**SPECIAL PROVISIONS**

**PREENGINEERED/PREMANUFACTURED CATTLE GUARDS**

**1.0 GENERAL**

 1.1 Scope

These specifications are for fully engineered, prefabricated cattle guards and shall be regarded as minimum standards for design and construction. The work included under this item shall consist of design, fabricating, finishing and transporting the steel cattle guard.

 1.2 Definitions

 Owner: Entity who ultimately will own the guard(s).

 Engineer: Entity who will be representing the Owner.

Contractor: Entity who will be installing, and/or purchasing, the guard(s).

Manufacturer: Firm who will be supplying the guard(s) in accordance with these Special Provisions.

 1.3 Qualified Manufacturer

Each Contractor is required to identify their intended supplier as part of the bid submittal. Qualified Cattle Guard Manufacturers must have at least 5 years experience fabricating these types of structures.

Contech Engineered Solutions and Big R Bridge are preapproved manufacturers of the specified Guards. To be approved for bidding, other manufacturers must provide the Engineer a written request at least 10 days prior to the bid. The written request shall accompany the following information:

* Manufacturer’s Product Literature,
* Manufacturer shall submit their qualifications, endorsements and certificates including certification as an Advanced (Major) Bridge Fabricator per AISC with Fracture Critical and Sophisticated Paint Endorsements
* Name of Manufacturer’s design professional who will be signing and sealing the engineering submittals, design professional must be a full-time employee of the manufacturer,
* Representative copies of detailed drawings, field procedures, calculations, quality control manual, welder’s certifications,
* Listing of projects including owner, location, size, year of fabrication, contact person.

The above will be evaluated by the Engineer for accuracy and ability to provide a cattle guard(s) in accordance with these specifications. Manufactures other than those listed above may only be used if the Engineer provides written approval 5 days prior to the bid. The Engineer’s ruling shall be final.

**2.0 APPLICABLE CODES AND STANDARDS**

2.1 Governing Specifications

Cattle guards(s) shall be designed in compliance with the LRFD Bridge Design Specifications, latest edition, by AASHTO. Calculations shall be in accordance with this document, and formulas shall reference the appropriate sections.

 2.2 Other Reference Codes, Specifications and Standards

 AISC, Steel Construction Manual, Latest Edition

 American Welding Society, Structural Welding Code, D1.1, Latest Edition

 ASCE/SEI 7 Minimum Design Loads for Buildings and Other Structures, Latest Edition

1. **GEOMETRY**

* 1. Span Length (Driving Distance)

The span length shall be 8’-0” (straight line dimension) and measured from end to end of the structure.

* 1. Width (Road Width) (Insert the dimension from one of the following 4-0" ; 6’-0" ; 8'-0" ; 10'-0" ; 12'-0" ; 14'-0" or 16'-0")

The cattle guard width shall be XX’-XX”.

* 1. Elevation Difference

The top of the cattle guard shall be at the same elevation at each end of the span.

1. **STRUCTURAL DESIGN LOADS**
	1. Dead Load

 The structure shall be designed for the total weight of the cattle guard.

* 1. Vehicle Load (VL)

 Cattle guard shall be designed for supporting HL-93 vehicle plus Dynamic Load Allowance.

Insert the required design vehicle (HS-20 ; U80 ; U54 ; U102 ; CUSTOM)

* 1. Combination of Loads

The load combinations and load factors to be used shall be as per specified in AASHTO LRFD Table 3.4.1-1.

1. **STRUCUTRAL DESIGN CRITERIA**
	1. Wheel Load Distribution

Cattle guard shall be designed to support the maximum wheel load from the design vehicle.

* 1. Submittals

Prior to fabrication, Manufacturer shall provide submittal drawings and calculations stamped by a licensed engineer in the state of Colorado (change as needed) demonstrating compliance with AASHTO LRFD design code and applicable live loads

1. **MATERIALS OF CONSTRUCTION**
	1. Structural Steel

For painted or galvanized steel cattle guards, all structural steel shall be ASTM A972, A572 Grade 50 of A588. Miscellaneous steel may be A36 or as noted on the drawings.

* 1. Fasteners

Structural bolts used to field splice, or connect; all main members shall be ASTM A325, in accordance with the *Specification for Structural Joints using ASTM A325 or A490 Bolts.* The nuts for these structural bolts shall be ASTM A563. One flat hardened washer meeting ASTM F436 shall be supplied with all bolts. All bolts, nuts and washers shall be galvanized and shall be furnished in an amount of 5% in excess of the number required for each size and length.

Non-structural bolts shall be ASTM A307, ¼” diameter carriage bolts, zinc plated or galvanized.

1. **FINISH** (Delete 7.0-7.3 if Unpainted)
	1. Cleaning

Prior to the first application of paint or primer, all surfaces shall be SP-7 Brush-Off Blasted to remove loose mill scale and all foreign debris.

* 1. Paint (Delete 7.2 if Galvanized) (if Painted, keep only one: a,b,or c.)

a. One-coat system shall be Envirolastic 940 LV by Sherwin Williams, 6.0-9.0 mils DFT, color to be Safety Yellow (change as need to any SW# on chart below)

b. Two-coat System – One coat primer, one topcoat per CDOT, BLM (or Other) specification.

c. Three-coat System – One coat primer, two topcoats per FHWA(or Other) specification.

* 1. Hot Dipped Galvanized (Delete 7.3 if Painted)

Per ASTM A123

**8.0 FABRICATION**

8.1 Welding

Welding procedures and weld qualification test procedures shall conform to the provisions of AWS D1.5, Structural Welding Code, latest edition. Filler metal shall be in accordance with the applicable AWS Filler Metal Specification, and shall match the corrosion properties of the base metal.

**9.0 QUALITY CONTROL**

9.1 AISC Certification

The cattle guard shall be fabricated in a shop owned by the Manufacturer. This facility shall have up to date certification by AISC as a Certified Bridge Fabrication - Intermediate (Major) with Fracture Critical Endorsement.

 9.2 Certified Weld Inspector

The Manufacturer shall employ a Certified Weld Inspector (CWI), with endorsement by AWS QC1. This CWI shall be present during the complete fabrication of the cattle guard. The CWI shall provide written documentation that the cattle guard has been fabricated in accordance with these specifications and the approved design drawings.

 9.3 Documentation

Material Certifications shall be available for review for all materials within the cattle guard. Traceability of heat numbers is required for all steel.

Documentation showing the performance of all critical quality checks shall also be made available for review by the Engineer or Owner.

 9.4 Non-Destructive Testing

All welds within the structure shall be visually inspected for conformance to size, under cut, profile and finish.

**10.0 DELIVERY AND ERECTION**

10.1 Delivery

Delivery shall be made via truck to a location nearest the site which is accessible to normal over-the-road equipment. All trucks delivering materials will need to be unloaded at the time of arrival. If the erection Contractor needs special delivery or delivery is restricted he shall notify the Manufacturer prior to bid date. This includes site issues which may prevent over-the-road equipment from accessing the site. Steerable dollies are not used in the cost provided by the Manufacturer.

10.2 Installation & Lifting Procedures

The Manufacturer will provide a standard typical written procedure for lifting and splicing the cattle guard (if required). All actual methods, equipment and sequence of erection used are the responsibility of the Contractor.

**11.0 WARRANTY**

The Manufacturer shall warrant their steel structure(s) to be free of design, material, and workmanship defects for a period of one year from the earlier of the date of delivery or from 60 days after final fabrication. This warranty shall not cover defects in the cattle guard caused by abuse, misuse, overloading, accident, improper maintenance, alteration, or any other cause not the result of defective materials or workmanship. This warranty shall be void unless Owner’s records can be supplied which shall indicated compliance with the minimum guidelines specified in the inspection and maintenance procedures. Paint, galvanizing and other special coatings shall be warranted by the coating manufacturer and is not covered by the Manufacturer. Repair or replacement shall be the exclusive remedy for defects under this warranty. The Manufacturer shall not be liable for any consequential or incidental damages for breach of any express or implied warranty on their structures. Use of de-icing or dust prohibitive chemicals or salts to any part of the cattle guard will void this warranty.

