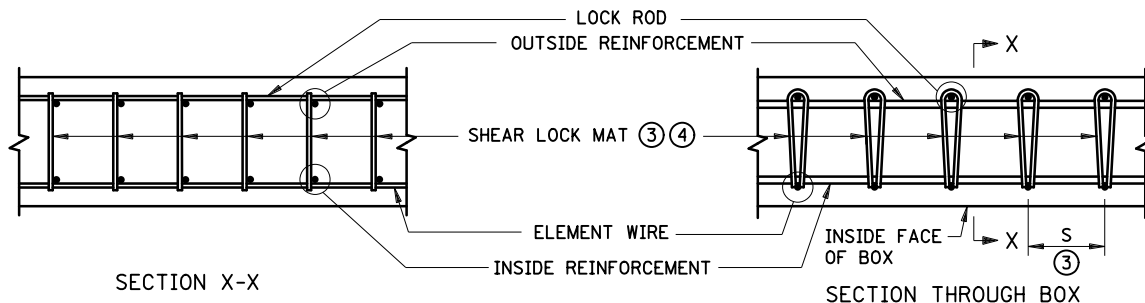
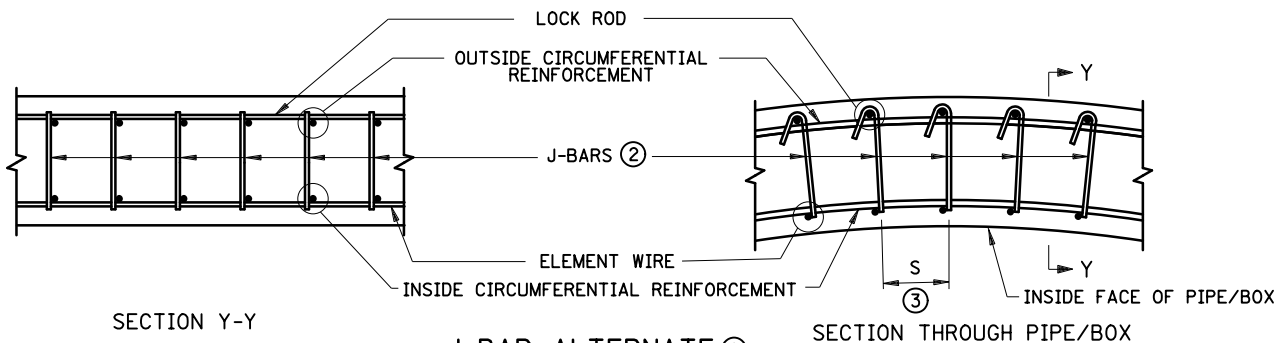


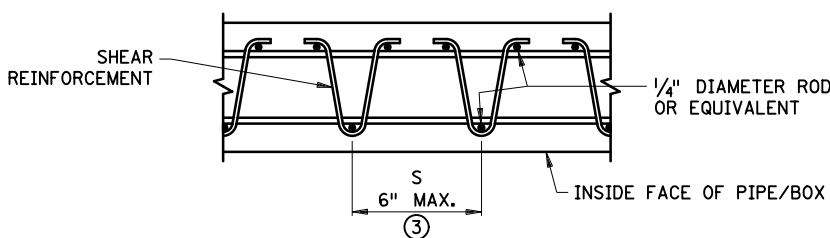
SHEAR LOCK ALTERNATE - PIPE ①



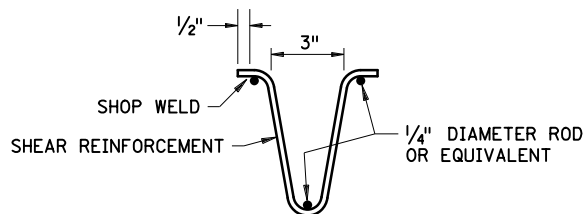
SHEAR LOCK ALTERNATE - BOX CULVERTS ①



J-BAR ALTERNATE ①



V-BAR ALTERNATE



V-BAR DETAIL

**NOTES:**

S = MAXIMUM SPACING OF ROWS OR RADIAL REINFORCING AT INNER CAGE. REFER TO STANDARD PLATES 3000, 3014, OR THE PRECAST BOX CULVERT STANDARDS FOR REINFORCEMENT CLEARANCES, SHEAR REINFORCEMENT AREAS, AMPLITUDE, AND SPACING.

USE SHEAR REINFORCEMENT IN CONFORMANCE WITH THE APPLICABLE REQUIREMENTS OF AASHTO M32. USE GRADE 60 REINFORCING BARS IN CONFORMANCE WITH SPEC. 3301.

ANCHOR SHEAR REINFORCEMENT IN CONFORMANCE WITH SECTION 12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

PIN ALL SHEAR REINFORCEMENT. FOR SHEAR LOCK MAT AND J-BAR ALTERNATES, PROVIDE ELEMENT WIRE WITH A MINIMUM DIAMETER OF 0.19" AND A LOCK ROD OF THE SAME DIAMETER. FOR THE V-BAR ALTERNATE USE ROD WITH A MINIMUM DIAMETER OF 0.25".

OTHER FORMS OF SHEAR REINFORCEMENT WILL BE CONSIDERED FOR APPROVAL UPON WRITTEN REQUEST.

- ① STIRRUPS MAY BE SPLICED A MINIMUM OF ONE OVERLAP AT OR NEAR  $\phi$  OF PIPE.
- ② THE J BAR ALTERNATE CAN BE FABRICATED FROM WELDED WIRE REINFORCEMENT OR AS APPROVED BY THE ENGINEER. BEND THE WIRE TO FORM A 140 DEGREE OR GREATER HOOK.
- ③ AS MEASURED ALONG THE INNER CAGE.
- ④ FOR BOX CULVERTS, SHEAR LOCK MATS MAY BE INSTALLED FROM THE INSIDE OR OUTSIDE AT FABRICATORS OPTION.

APPROVED MARCH 5, 2020

*Rom S. Smith*  
STATE DESIGN ENGINEER

STATE OF MINNESOTA  
DEPARTMENT OF TRANSPORTATION

**SHEAR REINFORCEMENT FOR  
PRECAST DRAINAGE STRUCTURES**

SPECIFICATION  
REFERENCE  
2501  
2503

STANDARD  
PLATE  
NO.  
**3007F**