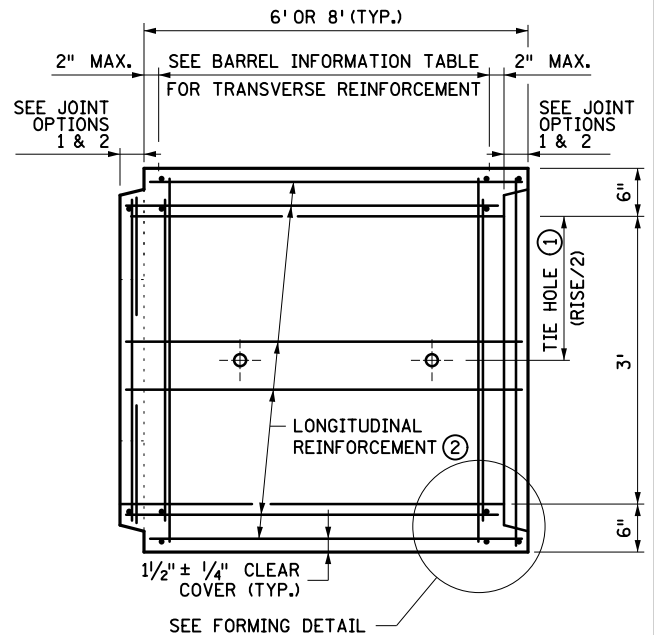
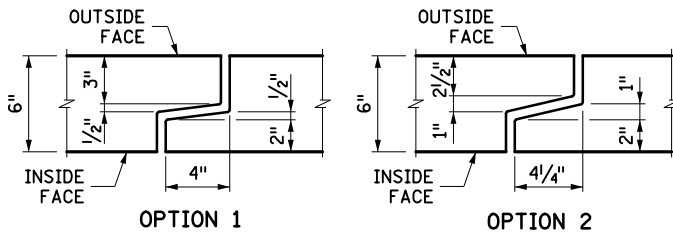


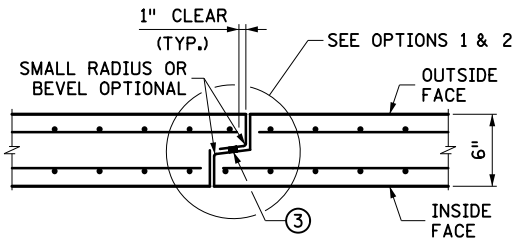
TRANSVERSE BARREL SECTION



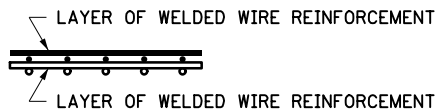
LONGITUDINAL BARREL SECTION



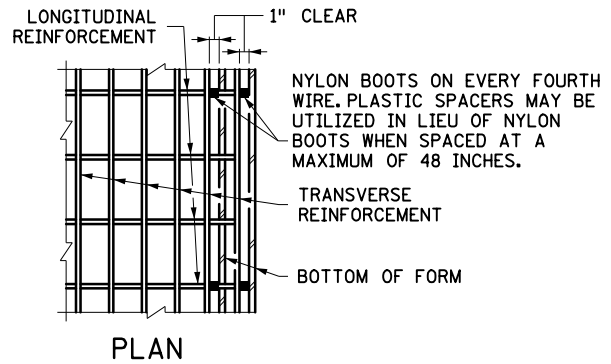
TONGUE AND GROOVE JOINT DETAIL



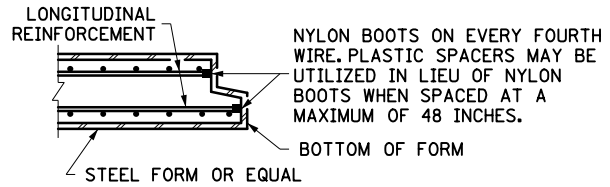
REINFORCEMENT LAYER DETAIL



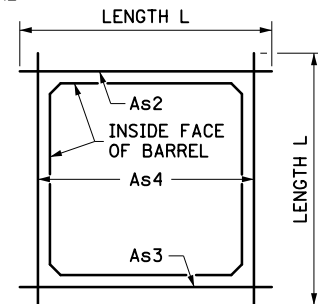
WHEN MORE THAN ONE LAYER OF WELDED WIRE REINFORCEMENT IS USED TO OBTAIN THE REQUIRED REINFORCEMENT AREAS, PLACE THE WIRES OF THE WELDED WIRE REINFORCEMENT AS SHOWN



PLAN



SECTION FORMING DETAIL



ALTERNATIVE INSIDE MAT REINFORCEMENT (4)

(As2 = As3 = As4 = 0.21 SQ. IN/FT)

SEE SHEET 2 OF 2 FOR NUMBERED NOTES.

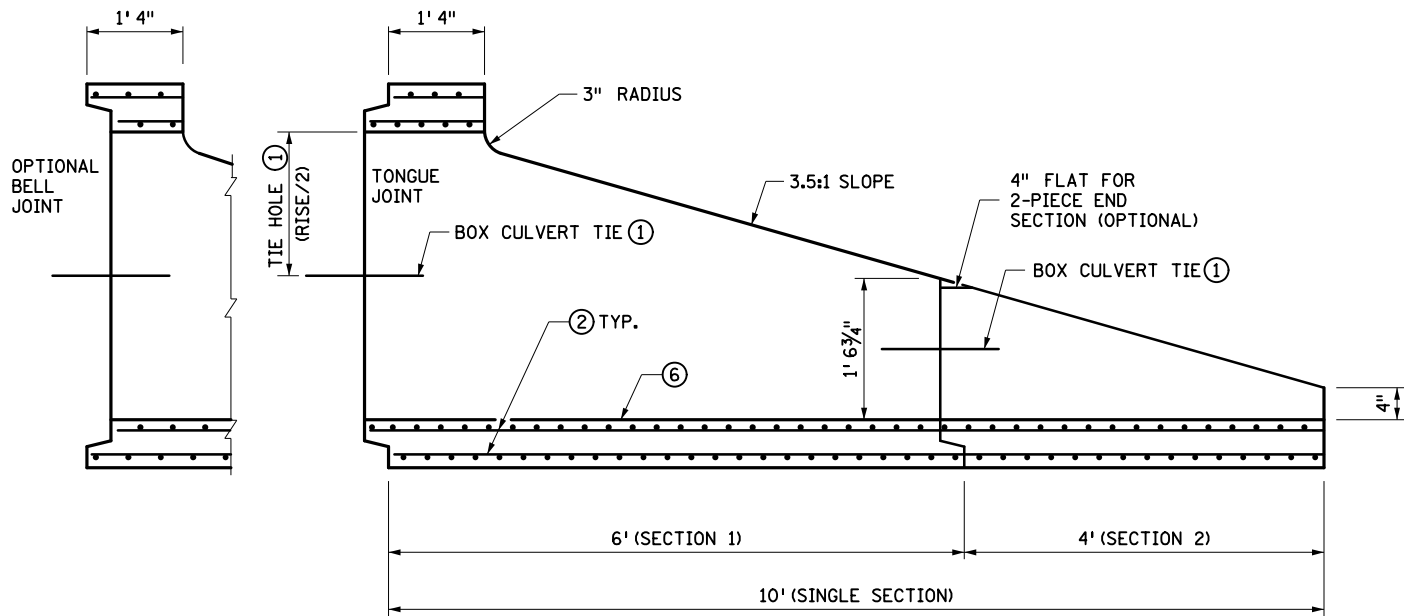
BARREL AND END SECTION INFORMATION TABLE				
f'c (P.S.I.)	FILL HEIGHT RANGE (FT.)	BARREL WEIGHT (LBS./FT.) (5)	TRANSVERSE REINFORCEMENT (SQ. IN/FT)	
			INSIDE MAT	OUTSIDE MAT
5000	1.5-20	1050	0.21	0.15

APPROVED 09-30-2022  
  
 STATE DESIGN ENGINEER

STATE OF MINNESOTA  
 DEPARTMENT OF TRANSPORTATION  
**3 X 3 PRECAST CONCRETE  
 BOX CULVERT**

SPECIFICATION  
 REFERENCE

STANDARD  
 PLATE  
 NO.  
**3021B**  
 1 OF 2




**PRECAST END SECTION (1 OR 2 PIECES)**

(REFER TO BARREL AND END SECTION TABLE FOR REINFORCEMENT)

**NOTES:**

- CONSTRUCT CULVERTS IN ACCORDANCE WITH SPEC. 2412 EXCEPT AS NOTED.
- PROVIDE WELDED WIRE REINFORCEMENT AND REINFORCEMENT BARS PER THE APPLICABLE REQUIREMENTS OF AASHTO M 259.
- MINIMUM WELDED WIRE REINFORCEMENT BEND DIAMETER = 6 WIRE DIAMETERS.
- 1/2" ± 1/4" CONCRETE COVER ON ALL REINFORCEMENT EXCEPT FOR TONGUE AND GROOVE DETAIL.
- ANY OF THE FOLLOWING COMBINATIONS OF STEEL REINFORCEMENT MAY BE USED:
  - (a) 1 OR 2 LAYERS OF WELDED WIRE REINFORCEMENT OR
  - (b) 1 LAYER OF WELDED WIRE REINFORCEMENT AND 1 LAYER OF REINFORCEMENT BARS OR
  - (c) 1 LAYER OF REINFORCEMENT BARS.
- DEVELOP REINFORCEMENT IN ACCORDANCE WITH AASHTO "LRFD BRIDGE DESIGN SPECIFICATIONS." IF BAR REINFORCEMENT IS SUBSTITUTED FOR WELDED WIRE REINFORCEMENT, INCREASE THE AREA OF REINFORCEMENT BY 8%, AND SUBMIT DESIGN CALCULATIONS VERIFYING COMPLIANCE WITH AASHTO 5.7.3.4. "CONTROL OF CRACKING BY DISTRIBUTION OF REINFORCEMENT."
- MAXIMUM SIZE OF REINFORCEMENT BARS IS NO. 6. THE MAXIMUM WELDED WIRE REINFORCEMENT SIZE IS W23 PER LAYER (MAXIMUM OF 2 LAYERS).
- SPACE CENTER TO CENTER OF TRANSVERSE WIRES NOT LESS THAN 2" NOR MORE THAN 4". SPACE CENTER TO CENTER OF LONGITUDINAL WIRES NOT MORE THAN 8".
- WELDING IS NOT PERMITTED ON REINFORCEMENT BARS OR WELDED WIRE REINFORCEMENT, EXCEPT THAT THE ORIGINAL WELDING REQUIRED TO MANUFACTURE WIRE REINFORCEMENT IS ACCEPTABLE.
- WHEN REINFORCEMENT IS CUT, PLACE ADDITIONAL REINFORCEMENT ON BOTH SIDES OF THE CUT MEMBER TO REPLACE OR EXCEED THE CUT STEEL.
- USE CONCRETE MIX NO. 3W82 WITH NO CALCIUM CHLORIDE ALLOWED.
- SHOP DRAWING APPROVAL IN ACCORDANCE WITH SPEC. 3238.2.A IS NOT REQUIRED UNLESS OPENINGS OR ATTACHMENTS ARE PLACED ON A BARREL SEGMENT.
- COMPACT THE FIRST 1.0' (LOOSE) OF FILL ABOVE THE BOX WITH LIGHT COMPACTION EQUIPMENT SUCH AS PLATE COMPACTORS OR WALK BEHIND ROLLERS.
- TRANSVERSE REINFORCEMENT IS PARALLEL TO THE CULVERT SPAN. LONGITUDINAL REINFORCEMENT IS PERPENDICULAR TO THE CULVERT SPAN.
- ① USE 3/4" DIAMETER CULVERT TIES. SEE STANDARD PLATE 3145 FOR DETAILS.
- ② PLACE LONGITUDINAL REINFORCEMENT IN ALL SLABS AND WALLS WITH A MINIMUM OF 0.06 SQ. IN./FT.
- ③ REFER TO SPEC, 2412 FOR SEALANT REQUIREMENTS.
- ④ AT FABRICATORS OPTION, SEPARATE MATS As2, As3, As4 MAY BE USED IN LIEU OF "U" SHAPES FOR INSIDE REINFORCING MAT. LENGTH L OF As2 = As3 = As4 = 3' 6".
- ⑤ ESTIMATED WEIGHT OF END SECTION 1 IS 4150 LBS. AND SECTION 2 IS 1800 LBS.
- ⑥ 6" THICK WALLS AND SLABS.

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 2 OF 2