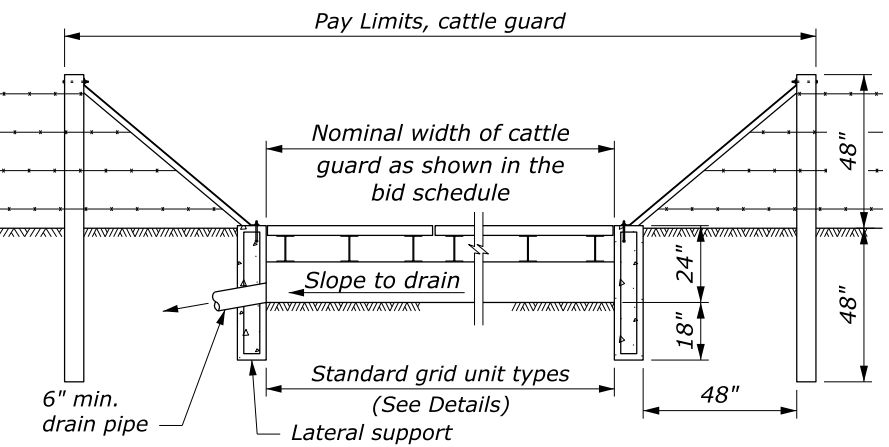
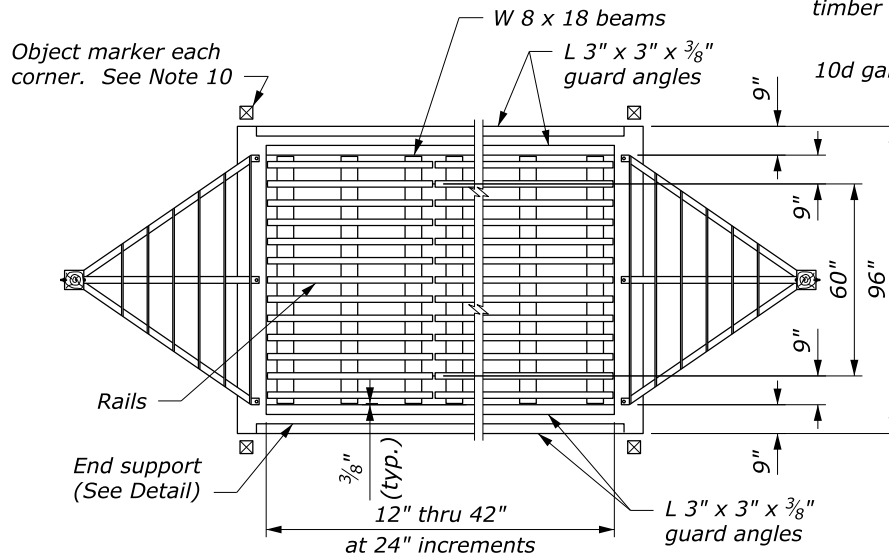
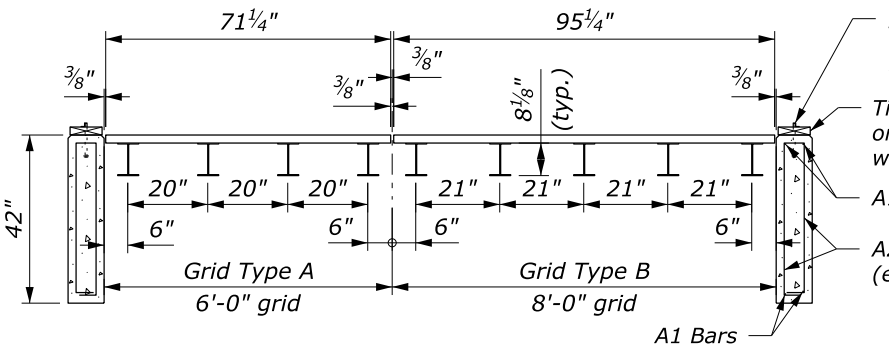




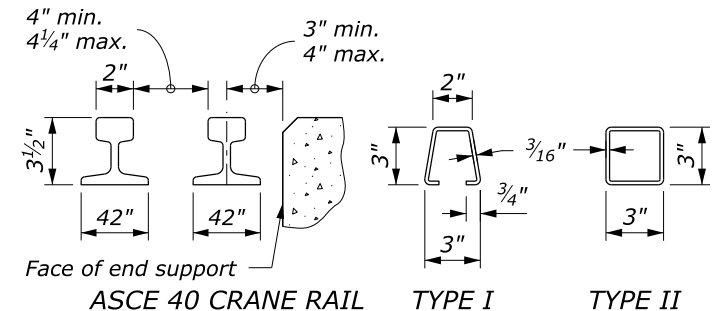
SECTION VIEW



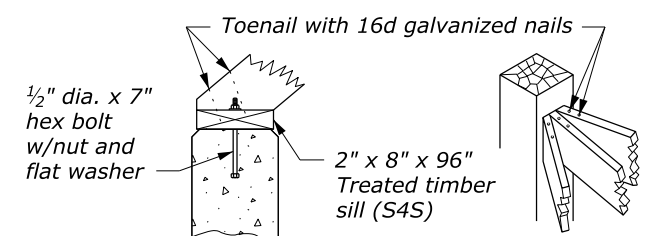
PLAN



STANDARD GRID UNIT TYPES

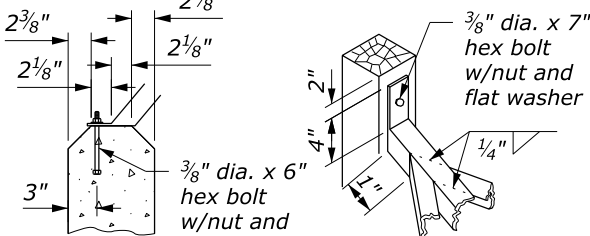


ACCEPTABLE ALTERNATE RAIL



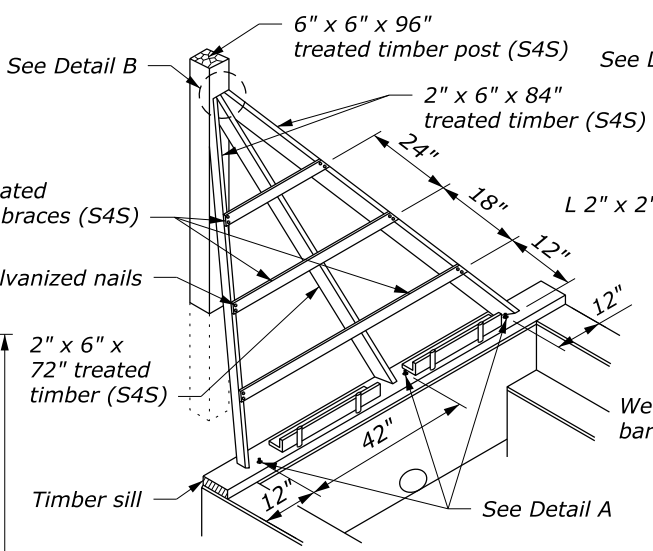
DETAIL A

DETAIL B

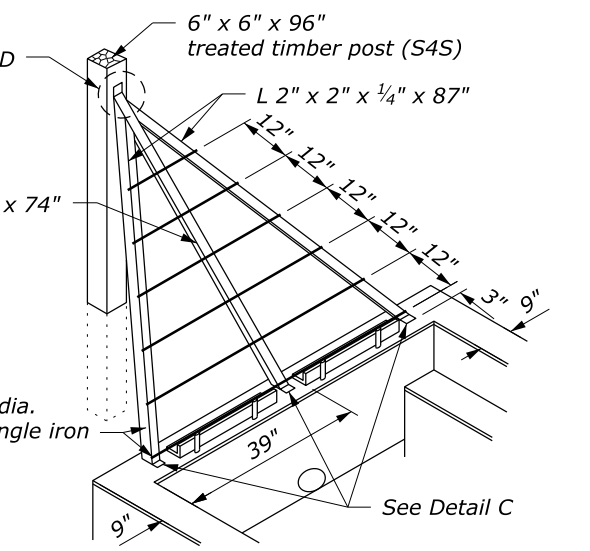


DETAIL C

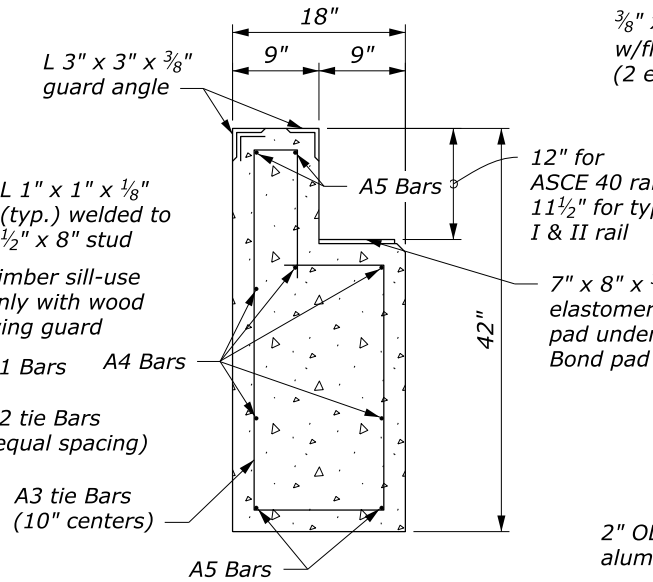
DETAIL D



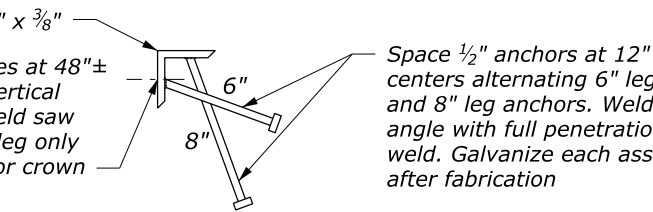
WOOD WING GUARD



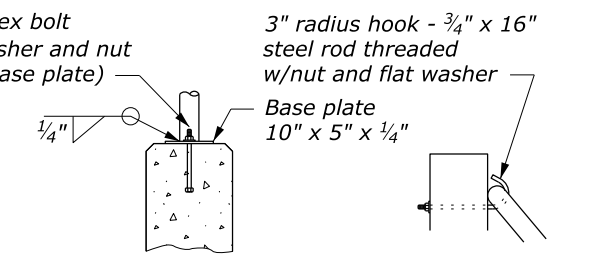
ANGLE IRON WING GUARD



END SUPPORT DETAIL
(#4 Reinforcing Bars)

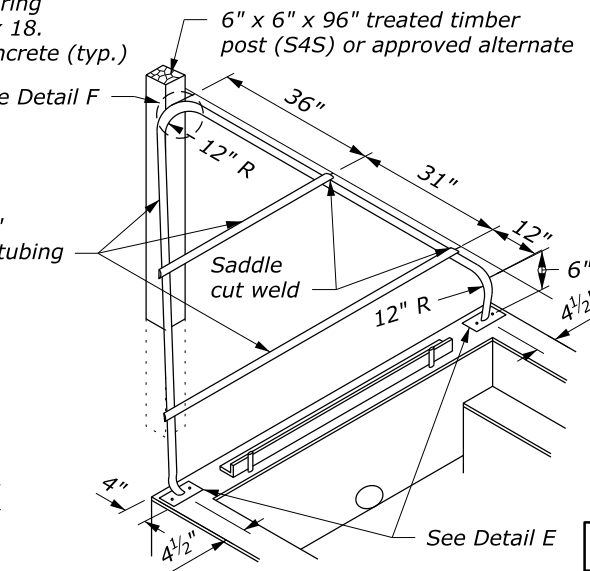


GUARD ANGLE DETAIL
(4 required per cattle guard)



DETAIL E

DETAIL F



ALUMINUM TUBING WING GUARD

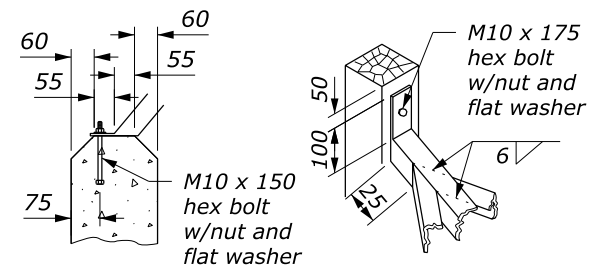
NO SCALE

NOTE:

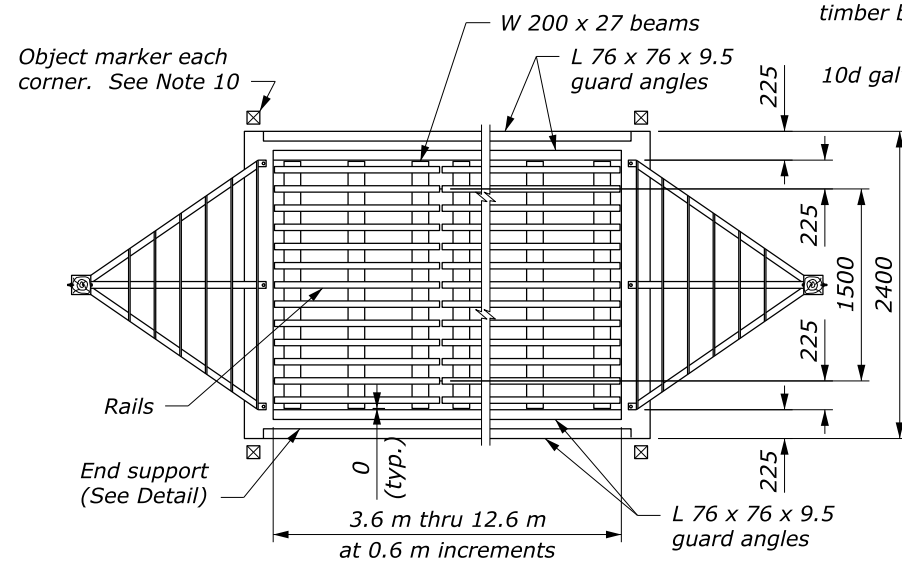
1. **LOADING:** AASHTO HS20.
2. **CONCRETE:** Chamfer exposed edges $\frac{3}{4}$ " unless otherwise shown. Give all concrete surfaces a Class 1 finish.
3. **STRUCTURAL STEEL:** Provide rails conforming to the requirements for ASCE 40 crane rail. Provide structural steel for alternate sections conforming to ASTM A 500, Grade B, Copper Steel or ASTM A 618, Grade 2. If the steel does not contain a minimum of 0.2 percent copper, galvanize the alternate sections. All other structural steel conforms to AASHTO ASTM A36 and is painted.
4. Provide 2" minimum concrete cover to the face of any bar unless otherwise shown. All bars are #4.
5. All welds are continuous $\frac{1}{4}$ " fillet shop welds. Weld rail or alternate sections on both sides to the W 8 x 18 beams at each intersection. Weld according to Section 555.
6. Use aluminum alloy 6061-T6 or 6063-T6 for aluminum tubing.
7. Provide timber conforming to AASHTO M 168. Treat timber with chromated copper arsenate according to AASHTO M 133.
8. Galvanize all hardware according to AASHTO M 111.
9. Construct the cattle guard to conform with the finished roadway grade and template.
10. Place one object marker at each corner of the cattle guard as shown. Mount object markers on 4" x 4" x 6'-0" posts with the reflector located 42" above the elevation of the lateral support concrete.
11. Install drain pipe as shown where required. Include drain pipe with cattle guard unless otherwise shown.
12. Unless otherwise shown in the special contract requirements, shop apply coating according to Section 563. Use Federal Standard 595B, Gray, 36231 for the top coat. Repair any damage to the coating installation.
13. Install channels and wood blocking on cattle guards wider than 16 feet to maintain grate spacing as shown on Standard 619-2.
14. See Standard 619-3 for optional precast foundation details.

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	FLH STANDARD 619-1
	SPECIFICATION FP-24
	APPROVED FOR USE 1/2024

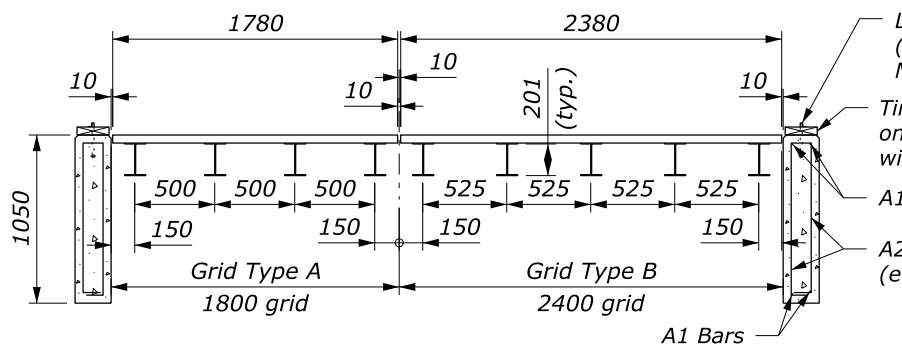
CATTLE GUARD



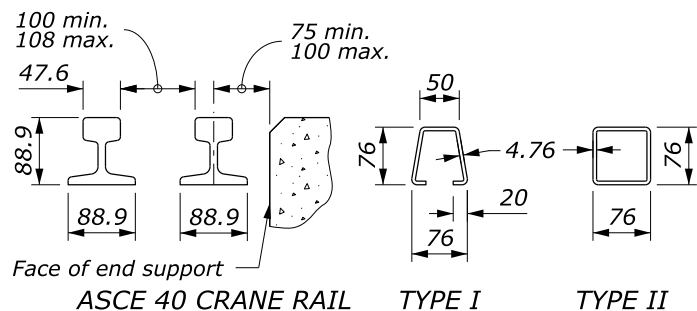
DETAIL D



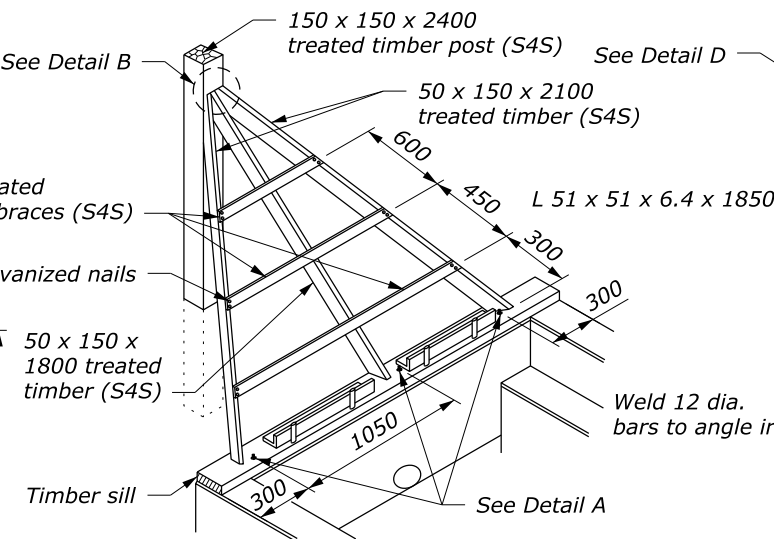
PLAN



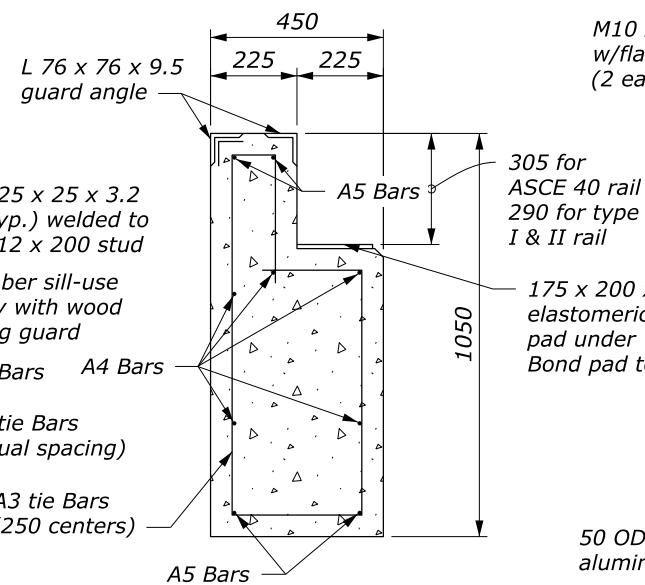
STANDARD GRID UNIT TYPES



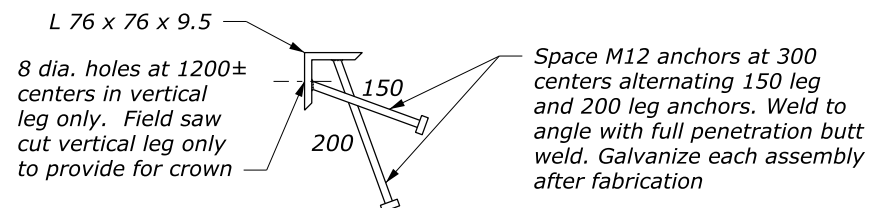
ACCEPTABLE ALTERNATE RAIL



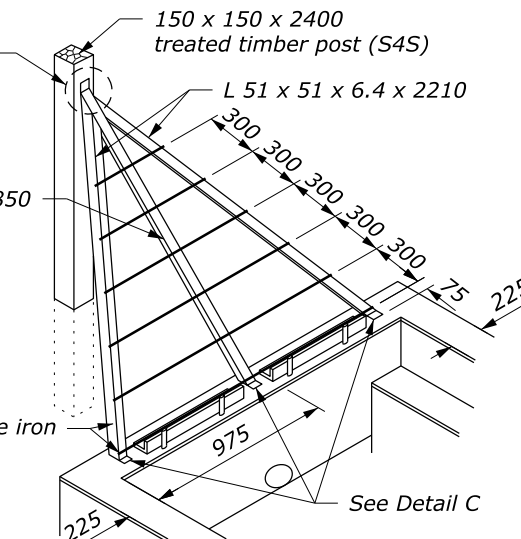
WOOD WING GUARD



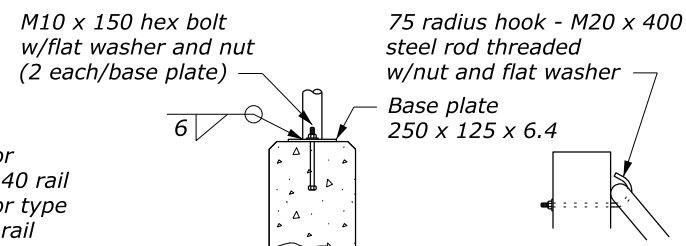
END SUPPORT DETAIL
(#13 Reinforcing Bars)



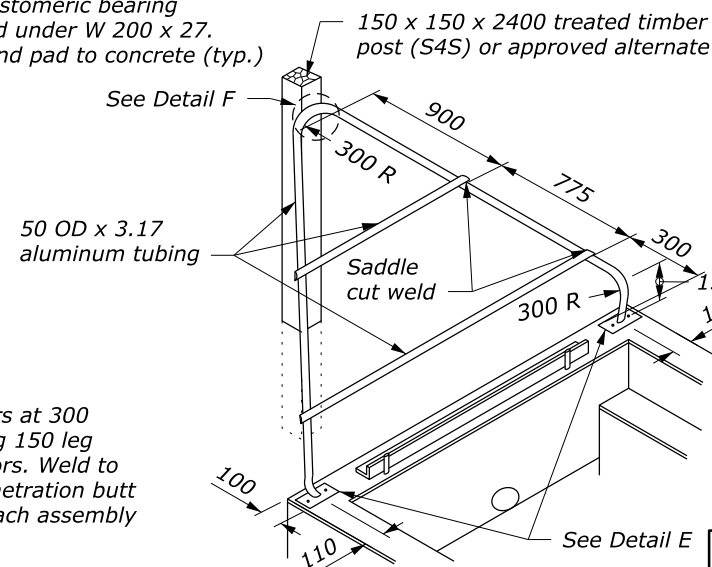
GUARD ANGLE DETAIL
(4 required per cattle guard)



ANGLE IRON WING GUARD



DETAIL F



ALUMINUM TUBING WING GUARD

NO SCALE

NOTE:

1. **LOADING:** AASHTO MS18.
2. **CONCRETE:** Chamfer exposed edges 20 mm unless otherwise shown. Give all concrete surfaces a Class 1 finish.
3. **STRUCTURAL STEEL:** Provide rails conforming to the requirements for ASCE 40 crane rail. Provide structural steel for alternate sections conforming to ASTM A 500, Grade B, Copper Steel or ASTM A 618, Grade 2. If the steel does not contain a minimum of 0.2 percent copper, galvanize the alternate sections. All other structural steel conforms to AASHTO ASTM A36 and is painted.
4. Provide 50 mm minimum concrete cover to the face of any bar unless otherwise shown. All bars are #13.
5. All welds are continuous 6 mm fillet shop welds. Weld rail or alternate sections on both sides to the W 200 x 27 beams at each intersection. Weld according to Section 555.
6. Use aluminum alloy 6061-T6 or 6063-T6 for aluminum tubing.
7. Provide timber conforming to AASHTO M 168. Treat timber with chromated copper arsenate according to AASHTO M 133.
8. Galvanize all hardware according to AASHTO M 111.
9. Construct the cattle guard to conform with the finished roadway grade and template.
10. Place one object marker at each corner of the cattle guard as shown. Mount object markers on 100 x 100 x 1950 posts with the reflector located 1050 mm above the elevation of the lateral support concrete.
11. Install drain pipe as shown where required. Include drain pipe with cattle guard unless otherwise shown.
12. Unless otherwise shown in the special contract requirements, shop apply coating according to Section 563. Use Federal Standard 595B, Gray, 36231 for the top coat. Repair any damage to the coating installation.
13. Install channels and wood blocking on cattle guards wider than 4.8 m to maintain grate spacing as shown on Standard M619-2.
14. See Standard M619-3 for optional precast foundation details.

*This drawing contains **Metric** units of measure.
Dimensions without units are millimeters.*

U.S. DEPARTMENT OF TRANSPORTATION, FHWA
OFFICE OF FEDERAL LANDS HIGHWAY

FLH STANDARD
M619-1

SPECIFICATION
EP-24

APPROVED FOR USE
1/2024

CATTLE GUARD