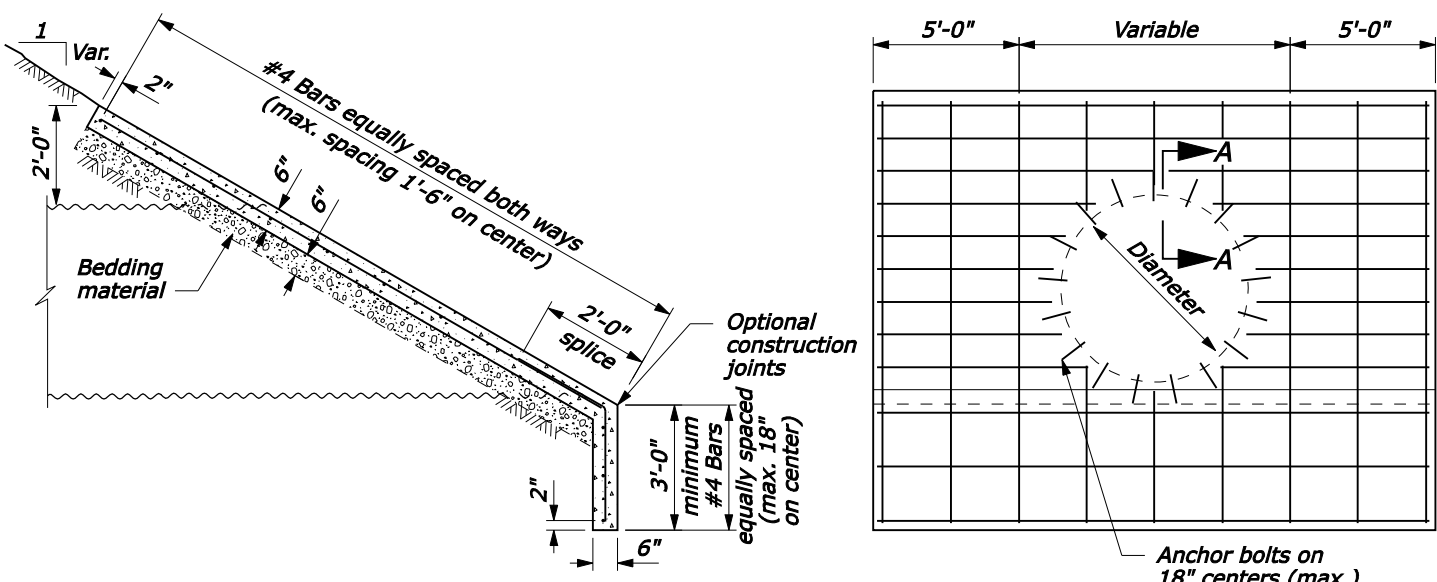
REINFORCED CONCRETE HEADWALL

PIPE ARCH SIZE	CONCRETE (cuyd)			
	Skew Angle			
	0°	15°	30°	45°
6'-1" x 4'-7"	3.2	3.4	3.7	4.6
7'-0" x 5'-1"	3.5	3.7	4.1	5.0
8'-2" x 5'-9"	4.0	4.2	4.7	5.7
9'-6" x 6'-5"	4.4	4.6	5.1	6.2
11'-5" x 7'-3"	5.0	5.2	5.8	7.1
12'-10" x 8'-4"	5.8	6.0	6.7	8.2
13'-11" x 8'-7"	6.2	6.4	7.1	8.7
15'-4" x 10'-4"	6.6	6.8	7.6	9.3
16'-3" x 10'-10"	7.3	7.5	8.3	9.5

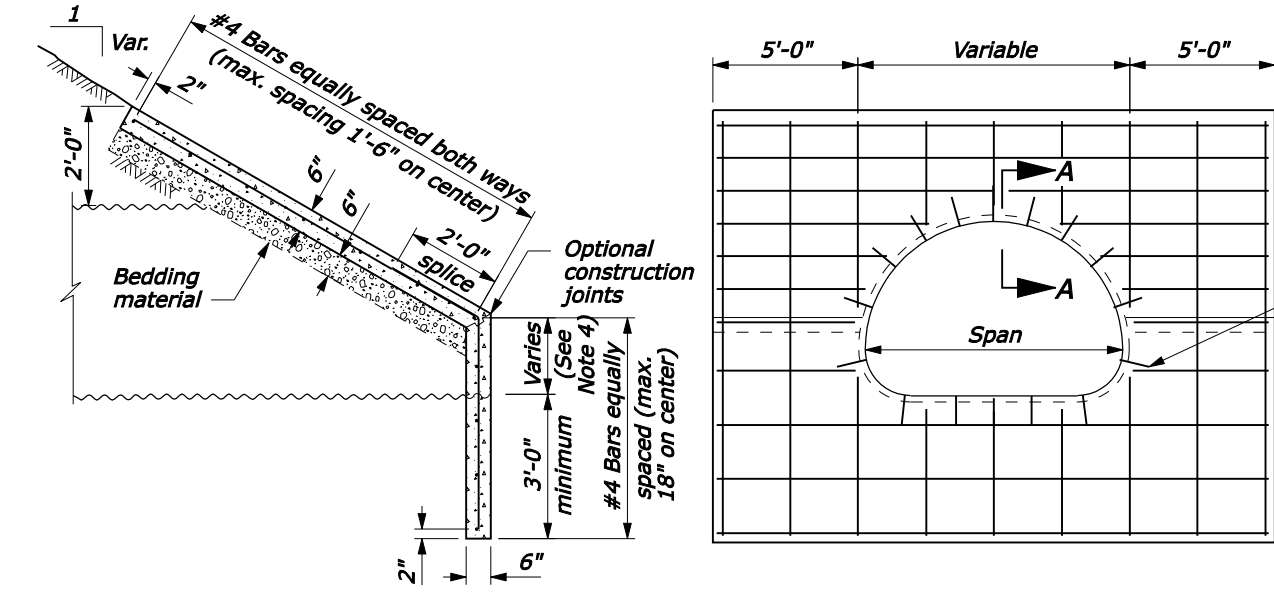
- NOTE:**
- CONCRETE: Chamfer all exposed edges $\frac{3}{4}$ inch.
 - REINFORCING STEEL: Grade 60 (ASTM A615 or A996) deformed billet steel bars conforming to AASHTO M 31. The minimum concrete cover to the face of any bar is 2 inches unless otherwise shown.
 - HEADWALL TYPE: Use Type A Step Bevel headwalls for round pipe unless otherwise specified in the special contract requirements.
 - STEP BEVEL: The variable dimension indicated for the height or step conform to manufacturer's recommendations unless otherwise specified in the special contract requirements.
 - CUTOFF WALLS: The minimum depth shown may be reduced in solid rock, provided wall is keyed into the rock at least 12".
 - ANCHOR BOLTS: Conform to ASTM A307-04. Galvanize in accordance with ASTM A153.
 - BEDDING: Construct a firm and uniform foundation before placing the bedding. Use clean $\frac{3}{8}$ inch sandy material for bedding unless otherwise specified in the special contract requirements.
 - ESTIMATED QUANTITIES: The concrete quantities are based on a 3 foot cut-off wall and 1:1.5 fill slopes for each of the skew angles. Interpolate concrete quantities for headwalls not shown. Reinforcing steel is estimated at 68 lb/cuyd of concrete excluding the weight of the anchor bolts.



TYPE A STEP BEVEL FOR ROUND PIPE



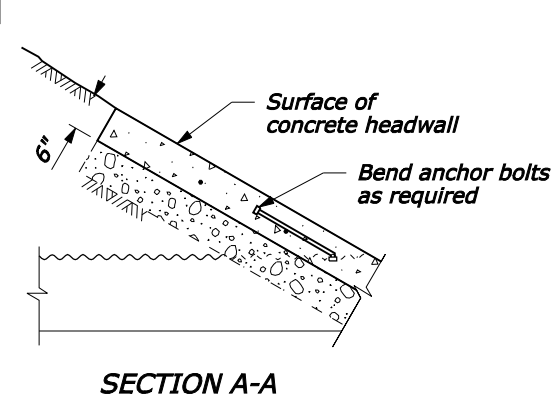
TYPE B FULL BEVEL FOR ROUND PIPE



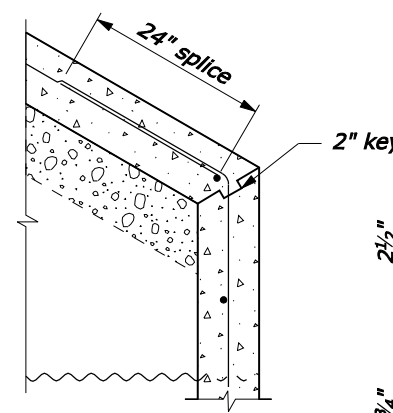
STEP BEVEL FOR PIPE ARCH CULVERT

REINFORCED CONCRETE HEADWALL

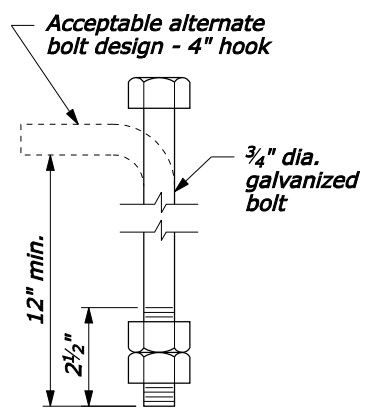
PIPE SIZE	CONCRETE (cuyd)							
	TYPE A STEP BEVEL				TYPE B FULL BEVEL			
	Skew Angle				Skew Angle			
Diameter	0°	15°	30°	45°	0°	15°	30°	45°
48"	3.2	3.2	3.3	3.5	2.7	3.0	3.4	3.4
60"	3.6	3.7	3.8	4.0	3.7	3.7	3.8	4.0
72"	4.1	4.1	4.2	4.5	4.2	4.3	4.4	4.6
84"	4.5	4.6	4.7	5.0	4.8	4.8	5.0	5.3
96"	5.1	5.2	5.3	5.7	5.3	5.4	5.6	5.9
108"	5.6	5.7	5.9	6.3	5.9	6.0	6.2	6.7
120"	6.0	6.1	6.3	6.8	6.5	6.6	6.8	7.3
132"	6.9	7.0	7.3	7.9	7.1	7.2	7.5	8.0
144"	7.4	7.5	7.8	8.5	7.7	7.9	8.1	8.8
156"	7.9	8.0	8.3	9.1	8.4	8.5	8.8	9.5
168"	8.6	8.8	9.2	10.0	9.0	9.2	9.5	10.4
180"	8.9	9.1	9.4	10.3	9.7	9.8	10.2	11.1



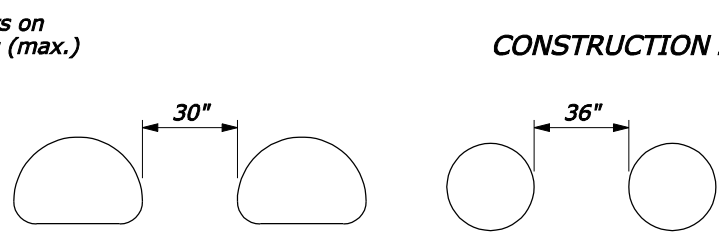
SECTION A-A



CONSTRUCTION JOINT DETAIL



ANCHOR BOLT DETAIL



PIPE-ARCHES ROUND PIPES

MULTIPLE PIPE INSTALLATION

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 WESTERN FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY DETAIL

REINFORCED CONCRETE HEADWALL

DETAIL APPROVED FOR USE 11/2006
 REVISIONS: DETAIL W601-10