**Temporary Gravel Bag Head Wall at Inlet**

- **Procedure:**
  1. Choose proper size of stud connectors. Stud connectors shall be welded to the pipe crest equally spaced on both sides of the invert.
  2. In cross section, limits of placement of the repair shall be made to subtend a minimum central angle of 120 degrees (at the 4 o'clock and 8 o'clock positions of a circular culvert), but may be extended up to 180 degrees (to 3 o'clock and 9 o'clock positions), or to a lesser central angle if deemed necessary.
  3. Minimum concrete cover above shear stud shall be 1½", and stud shall have a minimum ½" of lateral concrete cover.

**NOTES:**

1. Minimum number of studs shall be 8 circumferentially, 4 on each side of invert.
2. Recommended minimum plate thickness without burn-through for a ¾" headed stud is 0.020" (page 140) for a 7½" stud it is 0.015" (page 112).
3. Tems strength of 0.170 through 0.280 in thick wall plates exceed the culvert wall strength. Maximum load designs shall be limited by wall strength, and the selected number of studs shall be checked by wall strength.
4. The concrete shall be rounded with a 3 inch radius on a 1½ level at the ends of the inlet and outlet of the pipe.

**PROCEDURES FOR CORRUGATED STEEL PIPE (CSP) CULVERT INVERT REPAIR:**

1. Minimum number of stud connectors shall be welded to the pipe crest equally spaced on both sides of the invert, with minimum spacing between stud circumferentially shall be 3".
2. In cross section, limits of placement of the repair shall be made to subtend a minimum central angle of 120 degrees (at the 4 o'clock and 8 o'clock positions of a circular culvert), but may be extended up to 180 degrees (to 3 o'clock and 9 o'clock positions), or to a lesser central angle if deemed necessary.
3. Minimum concrete cover above shear stud shall be 1½", and stud shall have a minimum ½" of lateral concrete cover.
4. Provide welded wire fabric (WWF) to meet the temperature and shrinkage requirements for concrete pad. Tack weld or tie WWF to pipe crests at 12" spacing minimum each way.
5. WWF shall be placed with a minimum of 4" clear cover from the edge of concrete and shall be topped 0" minimum.