

ITEM 25606.3042XXM -SINGLE SLOPE TRAFFIC BARRIER

1. DESCRIPTION:

1.01 The work shall consist of constructing concrete traffic barrier in accordance with this specification, the contract plans, the lines and grades and locations shown on the plans or as established by the Engineer. The type of barrier shall be as indicated on the plans and in the proposal.

2. MATERIALS:

2.01 A. All materials in the finished barrier shall meet the requirements of the appropriate subsections of Section 700, MATERIALS DETAILS. Only Type 6 Portland cement will be allowed for any barrier, transitions, or special cast-in-place sections. These materials shall be sampled and tested in accordance with the Authority's written instructions.

B. **Bar Reinforcement:** Steel reinforcing bars shall be billet steel bars (ASTM A615, Grade 400) ONLY, conforming to the requirements of Section 709-01, Bar Reinforcement, Grade 400.

C. **Galvanizing of Bar Reinforcement:** The bar reinforcement shall be Class 1 galvanized after bar fabrication, in accordance with ASTM A767M, Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement, including Supplemental Requirements S1 and S3, and as modified by B. above. In accordance with ASTM A767M, the average coating thickness, of a minimum of 3 tests, shall be 1070 g/m² or 0.15 mm

Prior to galvanizing, the material shall have all grease, dirt, mortar, mill scale, injurious rust, or any other foreign substance removed.

For the purpose of this specification, the term "injurious rust" shall be interpreted to mean rust which is not firmly bonded to the steel. Rust which is difficult to remove, even by vigorous scrubbing with a wire brush, shall be considered firmly bonded to the steel.

The galvanized threads of nuts and mechanical connectors used for assembly with galvanized bolts and reinforcement shall be tapped oversize prior to coating and need not be re-tapped afterwards. The minimum additional diameter for Class-2A threads galvanized to Class C is as follows:

<u>Class-2A Thread Diameter (mm)</u>	<u>Additional Diameter (mm)*</u>
11 mm and smaller	.40
Over 11 to 25 mm	.53
Over 25	.79

* applies to both pitch and minor diameters, minimum and maximum limits.

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2. MATERIAL: (cont'd)

2.01 (cont'd)

Material galvanized in accordance with these specifications shall be free from wet storage stains (white rust). These corrosion deposits, if present, shall be removed in a manner satisfactory to the Authority prior to incorporation of the material in the work. After removal of these deposits, the coating shall have a uniform appearance free from uncoated spots, lumps, blister, gritty areas, acid flux and black spots. Materials with these defects, or not meeting the finish and adherence of coating requirements as defined in the above ASTM specification, will be rejected and immediately removed from the work site. Acceptable material will be provided to replace rejected material at no additional cost to the Authority.

- D. **Miscellaneous Hardware:** Chairs, tie wires, nuts, bolts, washers, other devices, and miscellaneous hardware used to support, position, or fasten the reinforcement shall be made of or coated with, a non-metallic material, or galvanized. The specific hardware that the Contractor proposes to use shall be approved by the Engineer. If the specific hardware is galvanized, the hardware shall be prepared and galvanized in accordance with the requirements of both ASTM A153M and Subsection 2.01-C, Galvanizing of Bar Reinforcement.
- E. **Mechanical Connectors.** Mechanical connectors used for galvanized bar reinforcement shall be galvanized in accordance with the requirements of ASTM A153M, Zinc Coating (Hot Dip) on Iron and Steel Hardware prior to installation. The thread shall be tapped oversize prior to being coated per Subsection 2.01-C., Galvanizing of Bar Reinforcement.

The assembled connection on the galvanized reinforcing bars shall have no exposed uncoated steel. Any damage to the galvanized coating or un-coated area shall be repaired as indicated in Subsection 3.03-F., Field Repair.

The manufacturer of the mechanical connectors shall certify, in writing to the Engineer, that the mechanical connectors, with oversize threads (if applicable), meet the following three parameters:

1. The maximum slip, at 50% of the yield strength of the reinforcing bar, shall be 0.25 mm. At least 70% of the maximum slip shall have occurred on the first cycle.
2. The maximum slip, at 90% of the yield strength of the reinforcing bar, shall be 0.46 mm.

- F. **Zinc-Rich Paint.** Zinc-rich paint used for the field repair of galvanized coating shall meet the following requirements:
1. One application of the material shall provide a dry coating thickness of at least 0.05 mm.

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2. The applied coating shall provide barrier protection and shall preferably be anodic to steel.

2. **MATERIALS:** (cont'd)

2.01 (cont'd)

3. Application of the coating material shall be possible under shop or field conditions.
4. The dried film shall have a minimum zinc dust content equal to 94% (by weight).
5. The brand of material used shall be approved by the galvanizer, and shall be compatible with the galvanizing, and inert in concrete.

G. Preformed Closed Cell Foam Material shall conform to 705-08.

2.02 **Galvanizing:** All steel shall be galvanized. Galvanizing of all steel except reinforcing steel shall be done in accordance with the requirements of Subsection 719-01. Reinforcing steel shall be galvanized in accordance with the requirements of Subsection 2.01-C, Galvanizing of Bar Reinforcement.

2.03 Concrete shall meet the requirements for Class A Concrete in Section 501 - PORTLAND CEMENT CONCRETE - GENERAL.

2.04 Preformed Closed Cell Foam Material shall meet the requirements of Subsection 705-08 of the Standard Specifications.

2.05 Any modification requested in the proportioning, air content, slump or curing shall be approved by the Chief Engineer.

2.06 Suitable excavated material will be allowed for use in back-filling around the barrier.

3. **CONSTRUCTION DETAILS:**

3.01 The Contractor shall precast the barrier as shown on the plans. Cast-in-place sections shall only be allowed for roadway lighting supports, sign foundations, and in sections where precast is not possible as determined by the Engineer, or as shown on the plans.

3.02 The provisions of subsections 555-3.04 Handling and Placing Concrete, 555-3.07 Finishing, A. General, and 555-3.08 Curing, shall apply, except as modified herein:

3.03 Delivery of any Type 6 cement concrete to the project for use in the cast-in-place sections shall be made in a truck assigned exclusively to the delivery of such concrete to assure that the required visual color match to the precast sections is maintained.

A. **Precast Concrete Barrier**

1. Precast Concrete Barrier shall meet the requirements of Section 704-05, Precast Concrete Barrier.

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3. CONSTRUCTION DETAILS: (cont'd)

3.03 (cont'd)

A. **Precast Concrete Barrier** (cont'd)

2. **Fabrication.** Barrier shall be cast in sections having a uniform length of approximately 6 m or as indicated on the plans. These sections shall be cast to conform to the shape shown on the contract plans. The Contractor shall provide the Engineer with shop drawings and detailed specifications for the fabrication and construction of the barrier. The shop drawings shall show the location of and type of all reinforcement in the precast concrete barrier. They shall be delivered to the Engineer for approval fifteen (15) working days before fabrication is to begin.

Curing of the Concrete Barrier shall conform to the requirements given in the curing subsection of Section 704-05 Precast Concrete Barrier.

3. Immediately prior to installation the Engineer shall inspect the sections for manufacturing defects or shipment damage. Damaged or defective sections shall be rejected or repaired in accordance with Section 704-05 Precast Concrete Median Barrier Repair.
4. **Placement.** Precast concrete barrier sections shall be placed upon a layer of subbase material (150 mm minimum depth) thoroughly compacted to such a line and grade that a smooth alignment of the barrier is obtained as determined by the Engineer. The barrier shall be so constructed that the joint opening at any point in the plane of the joint is not less than 13 mm or more than 25 mm.
5. **Sleeper Slabs.** The Contractor shall install concrete sleeper slabs on the grade at the ends of the precast sections at the locations indicated on the Plans. The Contractor may with the approval of the Engineer set the slabs lower than the required grade. A grout filler will be required regardless of method used. The grout shall be placed at the same time as the barrier.
6. A preformed closed cell foam material shall be glued to one end face of each section of barrier to form a joint seal between the barrier sections when installed. The material shall be 25 mm thick by 25 mm wide, recessed 13 mm from each face and top of the barrier.
7. Each section of concrete barrier shall have two lifting devices, capable of supporting the weight of the barrier section, cast into the barrier.

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3. CONSTRUCTION DETAILS: (cont'd)

3.03 (cont'd)

B. Cast in Place Concrete Barrier

1. **Fabrication.** Barrier shall be cast in sections having a uniform length of approximately 6 m or as indicated on the plans. These sections shall be cast to conform to the shape shown on the plans. Sections shall be separated by construction joints with provisions made at each joint for expansion. The barrier shall be so constructed that the joint opening at any point in the plane of the joint is not less than 13 mm or more than 25 mm. Preformed Closed Cell Foam meeting the requirements of 705-08 shall be placed in the joint and recessed 13 mm from the faces of the barrier. When the concrete barrier is cast upon a footing, the construction joints in the barrier shall exactly match the construction joint in the footing.

The Contractor shall provide the Engineer with working drawings and detailed specifications for the fabrication and construction of the barrier. The working drawings shall show the location of and the type of all reinforcement in the concrete barrier. They shall be delivered to the Engineer for approval ten (10) working days before fabrication is to begin.

- a. **Forms.** Forms shall be metal and of such construction that there will be minimum interference to inspection for grade and alignment. Forms shall be braced and secured adequately so that no discernible displacement from alignment or grade will occur during placement of concrete.
- b. **Concrete Placing and Vibrating.** Concrete shall be placed in the barrier forms in accordance with the requirements of subsection 555-3.04 "Handling and Placing Concrete". Concrete shall be compacted by means of approved immersion type mechanical vibrators. The vibrator shall be inserted into the concrete at 300 mm intervals. The vibrators shall be of a size and weight sufficient to thoroughly vibrate the entire concrete mass without damaging or misaligning the forms and reinforcement.
- c. **Removal of Forms and Finishing Surfaces.** Forms shall be left in place for 24 hours or until, in the judgment of the Engineer, the concrete has sufficiently set so that the forms may be removed without injury to the barrier. Immediately after the forms have been removed, surfaces exposed to view shall have all projections and irregularities carefully removed and all cavities neatly filled with mortar of the proportion used in the concrete. The same brand of cement and the same kind of aggregate shall be used for filling cavities as was used in the original concrete mix. Plastering of repaired surfaces will not be allowed. The surface film of all such repaired surfaces shall be carefully removed before setting occurs.

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3. CONSTRUCTION DETAILS: (cont'd)

3.03 (cont'd)

B. Cast in Place Concrete Barrier

- d. **Concrete Curing** . Curing of concrete barriers shall conform to the requirements given in Subsection 555-3.08, Curing. Other methods of curing may be used only when so indicated on the plans or in the itemized proposal.

C. Acceptance

The acceptance of the barrier will be based on the results of the materials sampled and tested as required under the appropriate Materials subsection and the inspection of the barrier in its final position with respect to alignment geometric configuration, structural integrity and surface finish.

4. METHOD OF MEASUREMENT:

- 4.01 The work shall be measured by the pay units indicated below for those items that are actually furnished and placed in accordance with the plans, specifications, standard sheet and as approved by the Engineer.
- 4.02 Concrete barrier when paid by the meter shall be measured along the axis of the barrier and between its extreme outer limits.

5. BASIS OF PAYMENT:

- 5.01 The unit prices bid for the items of work as enumerated below shall include the cost of all labor, material and equipment necessary to satisfactorily complete the work. Progress payments will be made when the barrier is in its final position and has cured the required length of time. Payment will be made, at the contract unit price, for 90% of the quantity properly placed. The remaining 10% of the quantity will be paid for upon final acceptance of the concrete barrier. Payment will be made under:

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>PAY UNIT</u>
25606.304201M	Single Slope Traffic Barrier (Pre-Cast	Meter
25606.304202M	Single Slope Traffic Barrier (Cast-in-Place)	Meter
25606.304203M	Single Slope Traffic Barrier (Wide Barrier & Pre-Cast)	Meter
25606.304204M	Single Slope Traffic Barrier (Cast-in-Place Wide)	Meter
25606.304205M	Single Slope Traffic Barrier (Half Section & Pre-Cast)	Meter
25606.304206M	Single Slope Traffic Barrier (Cast-in-Place Half Section)	Meter
25606.304207M	Single Slope Traffic Barrier Asymmetric (Precast Wide)	Meter