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5.21 SUPPLY OF LIVESTOCK GUARDS5.21.1 GENERAL5.21.1.1 **Description**

The Work consists of supplying livestock guards designed for safe passage of motor vehicles while safely prohibiting the passage of livestock.

5.21.1.2 **Design Standards**

The Contractor shall provide full shop drawings showing all materials, including specification and grade of steel, all material sizes and/or dimensions, and all connections, including grades and sizes of bolts and sizes of weld. Drawings shall be fully dimensioned in metric units.

Designs shall be certified by a Professional Engineer registered in the Province of Alberta, that they meet the specified load capacity for each type of livestock guard outlined herein.

In cases in which standards are quoted, such as the Canadian Standards Association (CSA) or the Canadian Welding Bureau (CWB), the latest edition shall be used.

The Contractor shall indicate patent information and ownership, if applicable. Ownership of the registered design will remain with the vendor.

CB-6 drawings referred to in this specification are found in the manual entitled "Standard Drawings for Highway Construction."

5.21.2 MATERIALS5.21.2.1 **General**

The Contractor shall supply all materials required to complete the Work to the standards shown on the drawings. Livestock guards shall be fabricated using new or used quality material as specified, be painted with one coat of oil alkyd type primer, and shall meet the requirements of the Canadian General Standards Board (CGSB) Spec. 1-GP-166M. Weathering steel which does not require paint, is also acceptable.

Finished products shall be identified with a trademark and the date of manufacture stamped or welded in an area of the guard that can be easily read after installation.

Fencing detail shown on the drawings is for information only, and with the exception of the applicable fence post sleeves, shall not apply to this specification.

5.21.2.2 **Types of Livestock Guard**

The various types of livestock guards are as follows:

5.21.2.2.1 Standard Highway Type

Standard highway livestock guards are used on all paved and unpaved roads and are designed to carry legal highway vehicles at various speeds. Details are shown on drawings CB6 2.13 M5, M6, M7 and M11.

5.21.2.2.2 Range Type

Range type livestock guards are designed to be used on lightly or seldom travelled roads with no more than standard farm or ranch vehicles. Details are shown on drawing CB6 2.13 M4.

5.21.2.2.3 Off-Highway Type

Off-highway type guards are used on logging or mining access roads where the load of the vehicles can exceed the legal highway limit. There may also be frequent light or average truck/car traffic. These guards shall be constructed in accordance with the applicable drawing for the required size with the increased load ratings detailed herein.

5.21.2.3 **Load Requirements**

In all load applications, the load shall be placed on the livestock guard in a location causing the greatest stress to the member in question.

5.21.2.3.1 Live Load Requirements

Range type and standard highway type livestock guards shall meet the live load capacity requirements of CSA bridge design code S6 for design truck: normal loading CS-600 truck (180 kN axle).

Off-highway livestock guards shall meet the live load capacity requirements of CSA bridge design code S6 for design truck: log haul loading CS-750 truck (225 kN axle).

5.21.2.3.2 Impact Loading

An impact load shall be applied concurrently with the live load. The impact load for all livestock guard types shall be:

- a vertical load equal to 40% of the live load, or
- a vertical load equal to 20% of the live load combined with a horizontal load equal to 20% of the live load.

5.21.3 EQUIPMENT

The Contractor shall supply all equipment necessary to complete the Work.

5.21.4 CONSTRUCTION5.21.4.1 **General**

All livestock guards shall be constructed in accordance with the applicable drawings.

Welding shall be performed by a company approved by the Canadian Welding Bureau to CSA Standard W47.1 with Work performed to CSA Standard W59.

5.21.4.2 **Sill and Frame Construction**

The frame shall be designed to allow even distribution of live loads to the sills. The ends of the frame which contact the road surfaces shall include a fill guard to prevent road material from falling between the deck and sills. The fill guard shall be welded to the side of the livestock guard.

No splices are permitted in supporting members.

5.21.4.3 **Deck Construction**

Deck construction shall consist of round structural tubing with dimensions as shown on the drawings arranged perpendicular to traffic. A gusset reinforcement shall be used between each member. This reinforcement shall not permit the build-up of gravel or snow which may allow livestock to cross.

Fence post sleeves designed to accept a 60 mm outside diameter (O.D.) post shall be connected through the deck and attached to the frame at an outward 115-degree slant. The top of the sleeve shall not protrude above the deck.

Deck members shall be continuous over the length of the guard. Any splices shall develop the full strength of the member and shall be detailed on the drawings.

5.21.5 INSPECTION, SAMPLING AND TESTING

The Contractor shall contact the Consultant for coordination of inspection during production. Inspection, sampling and testing of livestock guard materials may be carried out by the Consultant, in accordance with the latest editions of the applicable specifications and standards. In particular, acceptance shall be on the basis of load bearing tests, material tests and inspection of the completed product.

Where shop or plant inspections are made, the Contractor shall ensure the Consultant has free access to all parts of the shop or plant as involved in the manufacture or production of the material ordered, and shall furnish all such facilities as to provide a safe and adequate inspection of the production of the material. All materials which do not meet the specifications shall be rejected. No rejected material, the defects of which have subsequently been corrected, shall be used unless approval in writing has been given by the Consultant. Stocked materials, even though accepted in delivery, shall be subject to testing and shall meet the specifications at the time they are to be used in the Work.

The Contractor shall supply to the Consultant the material manufacturer's certification that the material meets the Department's specifications.

5.21.6 MEASUREMENT AND PAYMENT

Payment for the supply of livestock guards will be included in the unit price bid per livestock guard for the applicable type and size as supplied and installed.