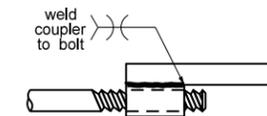
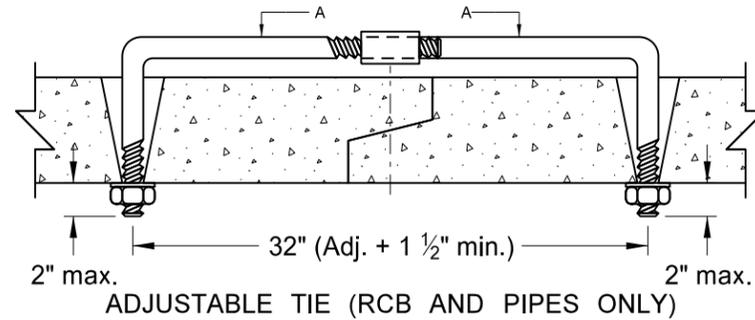
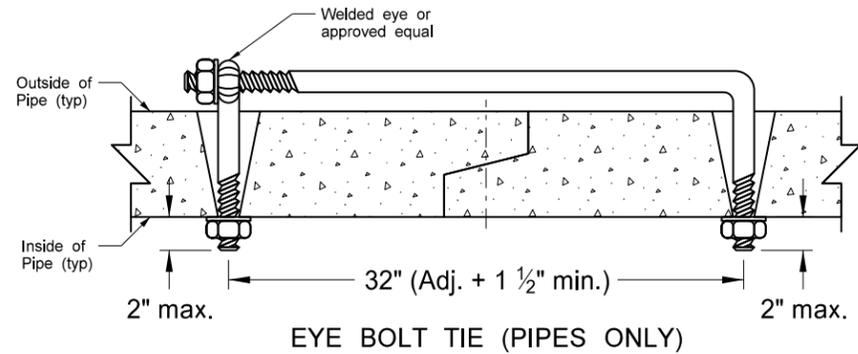
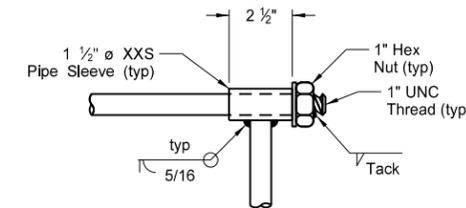
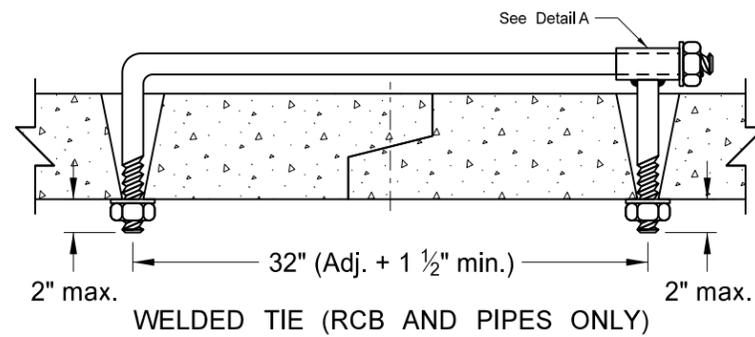
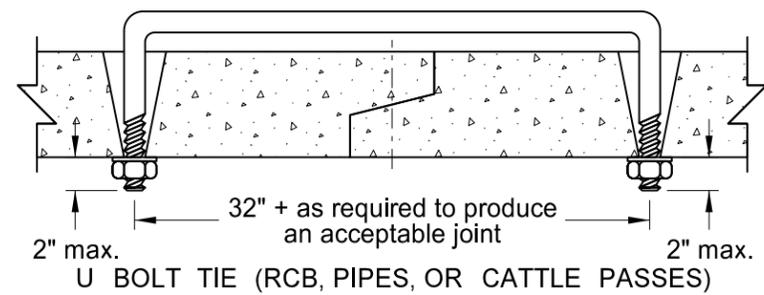


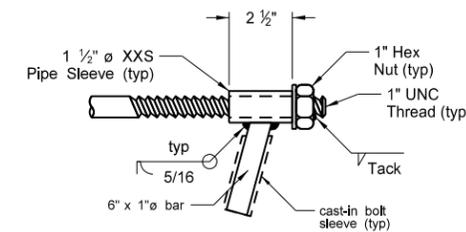
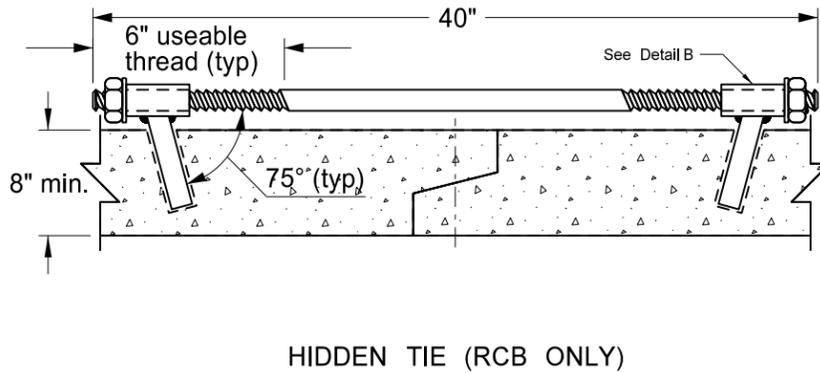
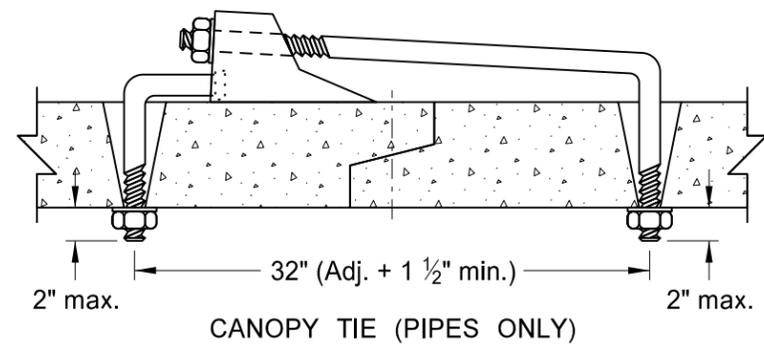
# CONCRETE PIPE, CATTLE PASS, OR PRECAST CONCRETE BOX CULVERT TIES



SECTION A-A



DETAIL A

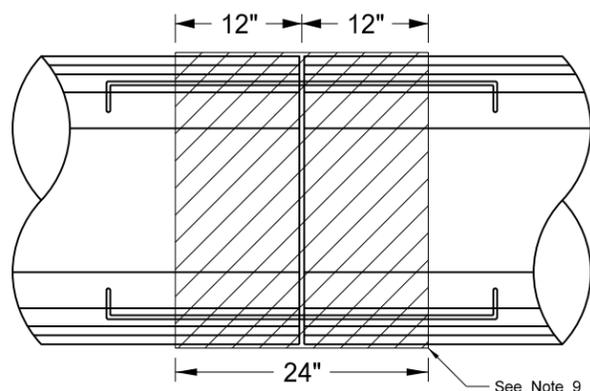


DETAIL B

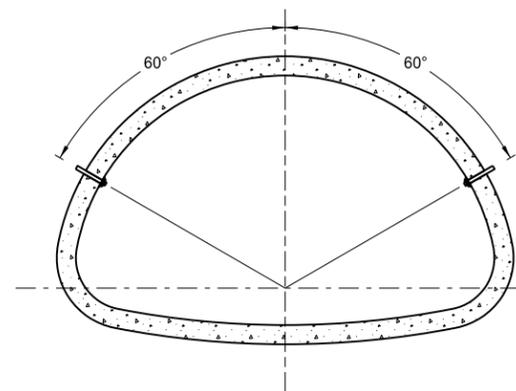
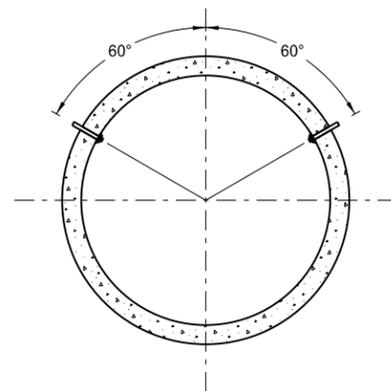
REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread $\phi$	XXS Pipe Sleeve Inner $\phi$
18" - 24"	$\frac{5}{8}$ " See note 2	$\frac{3}{4}$ "
30" - 66"	$\frac{3}{4}$ "	1"
72" - 78"	1"	1 $\frac{1}{4}$ "
RCB/Cattle Pass		

**NOTES:**

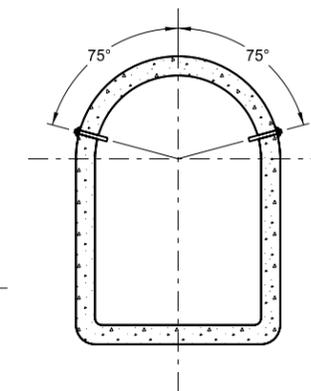
- The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
- Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
- Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.
- Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
- Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
- Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Holes shall have a diameter  $\frac{1}{4}$ " larger than the diameter of the thread. Holes in precast RCB's shall contain cast-in bolt sleeves with an inside diameter of 1  $\frac{1}{4}$ ".
- The contractor has the option of selecting the type of tie bolt used from those shown.
- The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for the appropriate conduit or RCB pay item.
- All centerline and approach RCP culvert joints shall be tied. Storm drain systems shall have the first three joints including the end section of all free ends tied. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
- Place joint wrap prior to installing ties. Overlap the joint by 12" in both directions.
- Tie bolts shall conform to ASTM A 36. Nuts shall be heavy hex and conform to ASTM A 563. Washers shall conform to ASTM F 436, Type 1. Welded pipe sleeves and cast-in bolt sleeves shall conform to ASTM A 53, Grade B.
- RCB tie locations shall be as shown on the plans.



PLAN VIEW



END VIEW



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8
6-6-17	Notes 2-11, Table, Title, Labels

This document was originally issued and sealed by Jonathan David Ketterling, Registration Number PE-4684, on 6/6/2017 and the original document is stored at the North Dakota Department of Transportation