

REQUEST FOR QUOTE

BID NUMBER:	1043
BID REQUEST DATE:	Friday, May 24, 2019
BID END DATE & TIME:	Thursday, June 06, 2019 at 12:00 Noon
NAME OF PURCHASER/BID REQUESTOR:	Stephanie Clayton (506) 474-7759 (office) (506) 461-8220 (cell) stephanie.clayton@snclavalinom.com
BUILDING ADDRESS(ES): (Where goods / services will be delivered)	Route 2 - KM 251 to KM 58 Route 95 - KM 5 to KM 14
TERM OF CONTRACT: (Include option term(s))	One Time
CONTRACT DOCUMENT:	Brunway standard Terms and Conditions
COMPLIANCE REQUIREMENTS:	Supplier Compliance Package. To be completed upon award.

Detailed Description of "Goods/Services Delivery Requirement" and/or scope of work.

This RFQ is for the **supply and installation of pavement markings** following pavement resurfacing along Route 2 between Longs Creek and the Quebec Border and along Route 95 between Woodstock and The U.S. Border. Line painting will need to be completed within 10 days of when the contractor is notified. The locations and estimated completion dates of line painting are outlined in Table 1. Exact dates will be established with the successful contractor.

Table 1: Locations and Estimated Quantities

Location	Direction	Lane	From	To	Length (m)	100mm Solid Yellow Line	100mm White 3:9 Skip	100mm Solid White Line	200mm Solid White Line	200mm White 3:3 Skip	Estimated Week of Line Painting
2	WB	Roadway	205+280	195+350	7,910	7,910	7,910	6,960	570	370	September 9th 2019
2	185 WB	Off Ramp	0+000	0+750	750	280	0	280	520	420	
2	WB	Roadway	179+500	174+400	5,348	5,348	5,348	5,348	0	0	
2	185 EB	Off Ramp	0+000	0+600	600	400	0	400	300	200	
2	185 EB	On Ramp	0+000	0+500	500	300	0	300	290	110	
2	EB	Roadway	185+060	186+460	1,403	1,403	1,403	940	260	200	
2	EB	Passing	216+200	219+140	2,907	2,907	2,907	0	0	0	
2	EB	Roadway	219+140	223+000	3,822	3,822	3,822	3,262	170	400	
2	223 EB	On Ramp	0+000	0+900	900	470	0	470	520	340	
2	EB	Passing	235+750	237+000	1,319	1,319	1,319	0	0	0	
2	EB	Roadway	237+000	250+390	13,507	13,507	13,507	13,507	0	0	September 9th 2019
2	WB	Roadway	74+600	73+350	794	794	794	794	0	0	
2	WB	Passing	73+350	72+700	1,400	1,400	1,400	0	0	0	
2	WB	Roadway	72+700	71+100	500	500	500	500	0	0	
2	WB	Passing	71+100	58+610	13,820	13,820	13,820	0	0	0	
2	69 WB	Off Ramp	0+000	0+600	600	370	0	370	300	140	
2	69 WB	On Ramp	0+000	0+600	600	350	0	350	340	160	
2	99 EB	Off Ramp	0+180	0+835	655	655	0	655	0	0	
2	99 EB	On Ramp	0+000	0+300	300	300	0	300	0	0	

Location	Direction	Lane	From	To	Length (m)	100mm Solid Yellow Line	100mm White 3:9 Skip	100mm Solid White Line	200mm Solid White Line	200mm White 3:3 Skip	Estimated Week of Line Painting
2	WB	Roadway	232+130	225+000	6,151	6,151	6,151	5,336	250	540	August 5th 2019
95	WB	Passing	14+550	13+050	620	620	620	0	0	0	
95	WB	Passing	13+200	13+450	250	250	250	0	0	0	
95	WB	Passing	13+800	13+900	100	100	100	0	0	0	
95	WB	Travel	9+300	9+500	200	0	200	200	0	0	
95	7 WB	Onramp	0+200	0+400	200	200	0	200	0	0	
95	EB	Passing	5+100	6+700	1,600	1,600	1,600	0	0	0	
95	EB	Roadway	6+700	6+800	100	100	100	100	0	0	
95	EB	Passing	6+800	7+100	300	300	300	0	0	0	
95	EB	Travel	7+500	7+600	100	0	100	100	0	0	
95	EB	Passing	12+400	12+500	100	100	100	0	0	0	
95	EB	Roadway	12+500	12+600	100	100	100	100	0	0	
95	EB	Passing	12+600	13+800	1,260	1,260	1,260	0	0	0	
95	187 WB	Onramp	187	187	1,900	1,510	160	1,360	380	300	
2	184 EB	Accel / Shoulder	0+420	0+700	280	0	0	0	280	280	
2	187 EB	Ramp / Accel	0+300	0+750	450	80	0	80	430	310	
2	188 EB	Offramp	0+000	0+360	360	200	0	200	190	130	
2	187 EB	Offramp	187	187	804	624	0	624	230	130	
2	EB	Travel	198+300	207+000	6,642	0	6,642	5,480	320	842	
2	WB	Roadway	51+170	51+230	60	60	60	20	40	0	September 9th 2019
2	WB	Roadway	106+390	106+460	70	70	70	70	0	0	September 9th 2020
Total:						69,180	70,543	48,306	5,390	4,872	

The Contractor will submit a unit price / meter for the supply and installation of pavement markings according to the attached specifications.

Brun-Way anticipates five mobilizations will be required to complete the work. An additional cost per mobilization should be included.

Brun-Way will be responsible for pre-marking.

The Contractor will be responsible for sweeping prior to painting if required.

Water-borne traffic paint and beads must meet the requirements of the attached specification - 560. The Contractor will supply to Brun-Way evidence from the paint and glass bead supplier indicating that the product meets specifications.

The contractor is responsible for all traffic control (including any additional trail vehicles that may be required) and must complete the work according to the most recent revision of the NB Work Area Traffic Control Manual.

All MSDS sheets for the materials must be submitted prior to the commencement of the work and a copy must be on site.

The Contractor striping truck resevoirs shall be completely empty of both paint type and glass beads before the initial loading. At the initial loading, the striping truck resevoirs will be calibrated for dipping.

Brun-Way will have the right to check the quantity of paint and glass bead in the Contractor paint truck resevoirs at all time.

The Contractor shall submit to the Engineer the number of kilograms of overlay glass beads applied daily.

The Contractor paint truck components (paint guns, bead guns, skip line spacing, etc.) shall be calibrated before the project in an area outside Brun-Way's highway system in the presence of the Project Manager.

All paint trucks must be equipped with an approved Skip Line Data Logger, or approved equivalent, capable of recording application data at all times during pavement markings operations. The Contractor shall provide daily report or any available reports from the Skip Line Data Logger, or approved equivalent upon request from the Project Manager. Recorded data shall include:

- Date
- Time
- Location
- Speed of vehicle
- Paint application thickness (wet mils)
- Distance paint lane km (100mm solid paint line)
- Road temperature
- Air temperature
- Liters of paint applied per colour

The Skip Line Data Logger must be calibrated before the start of the project and/or whenever deemed necessary by the Project Manager.

The Contractor is responsible to accurately track the road and exact location on the road that all recorded data applies to.

If, for any reason, the data logger becomes inoperable, the Contractor will immediately advise the Project Manager. The Contractor will inform the Project Manager of any area that has been painted without the data logger and a date when the instrument will be back in operation. If the instrument will be out of service for 3 or more Operational Days, the Contractor may be required to provide documentation from the Manufacturer regarding the problem and the proposed date for the solution.

The Contractor shall provide an approved method of measurement for the quantity of paint and glass beads stored in the reservoirs and a method to measure the application rate of paint and glass beads for each road in the event that the data logger becomes inoperable. All methods of measurement shall be identified at the first job meeting and approved before the start of the project.

The paint shall be applied to the Pavement surface such that a dry thickness of $\pm 255 \mu\text{m}$ is achieved. A minimum of 16 mils wet application is required. Any paint application quantity in excess of 16 mils may not be paid.

The Contractor shall record outside ambient temperature and humidity twice per day; once at mid-morning (approximately 10:00 am) and once at mid-afternoon (approximately 3:00 pm). These results shall be submitted to the Project Manager on a weekly basis.

The applied markings shall be to the satisfaction of the Engineer with respect to paint thickness, retro-reflectivity, the straightness and spacing of lines, the accuracy of dimensions and positioning of other markings, and absence of overspray and tracking.

Retroreflectivity shall meet the following minimum requirements based upon a 30 metre geometry retroreflectometer measured no earlier than two weeks and no more than 4 weeks after application of markings.

Yellow Paint: 200 mcd/m²/lx

White Paint: 250 mcd/m²/lx

The Contractor shall ensure lines are placed with clean edges, uniform distribution of glass beads, while limiting overspray, paint splatter, and tracking.

The Contractor shall be responsible for control of the paint spray during application so that it does not get on vehicles or other private property. In the event that this occurs, the Contractor shall be responsible for the costs of removing the paint off the private property and the repair of any damage that occurs as a result of the paint or its removal.

List of Documents

TCHPCO Item 560 - Pavement Markings

WATCM Fig 8-16

Required at Bid Submission:

- Completed Contractor Pre-Selection form
- Copy of the Contractors Health and Safety Manual

- Details of key personnel and their safety responsibilities and training
- H&S record and industry performance materials
- Experience Rating Assessment (ERA) from Work Safe NB for the past 3 years
- Annual safety data (Total hours worked, # of fatalities, # of lost time incidents, # of days lost # of modified work incidents, # of medical aids).
- Summary record of any penalties levied by the Government/Regulator
- Summary reports of any workplace fatality and/or incidents which resulted in significant property and or environmental damage
- Notification of any pending administrative actions against the contractor by the Regulator
- Average ERA for the industry or sector of activity

Please click the links below to access the associated schedules:

[Schedule C - Quality Assurance Program](#)

[Schedule D - Health and Safety Program](#)

[Schedule E - Environmental Requirements](#)

Summary of Specific Safety Requirements

- Employees who will be onsite will be required to receive Brun-Way's Safety Orientation from a Brun-Way representative before work can begin. The orientation will take approximately 1 hour to complete. It will be the responsibility of the Contractor to ensure that all employees receive this training from Brun-Way representative.

- Minimum PPE requirements are CSA Hard Hat, high viz safety vest, CSA approved steel toe boots (min 6" height), Long sleeve shirts for all personnel onsite, and safety glasses. Gloves shall be carried at all times; no manual handling may take place without use of gloves. Hearing protection shall be carried, and used as required.

- All knives shall be self retracting

- Any lifting over 33 lbs per individual requires a risk assessment be complete and no individual shall lift greater than 50 lbs.

- Stretching is recommended at the start of each workday.

- The successful bidder must;

- Complete a Job Safety Analysis for all activities using the SNC-Lavalin form and methodology prior to starting any work;

- Use the Step back Risk Evaluation method while completing the project.

The successful bidder shall adhere to all requirements outlined in the Health and Safety program, including all post award document submissions.

As per Section 6.2 of the Contractor Management SOP the classification level of this contract is Level 3.

If you have any questions regarding this RFQ please contact:

Stephanie Clayton

(506) 474-7759 (office)

(506) 461-8220 (cell)

stephanie.clayton@snclavalinom.com

By selecting this checkbox the bidder agrees to comply with all of Brun-Way Highways Operations Inc. Terms and Conditions per the Supplier Compliance Package and the Health and Safety requirements as per the Brun-Way Contractor Management Standard.

SNC-LAVALIN O&M PRIVILEGE CLAUSES

SNC-Lavalin O&M reserves the right to:

1. In its sole discretion and without liability to any bidder,
 - a) change or amend this bid request prior to the closing date and time;
 - b) cancel the bid, in whole or in part, at any time during the bid process, with or without the issuance of a replacement bid;
 - c) elect to make no contract award.
2. Expressly reject any or all bids or proposals, in whole or in part, as unsatisfactory, incomplete or failing to conform to the conditions of the bid.
3. In its discretion, waive formalities and accept bids or proposals which substantially comply with the conditions of the bid request.
4. Be the sole judges of compliance with respect to the conditions of the bid request.
5. At its sole discretion, request clarification from any bidder with respect to their bid or proposal and such clarification may be considered as part of bid or proposal. However, no new information may be added to a bid or proposal in response to the clarification request.
6. Accept or reject any bid or proposal, in whole or in part for any reason.
7. Select the bid or proposal with the perceived best value and not necessarily the lowest price, in accordance with the evaluation criteria.
8. Negotiate any aspect of the bid or proposal as declared in the bid request.
9. Evaluate each bid or proposal according to the criteria described in the bid request, however reserves the right to not divulge the results of the evaluation data or to provide reasons with respect to the acceptance or rejection of bids or proposals.
10. Consider and accept any alternate bids or proposals or part thereof.

TO BE COMPLETED BY SUPPLIER

IMPORTANT SUPPLIER NOTICE:

Please note that in order to ensure and maintain the integrity of this bid activity and to successfully process your response, this form must be returned prior to the Bid End Date & Time with the information requested below DIRECTLY TO:

Shannon Brinad via e-mail to brunwaybids@snclavalinom.com or via fax to (506) 474-7771 or, if the value is greater than \$50,000 the bid is to be mailed or hand delivered to Shannon Briand at 1754 Hanwell Road, Hanwell NB, E3C 2B2 referencing the Bid # on the package.

SUPPLIER QUOTE:

(Attach pricing spreadsheet if applicable)

SUPPLIER COMMENTS:

RFQ 1043 Pavement Marking Services

I/We submit below the breakdown of the Stipulated Proposal Price:

Contractor Name: _____

Date: _____

Item	Measurement	Estimated Quantity	Unit Price	Total
1. Supply & Installation of 100 mm Solid White Line	Meters	69,180		
2. Supply & Installation of 100 mm Solid Yellow Line	Meters	70,543		
3. Supply & Installation of 100 mm White 3:9 Skip	Meters	48,306		
4. Supply and Installation of 200 mm Solid White Line	Meters	5,390		
5. Supply & Installation of 200 mm White 3:3 Skip	Meters	4,872		
Mobilization		5		

Sub- Total \$ _____

Applicable HST \$ _____

Total \$ _____

560.1 DESCRIPTION

- .1 This Item consists of the supply and application of Pavement Marking.

560.2 MATERIALS

- 560.2 .1 All materials shall be supplied by the Developer.

.2 Classification

- .1 Pavement marking is classified into the following types based on performance requirements:

- .a Traffic paints
- .b Pavement marking - durable
- .c Pavement marking - temporary
- .d Pavement marking - temporary - removable

.3 Organic solvent based traffic paint

.1 General

- .1 Organic solvent based traffic paint shall be homogeneous, and shall be well ground to a uniform smooth consistency. It shall be free from skin, dirt and other foreign particles, and shall be capable of being sprayed at the temperature intended for application. The organic solvent based traffic paint shall flow evenly and smoothly and cover solidly when applied to pavement.
- .2 The materials used in the manufacture of the traffic paint shall be of high quality and consistency such that the appearance will not change in service to impair the colour or visibility of the delineation. The organic solvent based traffic paint film shall be flat in finish, and be visible under daylight and artificial light with the addition of the overlay glass beads.

.2 Colour

- .1 Pavement markings are white or yellow, colour standards are established by the Owner:
- White – standard number 37925 of the standard U.S. FED-STD 595 B.
 - Yellow – standard number 37507 of the standard U.S. FED-STD 595 B.

.3 Chemical composition

- .1 The chemical composition of the organic solvent based traffic paint shall be at the discretion of the paint manufacturer and shall be certified by the Developer.

.4 Reflectorization

- .1 The white and yellow organic solvent based traffic paints shall be used with overlay glass beads which are applied uniformly after application of the paint at a rate as shown below. The white and yellow organic solvent based traffic paints shall provide proper anchorage for overlay glass beads conforming to 560.2.8.

- .2 Overlay glass beads shall be applied at a rate of 0.7kg/L of paint for organic solvent based traffic paint
- .5 Physical property requirements
 - .1 Organic solvent based traffic paints shall be supplied ready-mixed for use without any addition of solvents.
 - .2 The handling and storage qualities must be acceptable with respect to degree of settling, uniform consistency, absence of skinning and thixotropic properties. The organic solvent based traffic paint shall be capable of being sufficiently atomized to produce an uniformly applied paint stripe without side splatter and overspray within the limitation imposed by conventional striping equipment.
 - .3 The supplier shall furnish to the Developer a complete data on physical properties, application procedure and material safety for the organic solvent based traffic paint.

TABLE 560.2.3.5
PHYSICAL PROPERTY REQUIREMENTS
FOR ORGANIC SOLVENT BASED TRAFFIC PAINT

Test and property	Requirements		Test methods		
	Min.	Max.	CGSB 1-GP-71	ASTM	Other
Water content % by mass		0.5	24.1		
Setting 6 months	8.0			D869	
Hiding Power m ² /l	8.4				Pfund cryptometer with #3.5 wedge
Skinning 48 hours	nil	nil	10.1		
Bleeding	5.0			D969 & D868	
Viscosity KU @ 7°C @ 25°C	80.0	135.0 90.0	4.5	D562	
Coarse particles #60 sieve - 250 µm #100 sieve - 150 µm	nil	nil 0.01		D185 & D2205	
No Pickup time, mins.		8.0*		D711	
Directional reflectance % White paint Yellow paint	70.0 50.0			E97	

* For coning type of traffic paints, this value can be higher.

.4 Thermoplastic pavement marking materials

.1 General

- .1 The thermoplastic pavement marking material shall not undergo any significant breakdown or deterioration when held at 170°C for four hours or during four one-hour reheatings to the plastic temperature. The softening point and viscosity characteristics of the plastic material shall remain constant through four reheatings and should be the same from batch to batch.
- .2 There shall be no significant change in the colour of the material as the result of up to four reheatings of one hour each, up to temperature of 170°C. The material shall be environmentally safe during heating and application. The material shall not deteriorate by contact with sodium chloride, calcium chloride, or any other chemical used for ice control, or because of oil content of pavement materials or oil droppings from the traffic.
- .3 The ingredients used in the production of thermoplastic pavement marking materials shall be of high quality and consistency so that the appearance will not change in service to impair the colour or the visibility of the delineation.

.2 Colour

- .1 The colour requirements shall conform to 560.2.3.2.

.3 Chemical composition

- .1 The chemical composition of the thermoplastic material shall be at the discretion of the manufacturer and shall be certified by the Developer.

.4 Reflectorization

- .1 Thermoplastic material for screed application and preformed thermoplastic pavement marking material shall contain premixed glass beads. Overlay glass beads shall also be applied at a rate recommended by the manufacturer for reflectorization. Thermoplastic materials recommended for spray application shall be used with overlay glass beads for reflectorization. These materials shall provide proper anchorage for the glass beads.

.5 Physical property requirements

TABLE 560.2.4.5
PHYSICAL PROPERTY REQUIREMENTS FOR
THERMOPLASTIC PAVEMENT MARKING MATERIAL

Test and property	Requirements		Test methods ASTM
	Min.	Max	
Directional reflectance % White Yellow	70 45		E97
Softening point °C	80		E28
Water absorption %		0.5	D570
Hardness at 25°C IRHD	90	98	D1415

- Material is cast into 3 " x 1" x 0.9" bars for this test.

.5 Field reacted polymeric pavement marking materials

.1 General

- .1 The ingredients used in the production of the field reacted polymeric pavement marking materials shall be of high quality consistency such that the appearance will not change in service to impair the colour or visibility of the delineation.

.2 Colour

- .1 The colour requirements shall conform to 560.2.3.2.

.3 Chemical composition

- .1 The chemical composition of the field reacted polymeric pavement marking material shall be at the discretion of the manufacturer and shall be certified by the Developer.

.4 Reflectorization

- .1 Field reacted polymeric pavement marking material recommended for screed application shall contain premixed glass beads and overlay glass beads shall also be applied at a rate recommended by the manufacturer for reflectorization of the pavement markings. Field reacted polymeric pavement marking materials recommended for spray application shall be used with overlay glass beads for reflectorization. These materials shall provide proper anchorage for the glass beads.

.5 Physical property requirements

TABLE 560.2.5.5
PHYSICAL PROPERTY REQUIREMENTS FOR FIELD REACTED
POLYMERIC PAVEMENT MARKING MATERIALS

Test and property	Requirements		Test methods
	Min.	Max.	ASTM
Setting, 6 months			D 869
Component A	6		
Component B	6		
Bleeding	5		D 868
Directional reflectance %			E97
White	70		
Yellow	45	12	
Black			
Hardness IRHD	90	98	D 1415

.6 Preformed plastic pavement marking tape

.1 General

- .1 Only material properties which are necessary for proper installation and satisfactory performance of preformed plastic pavement marking tape are specified here. The material as supplied, shall be free of cracks, and have edges true, straight and unbroken conforming to ASTM D4505. Preformed plastic pavement marking tape of all types shall have a uniform width and thickness.
- .2 The material used in the manufacture of preformed plastic pavement marking tape shall be of high quality so that the appearance will not change in service to impair the colour or the visibility of the delineation.

.2 Colour

- .1 The colour requirements shall conform to 560.2.3.2.

.3 Adhesive

- .1 The preformed plastic pavement marking tape shall be either precoated with a factory applied adhesive at the base or supplied with a suitable adhesive and any other material such as a primer that is necessary for installation of the tape onto the pavement.

.4 Material composition

- .1 The material composition of the performed plastic pavement marking tape shall be at the discretion of the manufacturer and shall be certified by the Developer.

TABLE 560.2.6.4
PHYSICAL PROPERTY REQUIREMENTS FOR
PREFORMED PLASTIC PAVEMENT MARKING TAPE

Property	Durable Preformed Plastic Tape		Temp. Preformed Plastic Tape		Test Methods	
	Min.	Max.	Min.	Max.	ASTM	Other
Directional reflectance %					E97	
White	65		65			
Yellow	45		45			
Black temporary				12		
Tensile strength Mpa			7.5*		D638	
Elongation at Break %		50		50	D638	
Adhesion at						
10°C	500		500		D1000	
24°C	500		500		D1000	
g/25.4 mm of width						
60° Gloss					D 523	
White		10		10		
Yellow		10		10		
Black temporary				5		

* This requirement is applicable to temporary preformed tape of removal type.

.7 Water - borne traffic paint

.1 General

- .1 Traffic paint shall be homogeneous water based paint, and shall be well ground to a uniform smooth consistency. It shall be free from skin, dirt and other foreign particles, and shall be capable of being sprayed at the temperature intended for the paint. The water based traffic paint shall flow evenly and smoothly and cover solidly when applied to pavements.
- .2 The materials used in the manufacture of the water based traffic paint shall be of a quality and consistency such that the appearance will not change in service to impair the colour or visibility of the markings. The water based traffic paint film shall be flat in finish, and the white and yellow markings shall be visible under daylight and artificial light after the addition of the overlay glass beads.

.2 Colour

- .1 The colour requirements shall conform to 560.2.3.2.

.3 Chemical composition

- .1 The chemical composition of the Water based traffic paint shall be determined by the paint manufacturer but shall comply with properties outlined in Table 560.2.7.3.

Table 560.2.7.3
Chemical Properties

Test	Requirements		Test Method		
	Min	Max	CGSB ¹	ASTM ²	Other
Chemical Properties					
Pigment Content (% by mass) ³	56	62		D3723	
Volatile matter (% by mass)		24		D2369	
Non-Volatile Vehicle (% by mass)	16.75		Method 19.1		
Coalescing Agent (2,2,4-trimethyl – 1,3 pentanediol monoisobutyrate) (% by weight on solid polymer)	10				
Type of Binder	Fastrack 3427 Emulsion				
White Paint					
Titanium Dioxide (g/L) ⁴	150				
Note – Lead Content (if present) not to exceed 600 mg/kg					

Notes for table 560.2.7.3

1 CGSB refers to the Canadian General Standards Board – Specification 1-GP-71

2 ASTM refers to the American Society of Testing and Materials

3 20% of the pigment content to be talc that meets ASTM D-605 with a photovolt green filter reflectance of 90% minimum

4 Titanium Dioxide pigment shall meet ASTM D-476 type II

.4 Reflectorization

- .1 The white and yellow paints shall be used with overlay glass beads which are applied uniformly after application of the paint at a rate as show below. The white and yellow paints shall provide proper anchorage for overlay beads
- .2 Overlay glass beads shall be applied at a rate of 0.8kg/L of paint for water borne traffic paint.

.5 Physical properties

- .1 Water based traffic paints shall be supplied ready-mixed for use without any addition of water.
- .2 The handling and storage qualities shall be acceptable with respect to degree of settling, uniform consistency, absence of skinning and thixotropic properties. The Water based traffic paint shall be capable of being sufficiently atomized to produce a uniformly applied paint stripe without side splatter and overspray within the limitation imposed by conventional striping equipment.
- .3 Water based traffic paint shall comply with properties outlined in Table 560.2.7.4

Table 560.2.7.5
Physical Properties

Test	Requirements		Test Method		
	Min	Max	CGSB ¹	ASTM ²	Other
Physical Properties					
No Pickup Time, minutes		8		D 711	
Non-tracking Time, seconds ³		60			Note 3
Volatile Organic Compound Content (VOC) excluding water, g/L		150		D 3960	
Freeze-Thaw Resistance	Pass			D 2243	
Viscosity, Krebs Unit (KU) @ 25 Celsius	85	95		D 562	
Viscosity Change after heat-shear Stability Test @ 25 celcius KU		10			Caltrans 8010-61G-30
Skinning Properties	Nil	Nil	1-GP-71 Method 10.1		
Coarse Particles #60 sieve – 250 um #100 sieve – 150 um	nil	nil 0.01% by weight		D 185& D 2205	
Settling Rate (Up to 6 months)	8.0			D 869	
	6.0			D1309	
Bleeding	4			D868 & D969	
Hiding Power (m ² /l)	8.4				Pfund cryptometer with #3.5 wedge
	4.0				1-GP-71 Method 14.2
Reflectance (color difference)% Yellow White	50 80	60		E1347	

Notes for Table 560.2.7.5

1 CGSB refers to the Canadian General Standards Board – Specification 1-GP-71

2 ASTM refers to the American Society of Testing and Materials

3 Non-tracking time based upon 375 um (15 mils) wet film thickness applied when pavement temperature is greater than 10 degrees Celsius and humidity conditions of 80% or less on dry pavement.

.8 Traffic Paint Reflectorizing Glass Beads

.1 General

- .1 Beads shall be true smooth, lustrous spheres manufactured from glass of a composition designed to be resistant to the effects of traffic wear and weathering. No foreign material shall be contained in or among the beads.
- .2 Glass beads shall meet the gradation requirements of Table 560.2.7.5 when tested in accordance with ASTM D1214 on sample sizes of 50 to 100 g.

Table 560.2.8.1
Grading Limits for Glass Beads

ASTM Sieve Size (µm)	Percent Passing
850	100
600	80 – 100
300	25 – 35
150	0 – 8
75	0 – 2

- .3 Glass beads shall be colourless to the extent that they do not impart a noticeable hue to the paint.
- .4 The refraction index of the glass beads shall not be less than 1.50 when tested in accordance with CGSB Specification 1-GP-71, Method 49.1.
- .2 Roundness
- .1 A minimum of 75% by mass of the glass beads shall be true spheres.
- .2 The percentage of true spheres shall be determined by ASTM D 1155, or, on a sample of approximately 1000 beads contained loosely in a culture dish, by counting the number of true spheres under reflected light and magnification as follows:
- Retained on the 300 µm sieve size, under 50x magnification;
 - Passing the 300 µm sieve size, under 100x magnification.
- .3 Failure to meet roundness requirements will be cause for rejection.
- .3 Imperfections
- .1 The surface of the beads shall be smooth, lustrous and free of film, pits, cavities or scratches. Not more than 25% of the true spheres shall have imperfections in the form of milkiness, air inclusions, dark specks and incipient fractures.
- .2 Testing for imperfections will be performed in accordance with CGSB Specification 1-GP-71, Method 149.1.
- .4 Moisture Resistance
- .1 Beads shall be treated so as to overcome the effect of water (vapour or liquid) on the beads before the beads are added to the painted marking.
- .2 Beads shall not agglomerate during storage and application, and shall flow freely from dispensing equipment whenever surface and atmospheric conditions are satisfactory for painting.
- .3 Moisture resistance will be tested on a 100 g sample of beads placed in a 500 mL beaker, to which an equivalent volume of distilled water shall be added. After standing

for 5 minutes the water shall be decanted and the glass beads transferred to a clean dry beaker.

- .1 After standing for 5 minutes the beads shall be poured slowly via a funnel into a standard stem of 125 mm length and 10 mm inside diameter.
- .2 The beads shall flow through the stem without stoppage. Slight initial agitation to start the flow at the beginning of the test is permissible.

.5 Dual Coating

- .1 The beads shall have both a moisture resistance silicone coating, and an adhesion promoting silane coating. The beads shall pass the moisture resistance test (as per 572.2.3.4) and the adherence coating test.
- .2 The adherence coating test is outlined as follows:
Prepare a solution by weighing 0.2 grams of dansyl chloride and dissolving in 25 ml of acetone. This solution can be used for several tests during the day, but must be kept refrigerated in a closed dark container between uses. Make a fresh solution daily.
 - Weigh 10 grams of beads and place in aluminum trays.
 - Saturate the glass beads sample with dansyl chloride solution using an eyedropper.
 - Dry the beads in an oven at 60C (140F) for 15 minutes. Beads will be yellow and agglomerated.
 - Rinse the beads by placing them in funnel containing new filter paper and pouring 100 ml of acetone over them. Use suction during the step.
 - Remove the beads from funnel and place in aluminum trays.
 - Dry the beads in the oven until free flowing.
 - Place the glass beads on filter paper and inspect them under ultra-violet light. Inspection must be in a dark room. A yellow-green fluorescence will be observed if adherence coating is present.

If all beads have a yellow-green fluorescence, the beads are properly coated with adherence coating. If only some of the beads have a yellow-green fluorescence, the beads are not properly coated and this is a cause for rejection. If no yellow-green fluorescence is seen, adherence coating was not applied and this is a cause for rejection. Beads with the adherence coating applied correctly will give a yellow-green fluorescence.

.6 Chemical Stability

- .1 Exposure of glass beads to paint film constituents, humidity, atmospheric conditions or diluted acid or alkali solutions shall not result in dulling of the surface that would adversely affect reflective properties of the beads.
- .2 Glass beads shall be resistant to deterioration by calcium chloride, as determined on a 10 g sample of beads placed in a 1000 mL beaker, covered with 500 mL of a calcium chloride solution (1.0 normal solution), left to soak for three hours, rinsed with 100 mL of distilled water three times and air dried.
 - .1 The beads will be examined under a microscope and compared with an untreated sample. Dulling of the surface of the beads or other detrimental effects shall constitute failure of this test.

560.3 EQUIPMENT

560.3 .1 General

- .1 The Developer shall supply all Equipment needed for applying Pavement Markings, as recommended by the manufacturer of the Pavement Marking paint products. Equipment shall be maintained in good working order and shall not contaminate the paint or other Pavement Marking materials or cause damage to the Pavement.

.2 Line Painting Equipment

- .1 Line Painting Equipment shall be capable of applying centre, lane and edge line markings to the required thicknesses and widths as a uniform stripe with sharp edges.
- .2 The Line Painting Equipment shall have a glass bead dispenser and shall be capable of applying the beads to the wet painted line uniformly at the recommended rate of 0.8 kg/L by means of a pressurized overlay glass bead gun.
- .3 The Line Painting Equipment shall have a heater capable of heating the paint to any temperature up to 60°C and maintaining a constant temperature during the spraying operation.

.3 Thermoplastic pavement markings

- .1 Equipment to be used for the application of thermoplastic material shall be capable of mixing, maintaining and applying the material at the recommended temperature.

.4 Other methods of application

- .1 Field reacted polymeric materials and thermoplastics shall be applied using a screed applicator.
- .2 Preformed plastic tape shall be installed conforming to the manufacturer's recommendations.

560.4 CONSTRUCTION

560.4 .1 General

- .1 The Developer shall supply pavement marking and symbols conforming to applicable shapes and sizes.
- .2 The Developer shall apply the pavement marking and symbols conforming to the Developer's construction drawings and the manufacturer's recommendations.
- .3 The work of pavement marking includes: surface preparation, pavement marking obliteration, premarking, application of temporary, short term and pavement markings.

.2 Surface preparation

- .1 The pavement surface must be clean and dry. Contaminants such as dirt, loose asphalt particles and oily residue shall be removed prior to application of pavement marking.

.3 Pavement marking obliteration

- .1 Durable markings and traffic paint shall be obliterated or removed when necessary.

.4 Premarking

- .1 The Developer shall provide the necessary measurements to establish the position of all pavement markings.

.5 Temporary pavement marking

- .1 Temporary marking shall include surface preparation, premarking and placement of temporary markings.
- .2 Temporary pavement marking shall be placed on temporary road surfaces prior to the opening to the general public.

.6 Short term pavement marking

- .1 Short term pavement marking is required when a paved roadway is to be opened to the general public prior to the application of permanent pavement markings.
- .2 As part of the work of pavement marking, the Developer shall apply short term pavement marking for the centreline and lane lines.
- .3 Short term pavement markings shall not conflict with permanent pavement markings.
- .4 Short term pavement markings placed on final surface course shall be of the removable type.

.7 Permanent pavement marking

- .1 Permanent pavement marking includes surface preparation, premarking, short term pavement marking, removal of short term pavement markings and placement of permanent pavement markings.
- .2 When permanent pavement markings cannot be placed prior to the opening to traffic, major and minor Roadways must have short term pavement markings.
- .3 Permanent pavement markings must be in place and maintained prior to any winter shut down.

.8 Application

.1 General

- .1 All pavement markings shall be accurately spaced and present a clean-cut, uniform appearance during either the day or night.
- .2 The application of pavement marking materials shall conform to the following requirements and the manufacturer's recommendations.

.2 Organic solvent based traffic paint

- .1 Paint shall applied when the pavement surface temperature is 5°C and above.
- .2 Paint shall be applied at a rate which results in a uniform thickness of 255 ±25 microns dry film. Reflectorizing glass beads, conforming to 560.2.8, shall be applied uniformly at a rate as shown below, immediately after paint application to ensure embedment of the glass beads.
- .3 Overlay glass beads shall not be applied on to black paint which is used for obliterating previous markings.
- .4 The paint temperature shall be between 40°C and 70°C when applied to the pavement.

.3 Water-borne traffic paint

- .1 Paint shall be applied as specified in 560.4.8.2.2 except that the pavement surface temperature shall be 10°C and above and relative humidity no higher than 70%.

.4 Thermoplastic pavement marking material

- .1 The material shall be applied when the pavement surface temperature is 5°C and above. The maximum relative humidity shall be 70%. At pavement surface temperatures below 5°C, the pavement shall be preheated immediately prior to material application.

Thermoplastics shall be applied at a rate which results in a uniform thickness of 1.90 mm ± 0.40 mm, measured dry. Markings shall not be applied over pavement joints.

- .2 Reflectorizing glass beads conforming to 560.2.8 with the exception of the requirements for silicone coating shall be applied uniformly at a rate of 1.5 kg ± 0.10 kg per 10 m² of marking, immediately before the material hardens.

.5 Field reacted polymeric pavement marking material

- .1 Field reacted polymeric pavement marking materials which are recommended for screed application shall be applied at a rate which results in a uniform thickness of 1.90 mm ± .40 mm, measured dry. Markings shall not be applied over pavement joints.

- .2 The materials shall be applied when the pavement surface temperature is 5°C and above. The maximum surface temperature shall be 35°C. The maximum relative humidity shall be 70%.

- .3 Reflectorizing glass beads conforming to 560.2.8, with the exception of the requirement for silicone coating, shall be applied uniformly at a rate of 1.5 kg ± 0.10 kg per 10 m² of marking, immediately before the material hardens.

- .4 Field reacted polymeric pavement marking materials recommended for spray application shall be applied at a uniform thickness of .30 mm ± .15 mm.

.6 Preformed plastic tape

- .1 The tape shall be applied when the pavement surface temperature is 21°C and above. The maximum relative humidity shall be 70%.

- .2 Joints of marking tape shall be butt joints without overlaps. Preformed markings shall not be applied over pavement joints.

.7 Pavement marking, temporary removable

- .1 Temporary removable pavement marking shall be applied conforming to the manufacturer's recommendation and shall be removed as indicated. Removed material shall be disposed of outside of the Facility Lands.



Brun-Way Highways Operations Inc.
1754 Route 640
Hanwell, New Brunswick, Canada, E3C 2B2
506.474.7750 506.474.7752

Letter of Acknowledgement

June 7, 2018

Brun-Way Highways Operations Inc.
Att: Shannon Briand
1754 Route 640
Hanwell, NB E3C 2B2

Dear Ms Briand

Contract for Provision of: RFQ 962

- 1. We acknowledge receipt of your Request for Quote package.
- 2. A) We have received all the documents listed in the Request for Quote without damage and in usable condition.
B) We have read the Request for Quote and will tender in accordance with the specified requirements.

Or

- 3. We will not be submitting a quotation because:

Contractors Name: _____

Date: _____

Yours Sincerely,





REQUEST FOR QUOTE

BID NUMBER:	962
BID REQUEST DATE:	Thursday, June 07, 2018
BID END DATE & TIME:	Monday, June 18, 2018 at 12:00 Noon
NAME OF PURCHASER/BID REQUESTOR:	Stephanie Clayton (506) 474-7759 (office) (506) 461-8220 (cell) stephanie.clayton@snclavalinom.com
BUILDING ADDRESS(ES): (Where goods / services will be	Route 2 - KM 258 to KM 0 Route 95 - KM 0 to 14
TERM OF CONTRACT: (Include	One Time
CONTRACT DOCUMENT:	Brunway standard Terms and Conditions
COMPLIANCE REQUIREMENTS:	Supplier Compliance Package. To be completed upon award.

Detailed Description of "Goods/Services Delivery Requirement" and/or scope of work.

This RFQ is for the **supply and installation of pavement markings** following pavement resurfacing and maintenance activities along Route 2 between Longs Creek and the Quebec Border. Line painting will need to be completed within 10 days of when the contractor is notified. The locations and estimated completion dates of line painting are outlined in Table 1. Exact dates will be established with the successful contractor.

Table 1: Locations and Estimated Quantities

Location	Direction	Lane	From	To	Length (m)	100mm Solid Yellow Line (m)	100mm White 3:9 Skip (m)	100mm Solid White Line (m)	200mm Solid White Line (m)	200mm White 3:3 Skip (m)	Estimated Date of Line Painting
Route 2	EB	Roadway	8+000	10+150	2130	2130	2,130	1,110	490	530	July 13th 2018
Route 2	EB	Roadway	20+450	22+800	2338	2338	2,338	1,638	310	390	
Route 2	WB	Roadway	27+200	22+600	5399	5399	5,399	4,199	510	690	
Route 2	EB	Roadway	161+000	168+000	6954	6954	6,954	6,954	0	0	July 6th 2018
Route 2	WB	Roadway	164+300	161+030	2700	2700	2,700	2,700	0	0	July 6th 2018
Route 2	EB	Roadway	56+160	77+840	22,166	22,166	22,166	17,086	2210	2870	September 7th 2018
Route 2	WB	Roadway	66+800	58+610	7,909	7,909	7,909	6,549	700	660	
Route 2	EB	Roadway	225+400	232+170	5,895	5,895	5,895	4,625	490	780	September 14th 2018
Route 2	WB	Roadway	223+000	211+960	13,821	13,821	13,821	12,621	480	720	
					Total	69,312	69,312	57,482	5,190	6,640	

In addition to the locations outlined in Table 1 the contractor will be required to stripe various locations between KM 0 and 258 and along Route 95 between KM 0 and 14 including ramps; based on various maintenance activities. The contractor will be notified of the exact locations prior to each mobilization. The estimated quantities of lines are outlined in Table 2.

Table 2: Additional Quantities Based on Maintenance Activities

Location	Direction	Lane	100mm Yellow Line (m)	100mm White 3:9 Skip (m)	100mm Solid White (m)
Route 2/ Route 95	EB/WB	Roadways/Ramps	77,000	154,000	77,000

The Contractor will submit a unit price / meter for the supply and installation of pavement markings according to the attached specifications.

Brun-Way anticipates five mobilizations will be required to complete the work. An additional cost per mobilization should be included.

Brun-Way will be responsible for pre-marking.

The Contractor will be responsible for sweeping prior to painting if required. The areas in Table 1 will be swept

Water-borne traffic paint and beads must meet the requirements of the attached specification - 560. The Contractor will supply to Brun-Way evidence from the paint and glass bead supplier indicating that the product meets specifications.

The contractor is responsible for all traffic control (including any additional trail vehicles that may be required) and must complete the work according to the most recent revision of the NB Work Area Traffic Control Manual.

All MSDS sheets for the materials must be submitted prior to the commencement of the work and a copy must be on site.

The Contractor striping truck reservoirs shall be completely empty of both paint type and glass beads before the initial loading. At the initial loading the striping truck reservoirs will be calibrated for dipping.

Brun-Way will have the right to manually check the quantity of paint and glass bead in the Contractor paint truck reservoirs at all time.

The contractor shall submit to the Engineer the number of kilograms of overlay glass beads applied daily.

The Contractor paint truck components (paint guns, bead gun, skip line spacing, etc.) shall be calibrated before the project in an area outside Brun-Way's highway system in the presence of the Project Manager.

The Skip Line Data Logger must be calibrated before the start of the project and/or whenever deemed necessary by the Project Manager.

All paint trucks must be equipped with an approved Skip Line Data Logger, or approved equivalent, capable of recording application data at all times during pavement markings operations. The Contractor shall provide daily report or any available reports from the Skip Line data Logger, or approved equivalent upon request from the Project Manager. Recorded data shall include:

- Date
- Time
- Location
- Speed of vehicle
- Paint application thickness(wet mils)
- Distance painted lane km (100mm solid paint line)
- Road temperature
- Air temperature
- Paint temperature
- Liters of paint applied per color

The Contractor is responsible to accurately track the road and exact location on the road that all recorded data applies to.

If, for any reason, the data logger becomes inoperable, the Contractor will immediately advise the Project Manager. The Contractor will inform the Project Manager of any area that has been painted without the data logger and a date when the instrument will be back in operation. If the instrument will be out of service for 3 or more Operational Days, the Contractor may be required to provide documentation from the Manufacturer regarding the problem and the proposed date for the solution.

The Contractor shall provide an approved method of measurement for the quantity of paint and glass beads stored in the reservoirs and a method to measure the application rate of paint and glass beads for each road in the event that the data logger becomes inoperable. All methods of measurement shall be identified at the first job meeting and approved before the start of the project.

Paint shall be applied to the Pavement surface such that a dry thickness of $255 \mu\text{m} \pm 25 \mu\text{m}$ is achieved. A minimum of 16 mils wet application is required. Any paint application quantity in excess of 16 mils wet may not be paid.

The Contractor shall record outside ambient temperature and humidity twice per day; once at mid-morning (approximately 10:00am) and once at mid-afternoon (approximately 3:00pm). These results shall be submitted to the Project Manager on a weekly basis.

The applied markings shall be to the satisfaction of the Engineer with respect to paint thickness, retro-reflectivity, the straightness and spacing of lines, the accuracy of dimensions and positioning of other markings, and absence of overspray and tracking.

Retroreflectivity shall meet the following minimum requirements based upon a 30 metre geometry retroreflectometer measured no earlier than two weeks and no more than 4 weeks after application of markings.

Yellow Paint: 200 mcd/m²/lx

White Paint: 250 mcd/m²/lx

The Contractor shall ensure lines are placed with clean edges, uniform distribution of glass beads, while limiting overspray, paint splatter, and tracking.

The Contractor shall be responsible for control of the paint spray during application so that it does not get on vehicles or other private property. In the event that this occurs, the Contractor shall be responsible for the costs of removing the paint off the private property and the repair of any damage that occurs as a result of the paint or its removal.

List of Documents

TCHPCO Item 560 - Pavement Markings
WATCM Fig 8-16

Required at Bid Submission:

- Completed Contractor Pre-Selection form
- Copy of the Contractors Health and Safety Manual
- Details of key personnel and their safety responsibilities and training
- H&S record and industry performance materials
- Experience Rating Assessment (ERA) from Work Safe NB for the past 3 years
- Annual safety data (Total hours worked, # of fatalities, # of lost time incidents, # of days lost # of modified work incidents, # of medical aids).
- Summary record of any penalties levied by the Government/Regulator
- Summary reports of any workplace fatality and/or incidents which resulted in significant property and or environmental damage
- Notification of any pending administrative actions against the contractor by the Regulator
- Average ERA for the industry or sector of activity

Please click the links below to access the associated schedules:

[Schedule C - Quality Assurance Program](#)

[Schedule D - Health and Safety Program](#)

[Schedule E - Environmental Requirements](#)

Summary of Specific Safety Requirements

- Employees who will be onsite will be required to receive Brun-Way's Safety Orientation from a Brun-Way representative before work can begin. The orientation will take approximately 1 hour to complete. It will be the responsibility of the Contractor to ensure that all employees receive this training from Brun-Way representative
- Minimum PPE requirements are CSA Hard Hat, high viz safety vest, CSA approved steel toe boots (min 6" height), Long sleeve shirts for all personnel onsite, and safety glasses. Gloves shall be carried at all times; no manual handling may take place without use of gloves. Hearing protection shall be carried, and used as required.
- All knives shall be self retracting
- Any lifting over 33 lbs per individual requires a risk assessment be complete and no individual shall lift greater than 50 lbs.
- Stretching is recommended at the start of each workday.
- The successful bidder must;
 - Complete a Job Safety Analysis for all activities using the SNC-Lavalin form and methodology prior to starting any work;
 - Use the Step back Risk Evaluation method while completing the project.

The successful bidder shall adhere to all requirements outlined in the Health and Safety program, including all post award document submissions

As per Section 6.2 of the Contractor Management SOP the classification level of this contract is Level 3.

If you have any questions regarding this RFQ please contact:

Stephanie Clayton, P.Eng.

(506) 474-7759 (office)

(506) 461-8220 (cell)

stephanie.clayton@snclavalinom.com

By selecting this checkbox the bidder agrees to comply with all of Brun-Way Highways Operations Inc. Terms and Conditions per the Supplier Compliance Package and the Health and Safety requirements as per the Brun-Way Contractor Management Standard.

SNC-LAVALIN O&M PRIVILEGE CLAUSES

SNC-Lavalin O&M reserves the right to:

1. In its sole discretion and without liability to any bidder,
 - a) change or amend this bid request prior to the closing date and time;
 - b) cancel the bid, in whole or in part, at any time during the bid process, with or without the issuance of a replacement bid;
 - c) elect to make no contract award.
2. Expressly reject any or all bids or proposals, in whole or in part, as unsatisfactory, incomplete or failing to conform to the conditions of the bid.
3. In its discretion, waive formalities and accept bids or proposals which substantially comply with the conditions of the bid request.
4. Be the sole judges of compliance with respect to the conditions of the bid request.
5. At its sole discretion, request clarification from any bidder with respect to their bid or proposal and such clarification may be considered as part of bid or proposal. However, no new information may be added to a bid or proposal in response to the clarification request.
6. Accept or reject any bid or proposal, in whole or in part for any reason.
7. Select the bid or proposal with the perceived best value and not necessarily the lowest price, in accordance with the evaluation criteria.
8. Negotiate any aspect of the bid or proposal as declared in the bid request.
9. Evaluate each bid or proposal according to the criteria described in the bid request, however reserves the right to not divulge the results of the evaluation data or to provide reasons with respect to the acceptance or rejection of bids or proposals.
10. Consider and accept any alternate bids or proposals or part thereof.
11. Disqualify a bidder from the bid process who has been identified as a high financial risk.

TO BE COMPLETED BY SUPPLIER

IMPORTANT SUPPLIER NOTICE:

Please note that in order to ensure and maintain the integrity of this bid activity and to successfully process your response, this form must be returned prior to the Bid End Date & Time with the information requested below DIRECTLY TO:

Shannon Briand via e-mail to brunwaybids@snclavalinom.com or via fax to (506) 474-7768 or, if the value is greater than \$50,000 the bid is to be mailed or hand delivered to Shannon Briand at 1754 Hanwell Road, Hanwell NB, E3C 2B2 referencing the Bid # on the package.

PLEASE DO NOT SEND A COPY OF YOUR BIDS TO THE BID REQUESTOR. Only bids received as per the instructions noted above will be eligible for the selection process.

SUPPLIER QUOTE:

(Attach pricing spreadsheet if applicable)

SUPPLIER COMMENTS:

RFQ 962 Pavement Marking Services

I/We submit below the breakdown of the Stipulated Proposal Price:

Contractor Name: _____

Date: _____

Item	Measurement	Estimated Quantity	Unit Price	Total
1. Supply & Installation of 100 mm Solid White Line	Meters	134,482		
2. Supply & Installation of 100 mm Solid Yellow Line	Meters	146,312		
3. Supply & Installation of 100 mm White 3:9 Skip	Meters	223,312		
4. Supply and Installation of 200 mm Solid White Line	Meters	5,190		
5. Supply & Installation of 200 mm White 3:3 Skip	Meters	6,640		
Mobilization		5		

Sub- Total \$ _____

Applicable HST \$ _____

Total \$ _____

ATTACHMENT

560.1 DESCRIPTION

- .1 This Item consists of the supply and application of Pavement Marking.

560.2 MATERIALS

- 560.2 .1 All materials shall be supplied by the Developer.

.2 Classification

- .1 Pavement marking is classified into the following types based on performance requirements:

- .a Traffic paints
- .b Pavement marking - durable
- .c Pavement marking - temporary
- .d Pavement marking - temporary - removable

.3 Organic solvent based traffic paint

.1 General

- .1 Organic solvent based traffic paint shall be homogeneous, and shall be well ground to a uniform smooth consistency. It shall be free from skin, dirt and other foreign particles, and shall be capable of being sprayed at the temperature intended for application. The organic solvent based traffic paint shall flow evenly and smoothly and cover solidly when applied to pavement.
- .2 The materials used in the manufacture of the traffic paint shall be of high quality and consistency such that the appearance will not change in service to impair the colour or visibility of the delineation. The organic solvent based traffic paint film shall be flat in finish, and be visible under daylight and artificial light with the addition of the overlay glass beads.

.2 Colour

- .1 Pavement markings are white or yellow, colour standards are established by the Owner:
- White – standard number 37925 of the standard U.S. FED-STD 595 B.
 - Yellow – standard number 37507 of the standard U.S. FED-STD 595 B.

560.2.3 .3 Chemical composition

- .1 The chemical composition of the organic solvent based traffic paint shall be at the discretion of the paint manufacturer and shall be certified by the Developer.

.4 Reflectorization

- .1 The white and yellow organic solvent based traffic paints shall be used with overlay glass beads which are applied uniformly after application of the paint at a rate as shown below. The white and yellow organic solvent based traffic paints shall provide proper anchorage for overlay glass beads conforming to 560.2.8.

560.2.3.4 .2 Rate of application for overlay glass beads per litre of traffic paint.

% volume solids of traffic paint	glass beads required in kg
40-56	0.7
57-70	0.8

560.2.3 .5 Physical property requirements

- .1 Organic solvent based traffic paints shall be supplied ready-mixed for use without any addition of solvents.
- .2 The handling and storage qualities must be acceptable with respect to degree of settling, uniform consistency, absence of skinning and thixotropic properties. The organic solvent based traffic paint shall be capable of being sufficiently atomized to produce an uniformly applied paint stripe without side splatter and overspray within the limitation imposed by conventional striping equipment.
- .3 The supplier shall furnish to the Developer a complete data on physical properties, application procedure and material safety for the organic solvent based traffic paint.

TABLE 560.2.3.5
PHYSICAL PROPERTY REQUIREMENTS
FOR ORGANIC SOLVENT BASED TRAFFIC PAINT

Test and property	Requirements		Test methods		
	Min.	Max.	CGSB 1-GP-71	ASTM	Other
Water content % by mass		0.5	24.1		
Setting 6 months	8.0			D869	
Hiding Power m ² /l	8.4				Pfund cryptometer with #3.5 wedge
Skinning 48 hours	nil	nil	10.1		
Bleeding	5.0			D969 & D868	
Viscosity KU @ 7°C @ 25°C	80.0	135.0 90.0	4.5	D562	
Coarse particles #60 sieve - 250 µm #100 sieve - 150 µm	nil	nil 0.01		D185 & D2205	
No Pickup time, mins.		8.0*		D711	
Directional reflectance % White paint Yellow paint	70.0 50.0			E97	

* For coning type of traffic paints, this value can be higher.

560.2.4 Thermoplastic pavement marking materials

.1 General

- .1 The thermoplastic pavement marking material shall not undergo any significant breakdown or deterioration when held at 170°C for four hours or during four one-hour reheatings to the plastic temperature. The softening point and viscosity characteristics of the plastic material shall remain constant through four reheatings and should be the same from batch to batch.
- .2 There shall be no significant change in the colour of the material as the result of up to four reheatings of one hour each, up to temperature of 170°C. The material shall be environmentally safe during heating and application. The material shall not deteriorate by contact with sodium chloride, calcium chloride, or any other chemical used for ice control, or because of oil content of pavement materials or oil droppings from the traffic.
- .3 The ingredients used in the production of thermoplastic pavement marking materials shall be of high quality and consistency so that the appearance will not change in service to impair the colour or the visibility of the delineation.

.2 Colour

- .1 The colour requirements shall conform to 560.2.3.2.

.3 Chemical composition

- .1 The chemical composition of the thermoplastic material shall be at the discretion of the manufacturer and shall be certified by the Developer.

.4 Reflectorization

- .1 Thermoplastic material for screed application and preformed thermoplastic pavement marking material shall contain premixed glass beads. Overlay glass beads shall also be applied at a rate recommended by the manufacturer for reflectorization. Thermoplastic materials recommended for spray application shall be used with overlay glass beads for reflectorization. These materials shall provide proper anchorage for the glass beads.

260.2.4.5 Physical property requirements

TABLE 560.2.4.5
PHYSICAL PROPERTY REQUIREMENTS FOR
THERMOPLASTIC PAVEMENT MARKING MATERIAL

Test and property	Requirements		Test methods ASTM
	Min.	Max	
Directional reflectance % White Yellow	70 45		E97
Softening point °C	80		E28
Water absorption %		0.5	D570
Hardness at 25°C IRHD	90	98	D1415

- Material is cast into 3 " x 1" x 0.9" bars for this test.

560.2 .5 Field reacted polymeric pavement marking materials

.1 General

- .1 The ingredients used in the production of the field reacted polymeric pavement marking materials shall be of high quality consistency such that the appearance will not change in service to impair the colour or visibility of the delineation.

.2 Colour

- .1 The colour requirements shall conform to 560.2.3.2.

.3 Chemical composition

- .1 The chemical composition of the field reacted polymeric pavement marking material shall be at the discretion of the manufacturer and shall be certified by the Developer.

.4 Reflectorization

- .1 Field reacted polymeric pavement marking material recommended for screed application shall contain premixed glass beads and overlay glass beads shall also be applied at a rate recommended by the manufacturer for reflectorization of the pavement markings. Field reacted polymeric pavement marking materials recommended for spray application shall be used with overlay glass beads for reflectorization. These materials shall provide proper anchorage for the glass beads.

260.2.5 .5 Physical property requirements

TABLE 560.2.5.5
PHYSICAL PROPERTY REQUIREMENTS FOR FIELD REACTED
POLYMERIC PAVEMENT MARKING MATERIALS

Test and property	Requirements		Test methods
	Min.	Max.	ASTM
Setting, 6 months			D 869
Component A	6		
Component B	6		
Bleeding	5		D 868
Directional reflectance %			E97
White	70		
Yellow	45	12	
Black			
Hardness IRHD	90	98	D 1415

560.2.6 Preformed plastic pavement marking tape

.1 General

- .1 Only material properties which are necessary for proper installation and satisfactory performance of preformed plastic pavement marking tape are specified here. The material as supplied, shall be free of cracks, and have edges true, straight and unbroken conforming to ASTM D4505. Preformed plastic pavement marking tape of all types shall have a uniform width and thickness.
- .2 The material used in the manufacture of preformed plastic pavement marking tape shall be of high quality so that the appearance will not change in service to impair the colour or the visibility of the delineation.

560.2.6 .2 Colour

- .1 The colour requirements shall conform to 560.2.3.2.

.3 Adhesive

- .1 The preformed plastic pavement marking tape shall be either precoated with a factory applied adhesive at the base or supplied with a suitable adhesive and any other material such as a primer that is necessary for installation of the tape onto the pavement.

.4 Material composition

- .1 The material composition of the performed plastic pavement marking tape shall be at the discretion of the manufacturer and shall be certified by the Developer.

TABLE 560.2.6.5
PHYSICAL PROPERTY REQUIREMENTS FOR
PREFORMED PLASTIC PAVEMENT MARKING TAPE

Property	Durable Preformed Plastic Tape		Temp. Preformed Plastic Tape		Test Methods	
	Min.	Max.	Min.	Max.	ASTM	Other
Directional reflectance %					E97	
White	65		65			
Yellow	45		45			
Black temporary				12		
Tensile strength Mpa			7.5*		D638	
Elongation at Break %		50		50	D638	
Adhesion at						
10°C	500		500		D1000	
24°C	500		500		D1000	
g/25.4 mm of width						
60° Gloss					D 523	
White		10		10		
Yellow		10		10		
Black temporary				5		

* This requirement is applicable to temporary preformed tape of removal type.

560.2.7 Water - borne traffic paint

.1 General

- .1 Traffic paint shall be homogeneous water based paint, and shall be well ground to a uniform smooth consistency. It shall be free from skin, dirt and other foreign particles, and shall be capable of being sprayed at the temperature intended for the paint. The water based traffic paint shall flow evenly and smoothly and cover solidly when applied to pavements.
- .2 The materials used in the manufacture of the water based traffic paint shall be of a quality and consistency such that the appearance will not change in service to impair the colour or visibility of the markings. The water based traffic paint film shall be flat in finish, and the white and yellow markings shall be visible under daylight and artificial light after the addition of the overlay glass beads.

2 Colour

- .1 The colour requirements shall conform to 560.2.3.2.

.3 Chemical composition

- .1 The chemical composition of the Water based traffic paint shall be determined by the paint manufacturer but shall comply with properties outlined in Table 560.2.7.3.

Table 560.2.7.3
Chemical Properties

Test	Requirements		Test Method		
	Min	Max	CGSB ¹	ASTM ²	Other
Chemical Properties					
Pigment Content (% by mass) ³	56	62		D3723	
Volatile matter (% by mass)		24		D2369	
Non-Volatile Vehicle (% by mass)	16.75		Method 19.1		
Coalescing Agent (2,2,4-trimethyl – 1,3 pentanediol monoisobutyrate) (% by weight on solid polymer)	10				
Type of Binder	Fastrack 3427 Emulsion				
White Paint					
Titanium Dioxide (g/L) ⁴	150				
Note – Lead Content (if present) not to exceed 600 mg/kg					

Notes for table 560.2.7.3

1 CGSB refers to the Canadian General Standards Board – Specification 1-GP-71

2 ASTM refers to the American Society of Testing and Materials

3 20% of the pigment content to be talc that meets ASTM D-605 with a photovolt green filter reflectance of 90% minimum

4 Titanium Dioxide pigment shall meet ASTM D-476 type II

560.2.7. .4 Physical properties

- .1 Water based traffic paints shall be supplied ready-mixed for use without any addition of water.
- .2 The handling and storage qualities shall be acceptable with respect to degree of settling, uniform consistency, absence of skinning and thixotropic properties. The Water based traffic paint shall be capable of being sufficiently atomized to produce a uniformly applied paint stripe without side splatter and overspray within the limitation imposed by conventional striping equipment.
- .3 Water based traffic paint shall comply with properties outlined in Table 560.2.7.4

Table 560.2.7.4
Physical Properties

Test	Requirements		Test Method		
	Min	Max	CGSB ¹	ASTM ²	Other
Physical Properties					
No Pickup Time, minutes		8		D 711	
Non-tracking Time, seconds ³		60			Note 3
Volatile Organic Compound Content (VOC) excluding water, g/L		150		D 3960	
Freeze-Thaw Resistance	Pass			D 2243	
Viscosity, Krebs Unit (KU) @ 25 Celsius	85	95		D 562	
Viscosity Change after heat-shear Stability Test @ 25 celcius KU		10			Caltrans 8010-61G-30
Skinning Properties	Nil	Nil	1-GP-71 Method 10.1		
Coarse Particles #60 sieve – 250 um #100 sieve – 150 um	nil	nil 0.01% by weight		D 185& D 2205	
Settling Rate (Up to 6 months)	8.0			D 869	
	6.0			D1309	
Bleeding	4			D868 & D969	
Hiding Power (m ² /l)	8.4				Pfund cryptometer with #3.5 wedge
	4.0				1-GP-71 Method 14.2
Reflectance (color difference)% Yellow White	50 80	60		E1347	

Notes

1 CGSB refers to the Canadian General Standards Board – Specification 1-GP-71

2 ASTM refers to the American Society of Testing and Materials

3 Non-tracking time based upon 375 um (15 mils) wet film thickness applied when pavement temperature is greater than 10 degrees Celsius and humidity conditions of 80% or less on dry pavement.

560.2.8 Dual Coated Overlay Glass Beads

.1 General

- .1 Beads shall be true smooth, lustrous spheres manufactured from glass of a composition designed to be resistant to the effects of traffic wear and weathering. No foreign material shall be contained in or among the beads.
- .2 Glass beads shall meet the gradation requirements of Table 560.2.7.5 when tested in accordance with ASTM D1214 on sample sizes of 50 to 100 g.

Table 560.2.8.1
Grading Limits for Glass Beads

ASTM Sieve Size (µm)	Percent Passing
850	100
600	80 – 100
300	25 – 35
150	0 – 8
75	0 – 2

560.2.8.1 .3 Glass beads shall be colourless to the extent that they do not impart a noticeable hue to the paint.

.4 The refraction index of the glass beads shall not be less than 1.50 when tested in accordance with CGSB Specification 1-GP-71, Method 49.1.

560.2.8 .2 Roundness

.1 A minimum of 75% by mass of the glass beads shall be true spheres.

.2 The percentage of true spheres shall be determined by ASTM D 1155, or, on a sample of approximately 1000 beads contained loosely in a culture dish, by counting the number of true spheres under reflected light and magnification as follows:

- Retained on the 300 µm sieve size, under 50x magnification;
- Passing the 300 µm sieve size, under 100x magnification.

.3 Failure to meet roundness requirements will be cause for rejection.

.3 Imperfections

.1 The surface of the beads shall be smooth, lustrous and free of film, pits, cavities or scratches. Not more than 25% of the true spheres shall have imperfections in the form of milkiness, air inclusions, dark specks and incipient fractures.

.2 Testing for imperfections will be performed in accordance with CGSB Specification 1-GP-71, Method 149.1.

.4 Moisture Resistance

.1 Beads shall be treated so as to overcome the effect of water (vapour or liquid) on the beads before the beads are added to the painted marking.

.2 Beads shall not agglomerate during storage and application, and shall flow freely from dispensing equipment whenever surface and atmospheric conditions are satisfactory for painting.

.3 Moisture resistance will be tested on a 100 g sample of beads placed in a 500 mL beaker, to which an equivalent volume of distilled water shall be added. After standing

for 5 minutes the water shall be decanted and the glass beads transferred to a clean dry beaker.

- 560.2.8.4 .1 After standing for 5 minutes the beads shall be poured slowly via a funnel into a standard stem of 125 mm length and 10 mm inside diameter.
- .2 The beads shall flow through the stem without stoppage. Slight initial agitation to start the flow at the beginning of the test is permissible.

560.2.8. .5 Dual Coating

- .1 The beads shall have both a moisture resistance silicone coating, and an adhesion promoting silane coating. The beads shall pass the moisture resistance test (as per 572.2.3.4) and the adherence coating test.
- .2 The adherence coating test is outlined as follows:
Prepare a solution by weighing 0.2 grams of dansyl chloride and dissolving in 25 ml of acetone. This solution can be used for several tests during the day, but must be kept refrigerated in a closed dark container between uses. Make a fresh solution daily.
- Weigh 10 grams of beads and place in aluminum trays.
 - Saturate the glass beads sample with dansyl chloride solution using an eyedropper.
 - Dry the beads in an oven at 60C (140F) for 15 minutes. Beads will be yellow and agglomerated.
 - Rinse the beads by placing them in funnel containing new filter paper and pouring 100 ml of acetone over them. Use suction during the step.
 - Remove the beads from funnel and place in aluminum trays.
 - Dry the beads in the oven until free flowing.
 - Place the glass beads on filter paper and inspect them under ultra-violet light. Inspection must be in a dark room. A yellow-green fluorescence will be observed if adherence coating is present.

If all beads have a yellow-green fluorescence, the beads are properly coated with adherence coating. If only some of the beads have a yellow-green fluorescence, the beads are not properly coated and this is a cause for rejection. If no yellow-green fluorescence is seen, adherence coating was not applied and this is a cause for rejection. Beads with the adherence coating applied correctly will give a yellow-green fluorescence.

560.2.8.1 .6 Chemical Stability

- .1 Exposure of glass beads to paint film constituents, humidity, atmospheric conditions or diluted acid or alkali solutions shall not result in dulling of the surface that would adversely affect reflective properties of the beads.
- .2 Glass beads shall be resistant to deterioration by calcium chloride, as determined on a 10 g sample of beads placed in a 1000 mL beaker, covered with 500 mL of a calcium chloride solution (1.0 normal solution), left to soak for three hours, rinsed with 100 mL of distilled water three times and air dried.
 - .1 The beads will be examined under a microscope and compared with an untreated sample. Dulling of the surface of the beads or other detrimental effects shall constitute failure of this test.

560.3 EQUIPMENT

560.3 .1 General

- .1 The Developer shall supply all Equipment needed for applying Pavement Markings, as recommended by the manufacturer of the Pavement Marking paint products. Equipment shall be maintained in good working order and shall not contaminate the paint or other Pavement Marking materials or cause damage to the Pavement.

560.3 .2 Line Painting Equipment

- .1 Line Painting Equipment shall be capable of applying centre, lane and edge line markings to the required thicknesses and widths as a uniform stripe with sharp edges.
- .2 The Line Painting Equipment shall have a glass bead dispenser and shall be capable of applying the beads to the wet painted line uniformly at the recommended rate of 0.8 kg/L by means of a pressurized overlay glass bead gun.
- .3 The Line Painting Equipment shall have a heater capable of heating the paint to any temperature up to 60°C and maintaining a constant temperature during the spraying operation.
- .3 Thermoplastic pavement markings
 - .1 Equipment to be used for the application of thermoplastic material shall be capable of mixing, maintaining and applying the material at the recommended temperature.
- .4 Other methods of application
 - .1 Field reacted polymeric materials and thermoplastics shall be applied using a screed applicator.
 - .2 Preformed plastic tape shall be installed conforming to the manufacturer's recommendations.

560.4 CONSTRUCTION

560.4 .1 General

- .1 The Developer shall supply pavement marking and symbols conforming to applicable shapes and sizes.
- .2 The Developer shall apply the pavement marking and symbols conforming to the Developer's construction drawings and the manufacturer's recommendations.
- 560.4.1 .3 The work of pavement marking includes: surface preparation, pavement marking obliteration, premarking, application of temporary, short term and pavement markings.

560.4 .2 Surface preparation

- .1 The pavement surface must be clean and dry. Contaminants such as dirt, loose asphalt particles and oily residue shall be removed prior to application of pavement marking.

.3 Pavement marking obliteration

- .1 Durable markings and traffic paint shall be obliterated or removed when necessary.

.4 Premarking

- .1 The Developer shall provide the necessary measurements to establish the position of all pavement markings.

.5 Temporary pavement marking

- .1 Temporary marking shall include surface preparation, premarking and placement of temporary markings.
- .2 Temporary pavement marking shall be placed on temporary road surfaces prior to the opening to the general public.

.6 Short term pavement marking

- .1 Short term pavement marking is required when a paved roadway is to be opened to the general public prior to the application of permanent pavement markings.
- .2 As part of the work of pavement marking, the Developer shall apply short term pavement marking for the centreline and lane lines.
- .3 Short term pavement markings shall not conflict with permanent pavement markings.
- .4 Short term pavement markings placed on final surface course shall be of the removable type.

.7 Permanent pavement marking

- .1 Permanent pavement marking includes surface preparation, premarking, short term pavement marking, removal of short term pavement markings and placement of permanent pavement markings.

- .2 When permanent pavement markings cannot be placed prior to the opening to traffic, major and minor Roadways must have short term pavement markings.
- .3 Permanent pavement markings must be in place and maintained prior to any winter shut down.

560.4 .8 Application

.1 General

- .1 All pavement markings shall be accurately spaced and present a clean-cut, uniform appearance during either the day or night.
- .2 The application of pavement marking materials shall conform to the following requirements and the manufacturer's recommendations.

.2 Organic solvent based traffic paint

- .1 Paint shall applied when the pavement surface temperature is 5°C and above.
- .2 Paint shall be applied at a rate which results in a uniform thickness of 255 ±25 microns dry film. Reflectorizing glass beads, conforming to 560.2.8, shall be applied uniformly at a rate as shown below, immediately after paint application to ensure embedment of the glass beads.
- .3 Overlay glass beads shall not be applied on to black paint which is used for obliterating previous markings.

Rate of application for overlay glass beads
per litre of traffic paint

% volume solids of traffic paint	Glass beads required in kg
40-56	0.7
57-70	0.8

- .4 The paint temperature shall be between 40°C and 70°C when applied to the pavement.
- .3 Water-borne traffic paint
 - .1 Paint shall be applied as specified in 560.4.8.2.2 except that the pavement surface temperature shall be 10°C and above and relative humidity no higher than 80%.

.4 Thermoplastic pavement marking material

- .1 The material shall be applied when the pavement surface temperature is 5°C and above. The maximum relative humidity shall be 70%. At pavement surface temperatures below 5°C, the pavement shall be preheated immediately prior to material application.

Thermoplastics shall be applied at a rate which results in a uniform thickness of 1.90 mm ± 0.40 mm, measured dry. Markings shall not be applied over pavement joints.

560.4.8.4

- .1 Reflectorizing glass beads conforming to 560.2.8 with the exception of the requirements for silicone coating shall be applied uniformly at a rate of 1.5 kg ± 0.10 kg per 10 m² of marking, immediately before the material hardens.

560.4.8 .

5 Field reacted polymeric pavement marking material

- .1 Field reacted polymeric pavement marking materials which are recommended for screed application shall be applied at a rate which results in a uniform thickness of 1.90 mm ± .40 mm, measured dry. Markings shall not be applied over pavement joints.

- .2 The materials shall be applied when the pavement surface temperature is 5°C and above. The maximum surface temperature shall be 35°C. The maximum relative humidity shall be 70%.

- .3 Reflectorizing glass beads conforming to 560.2.8, with the exception of the requirement for silicone coating, shall be applied uniformly at a rate of 1.5 kg ± 0.10 kg per 10 m² of marking, immediately before the material hardens.

- .4 Field reacted polymeric pavement marking materials recommended for spray application shall be applied at a uniform thickness of .30 mm ± .15 mm.

.6 Preformed plastic tape

- .1 The tape shall be applied when the pavement surface temperature is 21°C and above. The maximum relative humidity shall be 70%.

- .2 Joints of marking tape shall be butt joints without overlaps. Preformed markings shall not be applied over pavement joints.

.7 Pavement marking, temporary removable

- .1 Temporary removable pavement marking shall be applied conforming to the manufacturer's recommendation and shall be removed as indicated. Removed material shall be disposed of outside of the Facility Lands.

NOTES:

1. Paint Truck and Buffer Vehicle to display right arrow when working in the right lane travelled lane.
2. An additional trail vehicle may be utilized to control tracking.

**Line Painting
Moving Operation
All Volumes**

