

53.20 PAINTED ROADWAY LINES

53.20.1 GENERAL

The Work consists of supplying paint and painting roadway lines on pavement surfaces. The various configurations of roadway lines are shown in the Department manual entitled “Alberta Highway Pavement Marking Guide.”

53.20.2 MATERIALS

53.20.2.1 Paint and Glass Beads

The Contractor shall supply the paint and glass bead materials from the Alberta Transportation Recognized Products list. The Contractor shall be responsible for ensuring that the quality of the paint and beads supplied meets the requirements specified.

The Contractor shall provide the Engineer with the following information prior to commencing the Work:

- ! Names and mailing addresses of the suppliers and manufacturers.
- ! Paint formulation to be supplied.
- ! Written confirmation from the manufacturer that the materials to be supplied meet all specified requirements.

The Contractor shall advise the Engineer of any change in paint formulation.

The Contractor shall verify that all materials delivered and used in the Work are the type ordered.

No paint formulation shall be diluted or mixed with a different formulation or with any other material without the prior approval of the Engineer.

The Contractor shall prevent contamination of the materials. Paint shall be protected from freezing.

53.20.3 EQUIPMENT

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

53.20.3.1 Painting Truck

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

- ! 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).
- ! 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.

- ! The compressors shall have a minimum rated capacity of 4.25 cubic metres per minute.
- ! 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.
- ! 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 operator in maintaining alignment on the existing lines.
- ! A minimum of five spray guns and bead dispensers mounted in the following configuration:
 - 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 adjacent guns shall be used simultaneously.
 - 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 adjacent guns shall be used simultaneously.
- ! Equipped to apply white or yellow paint from the three spray guns mounted on the lefthand side of the paint truck and to switch from one colour to the other during operation.
- ! Control of both independent booms, all spray guns, bead dispensers and painting controls from the operator's compartment(s).

The Engineer may allow the use of alternate equipment, provided the Contractor demonstrates that such equipment is capable of achieving the desired end product.

53.20.3.2 Companion Vehicles

The painting vehicle shall be immediately followed by a crash attenuator vehicle consisting of a five ton truck 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.

53.20.3.3 Safety Equipment

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

- ! A two-way radio for voice communication.

- ! 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.

- ! A sequential arrow board meeting the following specifications:
 - Minimum size 0.75 metres x 1.52 metres.
 - Minimum 25 amber sealed beam, hooded lamps.
 - Fully adjustable light intensity on all arrow board lights.
 - Operating modes which include:
 - (1) sequential left arrow or chevron
 - (2) sequential right arrow or chevron
 - (3) sequential double arrow or chevron
 - (4) horizontal bar
 - (5) all four lamps in the extreme corners of the panel flashing simultaneously at 35-50 flashes per minute with the flashing light lit 50% of the time.
 - The arrow board shall be controlled from a console located in the vehicle cab.
 - The arrow board display shall be visible to traffic approaching the rear of the trucks.

- ! 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.

- ! A warning sign, mounted at the rear of the equipment, 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 equipment is applying paint.

53.20.4 PROCEDURE

53.20.4.1 General

Line painting on highways with high traffic volumes shall be performed between Monday and Thursday inclusive if so directed by the Engineer.

Operation of the painting truck against the flow of traffic is not permitted.

Materials loading is not permitted on the travel lanes of a roadway surface.

53.20.4.2 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:

53.20.4.2.1 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.

53.20.4.2.2 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.

53.20.4.3 Arrowboard Message

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

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

53.20.4.4 **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 minor intersections of highways and secondary highways, local roads or farm entrances, the Contractor shall only paint the shoulder lines on the primary highway to a point corresponding to the edge of the intersecting shoulder line or as directed by the Engineer.

The Contractor shall ensure that painted lines match the existing lines exactly unless otherwise directed by the Engineer. When painting is required in areas where there are no existing lines or where revisions to the existing lines are required, these areas will be identified and laid out or spotted by the Engineer.

53.20.4.5 Pavement Surface and Atmospheric Conditions

In addition to the general restrictions specified in Specification 51.2, General(For Maintenance Work), painting shall not be performed during the following conditions:

- ! When the temperature is below 0°C.
- ! When wind conditions cause overspray.
- ! 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.

The Contractor shall immediately notify the Engineer of any areas that in his opinion are unsuitable for painting. Sweeping, when directed by the Engineer, shall be performed by the Contractor.

53.20.4.6 Paint and Bead Application

The Engineer will specify the application rate to be used for each section of highway. Paint shall be uniformly applied. Except for “wide lines” as designated, all painted lines shall be 100 mm wide. Glass beads shall be applied immediately following the paint application at a uniform application rate of 600 g/R of paint.

53.20.4.7 Removal of Incorrectly Painted Lines

All lines that are incorrectly painted by the Contractor or painted where no lines are specified shall be removed by the Contractor at his own expense and to the satisfaction of the Engineer. The method and equipment used by the Contractor to remove incorrectly painted lines will be subject to the approval of the Engineer.

53.20.5 SAMPLING AND TESTING

The Contractor shall satisfy himself that the material meets the required quality, with a minimum requirement as stated in the QC/QA process shown in the Special Provisions. The Contractor shall provide the Engineer with the quality control records for review upon request.

All materials will be subject to further inspection, sampling and testing by the Department and the Contractor shall provide safe, convenient access, acceptable to the Engineer, for inspection and sampling of the materials, and shall cooperate in the inspection and sampling process when requested to do so.

53.20.6 TIME TO COMPLETE

In urgent situations, the Contractor shall complete the Work within 7 calendar days of the issuance of the Work Order. In all other cases, the Contractor shall complete the Work within 60 calendar days of the issuance of the Work Order.

53.20.7 ACCEPTANCE CRITERIA

The Work will be considered acceptable under the following conditions:

- ! When the following dimensional criteria are met:
 - Painted lines do 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.
 - Painted lines do 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.
 - Painted direction dividing, lane dividing or continuity lines do not exceed a maximum dimensional length deviation of + / - 100 mm for specified 3.0 m length of line.
 - No spaces between painted direction dividing, lane dividing or continuity lines exceed a maximum dimensional length deviation of + / - 100 mm for specified 6.0 m or 3.0 m length of space.

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

- ! all paint and glass beads have been applied at the proper locations and in accordance with the drawings.

- ! any incorrectly painted lines or lines painted at improper locations have been removed to the satisfaction of the Engineer.

- ! the "Actual Daily Amount" of each colour of paint applied each day is at least 95% of the applicable "Required Daily Amount".

The "Required Daily Amount" for each day will be determined using the applicable specified paint application rate and the length of each colour of line painted. The "Actual Daily Amount" applied each day will be determined by measuring the number of loads or partial loads for each colour of paint.

- ! any days production of roadway lines for which the "Actual Daily Amount" is less than 95% of the "Required Daily Amount" have been repainted at a second application rate of not less than 95% of the specified application rate.

- ! glass beads have been uniformly applied at the specified application rate.

53.20.8 MEASUREMENT AND PAYMENT

53.20.8.1 Painting Roadway Lines

Measurement will be made in kilometres of the length of line painted. Separate measurements will be made for each colour of paint used. The space between “dashed lines” will not be measured for payment.

Payment will be made at the applicable unit price bid per line-kilometre for “Painted Roadway Lines - White” or “Painted Roadway Lines - Yellow” regardless of the specified width. These payments will be full compensation for inspecting the areas to be painted, applying the paint and glass beads and all labour, equipment, tools and incidentals necessary to complete the Work.

No payment will be made for any roadway lines painted during a given day in which the Acceptance Criteria has not been achieved for that day.

In urgent situations where the Contractor is required to complete the Work within 7 calendar days of the issuance of the Work Order, an additional payment will be made at the unit price bid per occurrence for "Line Painting - Premium". This payment will be full compensation for complying with the accelerated scheduling required to complete the Work.

53.20.8.2 Painting Roadway Lines at Intersections and Interchanges

Separate measurements will be made of the number of intersections (per side of road) and the number of interchanges painted.

Payment will be made at the unit price bid per side for "Line Painting - Intersections" or at the unit price bid per interchange for "Line Painting - Interchanges". These payments will be full compensation for the additional effort involved in painting roadway lines at these locations. These payments will be separate and additional to those made for "Painted Roadway Lines".

Payment for "Line Painting - Intersections" will only be made in for those intersections where the Contractor is required to paint additional lane lines (turning lanes or acceleration/deceleration lanes) and will based on the number of roadway sides of the intersection requiring line painting. For example, additional line painting required on both sides of a 2 lane undivided highway would be considered two sides.

Payment for "Line Painting - Intersections" will also be made for the painting of climbing lanes or passing lanes.

The unit price bid for "Line Painting - Interchanges" will apply regardless of the size of the interchange.

53.20.8.3 Supply of Paint and Glass Beads

Measurement will be made in litres of the daily quantity of paint used, up to maximum of 103% of the "Required Daily Amount". Separate measurements will be made for each colour of paint. The quantities will be determined by measuring the number of loads or partial loads of paint used each day.

Payment will be made at the applicable unit price bid per litre for "Supply of Paint - Yellow" or "Supply of Paint - White". These payments will be full compensation for supplying, storing, and handling the paint and all labour, equipment tools and incidentals necessary to complete the Work.

No payment will be made for any quantities of paint used in excess of 103% of the "Required Daily Amount".

No payment will be made for any quantities of paint used when the lines fail to meet the Acceptance Criteria.

The supply and application of glass beads is considered incidental to the work and no separate payment will be made.

53.20.8.4 Sweeping

Measurement and payment for sweeping will be made in accordance with Specification 53.17, Roadway and Raised Median Cleaning, as required.

53.20.9 WARRANTY

The warranty period for this Work shall be 60 days.