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## 7.2 PAINTED ROADWAY LINES

### 7.2.1 GENERAL

#### 7.2.1.1 **Description**

This specification covers the painting of roadway lines which includes edge lines, lane lines, continuity lines and directional dividing lines as shown on the drawings and the supply of paint and glass beads.

#### 7.2.1.2 **Contractor Quality Control Inspection Plan**

The Contractor shall be totally responsible for quality control inspection throughout every stage of the work to ensure that materials and workmanship comply with the requirements of this specification.

The Contractor shall develop and submit in writing to the Consultant a Quality Control Inspection Program (QCIP) that addresses all the elements which will effect the quality of the line painting including but not limited to:

- **Paint Application Rates**
- **Glass Bead Application Rates**
- **Pavement Surface and Atmospheric Conditions**
- **Line Widths, Line Lengths and Space Lengths**

The Contractor shall maintain records of QCIP data, complaints from the public, and other details relevant to the Work and provide these records to the Consultant daily.

### 7.2.2 MATERIALS

The Contractor shall supply all paint and glass beads in accordance with Specification 5.20, Supply of Line Painting Materials.

### 7.2.3 EQUIPMENT

#### 7.2.3.1 **General**

The Contractor shall provide all equipment necessary for completion of the Work including but not limited to the painting truck, a pilot truck, a crash attenuator vehicle and all ancillary equipment such as fork lifts, hoists, pumps and transport vehicles required to load, unload and transport the paint and glass beads.

#### 7.2.3.2 **Painting Truck**

The painting truck shall be self-propelled and equipped to meet or exceed the following requirements:

- (a) Two paint tanks each having a minimum capacity of 270 litres feeding three lines for a simultaneous two-colour application (two yellow directional dividing lines and one white edgeline).

- (b) Painting controls capable of adjusting the paint application for the length of dashed line required. Each spray gun shall have independent controls and adjustment mechanisms and shall be operated from the operator's compartment.
- (c) The compressor shall have a minimum rated capacity of 4.25 cubic metres per minute.
- (d) Bead dispensers shall be electrically controlled, air operated, gravity fed with controls to adjust the bead flow. The bead dispensers shall be fed from tanks capable of holding a minimum of 45 kilograms of beads.
- (e) A television vehicle guidance or a vehicle guidance system mounted on a retractable A-frame with a guide wheel and pointer system, to assist the truck driver in maintaining alignment on the existing lines.
- (f) A minimum of five spray guns and five bead dispensers mounted in the following configuration:
  - (i) Three spray guns and three bead dispensers mounted on an independently-controlled boom located on the left side of the truck to paint the directional dividing lines. The outer two spray guns and bead dispensers shall be in a configuration that will produce two lines of equal width with the distance between the two lines equal to the width of one line (100 mm). The inner spray gun and bead dispenser shall operate independently and shall be used to apply the directional dividing line where only a single directional dividing line is required. When a 200 mm wide line is required, 2 guns shall be used simultaneously.
  - (ii) Two spray guns and two bead dispensers mounted on an independently controlled boom on the right side of the truck to apply the right edge line. When a 200 mm wide line is required, 2 guns shall be used simultaneously.
- (g) Equipped to apply white or yellow paint from the three spray guns mounted on the left hand side of the paint truck and to switch from one colour to the other during operation.
- (h) Control of both independent booms, all spray guns, bead dispensers and painting controls from the operator's compartment(s).

### 7.2.3.3 Companion Vehicles

The painting vehicle shall be immediately followed by a vehicle equipped with a crash attenuator which meets National Cooperative Highway Research Program, Report 350 Test Criteria, Test Level 3 for 100 km/hour work zones. The weight of the crash attenuator vehicle including ballast, flashing arrow board and truck mounted crash attenuator shall be 6 300 to 12 000 kg.

The crash attenuator vehicle shall be followed by a ½ ton or larger truck acting as a pilot vehicle.

### 7.2.3.4 Safety Equipment

The painting truck and both companion vehicles shall be equipped with the following:

- (a) A two-way radio for voice communication.

- (b) An overhead revolving beacon with an amber lens a minimum of 180 mm high and 180 mm wide. The beacon shall be mounted on the top of the vehicle fully visible to traffic approaching from both front and rear.
- (c) A sequential arrowboard meeting the requirements as shown in Specification 1.2, General.
  - (i) The arrowboard shall be controlled from a console located in the vehicle cab.
  - (ii) The arrowboard display shall be visible to traffic approaching the rear of the trucks.
- (d) A "slow moving vehicle" sign. The sign shall be mounted at the rear of the vehicle and be visible to the public only when the painting truck is applying paint.
- (e) A warning sign, mounted at the rear of the truck, stating "wet paint keep off". The sign shall have standard warning colours with letters having a minimum height of 150 mm and shall be visible to the public only when the truck is applying paint.

#### 7.2.4 HIGHWAY OPERATIONS

##### 7.2.4.1 **General**

All painting shall be carried out during hours of daylight between ½ hour after sunrise and ½ hour before sunset. Generally the Contractor may paint lines during any day of the week but is cautioned that traffic volumes are usually higher on all highways on Friday, Saturday and Sunday. Line painting on highways with relatively high traffic volumes shall be performed between Monday and Thursday inclusive if so directed by the Consultant.

Operation of the painting truck against the flow of traffic shall not be permitted.

Loading glass beads or paint onto the painting truck is not permitted on a roadway surface.

##### 7.2.4.2 **Operation of Companion Vehicles**

The Contractor shall operate both companion vehicles in conjunction with the painting truck during the painting of all longitudinal lines. Companion vehicle operators shall not attempt to control traffic from inside the vehicle.

The actual operating parameters of the companion vehicles will be determined by the Contractor to safely accommodate traffic and will be based on site specific conditions such as sight distances, highway geometrics and traffic patterns and volumes. Typical operating parameters are as follows:

###### 7.2.4.2.1 Crash Attenuator Vehicle

The crash attenuator vehicle shall follow behind the painting truck at a distance of 50 to 400 metres. Typically, on 4 Lane highways the crash attenuator vehicle should closely follow the paint truck to encourage traffic to maintain the passing lane and not pull in behind the paint vehicle. On 2 Lane roadways, traffic should still be encouraged to pass both vehicles in one pass, however actual conditions may dictate that the crash attenuator vehicle give way to allow safe passing.

On Single Lane Roads (for example on interchange ramps) the crash attenuator vehicle shall be driven in the travel lane to keep traffic from passing the painting truck.

#### 7.2.4.2.2 Pilot Vehicle

On 2 lane and 4 Lane Highways the pilot vehicle shall be operated as follows:

- (i) On a 4 Lane Highway, the pilot truck shall be driven in the same travel lane as the paint machine, following it at a constant distance of approximately two kilometres.
- (ii) On a 2 Lane Highway with a minimum 3 metre shoulder, the pilot truck shall be driven along the right shoulder, not straddling the right edge line and following the painting truck at a constant distance of approximately two kilometres.
- (iii) On a 2 Lane Highway with less than a 3 metre shoulder, the pilot truck shall travel from approach road to approach road and stop until the paint machine has cleared the next approach road. Approach road in this context includes local roads, farm entrances, field entrances, etc. The pilot truck, when stopped in an approach road, shall sit parallel to the highway in order that the signs and arrowboard are fully visible to traffic approaching from the rear.

#### 7.2.4.3 **Arrowboard Message**

The crash attenuator vehicle, pilot truck and the painting truck are to display the same message at all times. The message shall be one of the following:

- (a) On 2 Lane Highway - a bar (6 horizontal lights flashing) is preferred but if a bar cannot be shown on the type of arrowboard used, the 4 corner lights flashing is an acceptable alternative.
- (b) On a 4 Lane Highway - a right arrow when operating in the left lane and a left arrow when operating in the right lane.
- (c) On a Single Lane Road (for example the exit leg of an interchange) - four flashing corner lights or a bar.

#### 7.2.5 PAINTING ROADWAY LINES

##### 7.2.5.1 **Areas to be Painted**

The Contractor shall paint lane lines, continuity lines, edge lines and directional dividing lines on the highway sections, interchanges or intersections specified, as well as the lines through towns, at truck turnouts, rest areas, points of interest and weigh scale turnouts. At intersections, edge lines shall be painted to the right-of-way limit or the point where the pavement ends whichever occurs first.

On pavement overlay projects, the Contractor shall ensure that the start and finish of "No-Passing Zones" are consistent with those on the underlying pavement, unless otherwise directed by the Consultant.

On new construction, the start and finish of "No-Passing Zones" will be determined and laid out by the Consultant.

### 7.2.5.2 Pavement Surface and Atmospheric Conditions

Painting shall not be performed during the following conditions:

- (i) When the temperature is below 0°C.
- (ii) When wind conditions cause overspray.
- (iii) When the visibility is less than 700 metres.
- (iv) During periods of rainfall.

Areas to be painted shall be clean and dry during the application of paint.

Areas to be painted shall be inspected by the Contractor to ensure they are clean, free of sand and debris, and suitable for painting. Sweeping, when required, shall be completed by the Contractor.

### 7.2.5.3 Paint and Bead Application

All painted lines shall be uniformly applied at a minimum rate of not less than 38 l/km of solid 100 mm wide line. Glass beads shall be applied immediately following the paint application at a uniform minimum application rate of not less than 600 g/l of paint.

The Contractor may heat paint to a maximum temperature of 65°C prior to application to the roadway surface to reduce drying time. The Contractor shall use due care in heating the paint because of its volatile nature.

### 7.2.5.4 Acceptance Criteria

All painted lines shall not exceed a dimensional width of 110 mm for specified 100 mm wide line. No tolerance below 100 mm is allowed for the specified 100 mm wide line.

All painted lines shall not exceed a dimensional width of 210 mm for specified 200 mm wide line. No tolerance below 200 mm is allowed for the specified 200 mm wide line.

All painted direction dividing, lane dividing or continuity lines shall not exceed a maximum dimensional length deviation of +/- 100 mm for specified 3.0 m length of line.

All spaces between painted direction dividing, lane dividing or continuity lines shall not exceed a maximum dimensional length deviation of +/- 100 mm for specified 6.0 m or 3.0 m length of space.

All paint shall be applied at the proper locations in accordance with the drawings or as directed by the Consultant.

All paint and glass beads shall be uniformly applied at the minimum application rates.

All painted lines shall be uniform in thickness and free of tire tracking, with no splatter, excessive overspray or other defects.

**7.2.5.5 Removal, Repair or Replacement of Unacceptable Painted Lines**

All painted lines that do not meet the acceptance criteria shall be removed, repaired or replaced by the Contractor to the satisfaction of the Consultant. The method and equipment used by the Contractor to remove, repair or replace painted lines that do not meet the acceptance criteria will be subject to the approval of the Department. In the case of tire tracking, the accepted repair will be reapplying paint and beads to the damaged areas.

**7.2.5.6 Painting of Temporary Roadway Lines for Seasonal Shutdown**

When the Contract is carried over from one season to the next, all newly constructed asphalt pavement or asphalt stabilized surfaces shall be provided with temporary roadway lines as directed by the Consultant. All temporary roadway lines shall be painted in conformance with all of the requirements of this specification.

**7.2.6 MEASUREMENT AND PAYMENT**

Measurement of painted roadway lines will be made in kilometres along the centreline of the roadway for the length of road painted including the length of road through intersections. Intersections and interchanges will be counted separately and will include all roadway lines which would not be covered by the standard painting operation. Only those intersections or interchanges specified in the Contract or identified by the Consultant will be counted separately for payment. At locations such as truck turnouts and points of interest turnouts, where additional lines are required beyond normal limits, individual lines will be measured separately and paid for under the applicable bid item.

Payment for painted roadway lines will be made at the applicable unit price bid per kilometre for:

- "Roadway Lines – Supplying Paint and Painting (Directional Dividing and 2 Edge Lines)"
- "Roadway Lines – Supplying Paint and Painting (Lane Dividing and 2 Edge Lines)"
- "Roadway Lines – Supplying Paint and Painting (Lane Dividing Lines)"

Payment for painted intersections or interchange lines will be made at the unit price bid per intersection or interchange for "Intersection Lines - Supplying Paint and Painting" or "Interchange Lines - Supplying Paint and Painting", as applicable.

These payments will be full compensation for inspecting the areas to be painted, sweeping and cleaning the surface to be painted, supplying and applying the paint and glass beads and traffic accommodation.

No payment will be made for the repairing, removing or obliterating of incorrectly painted roadway lines.

**7.2.6.1 Temporary Roadway Line Painting**

When the Contractor is required to paint roadway, intersection and/or interchange lines as a temporary measure at the end of a construction season, payment will be made in accordance with this section. (7.2.6)

**7.2.7 WARRANTY**

Contrary to Section 1.2.54, Contractor's Warranty and Final Acceptance, the warranty period for painted roadway lines will be 60 days.