53.5 ASPHALT PAVEMENT CRACK ROUTING AND SEALING

53.5.1 GENERAL

The Work consists of routing, cleaning and drying cracks in pavement surfaces and sealing them with the crack sealant.

53.5.2 MATERIALS

The Contractor shall supply crack sealant from the list of products specified in the Special Provisions. The Contractor shall verify that all crack sealant delivered and used in the Work is the type and grade ordered.

The Contractor shall provide the Engineer with the following information 5 days prior to commencing the Work:

- Name and mailing address of crack sealant supplier and manufacturer.
- Name of crack sealant product to be supplied.
- Written confirmation from the manufacturer that the crack sealant to be supplied meets all specified requirements along with test results that demonstrate that the product meets all specified requirements.

The Contractor shall supply the Engineer with the manufacturer's quality control test results (indicating at the minimum cone penetration and flow) for each batch of crack sealant. These test results shall be supplied at the time of delivery of each batch of crack sealant to the Work.

All crack sealant supplied shall be subject to inspection, sampling and testing by the Engineer and the Contractor shall cooperate in the inspection and sampling process.

When necessary, the Contractor shall supply one of the following blotting agents:

- screened sand with a maximum topsize of 2 mm
- cement
- flyash

The use of other products shall be subject to the approval of the Engineer.

53.5.3 EQUIPMENT

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

The melting kettle shall consist of a double jacketed oil bath kettle with thermometric controls which automatically control the product temperatures and with continuous agitation equipment to prevent localized variations in temperature. The kettle shall be equipped with two calibrated thermometers to monitor the temperature of the crack sealant and the temperature of the heat transfer oil.

The mechanical router shall be capable of producing the specified rout cross-section.

The compressed air unit shall be equipped with water and oil traps and must produce sufficient air volume and pressure to remove all debris from the cracks. It shall be capable of delivering a continuous stream of clean, dry air at 600 kPa and 4.5 m^3 /min.

Application equipment shall be capable of regulating the application of crack sealant directly to the road and shall be equipped with a thermometer to monitor the temperature of the material as it is applied.

The hot compressed air lance shall be capable of providing a continuous hot, high pressure air stream (1000ºC at a rate of 1000 m/sec) with no flame at the exit nozzle.

53.5.4 PROCEDURE

Traffic control shall be performed in accordance with Specification 55.1, Traffic Accommodation and Temporary Signing. Signing shall conform to drawings TEB 1.12, TEB 1.16 and TEB 1.19 unless otherwise directed by the Engineer. The work area shall be a maximum of 3 km in length.

All Work shall be performed during daylight hours only, unless adequate lighting exists which provides visibility of at least 700 metres and prior approval of the Engineer is obtained. No Work shall be performed when the visibility is less than 700 metres. No Work shall be performed during rain or snow or when the pavement surface is wet.

The crack sealant shall not be applied when the pavement temperature is below 10° Celsius.

Unless otherwise directed by the Engineer, all transverse cracks between 2 mm and 25 mm in width and longitudinal cracks between 2 mm and 12 mm in width shall be routed and sealed.
Cracks shall be routed to the applicable cross-section shown on the drawings, keeping the crack in the centre of the rout cross-section.

Prior to the application of crack sealant, the entire road surface shall be cleaned ensuring all loose material and moisture is removed from the routed cracks and surrounding areas. The routed cracks shall be treated with the hot compressed air lance until the pavement in the routed crack is dry and slightly darkened. There shall be a maximum time period of 2 minutes between cleaning and drying the routed cracks and the application of the crack sealant.

Crack sealant shall be heated and applied within the applicable specified temperature ranges and in accordance with the manufacturer's recommendations. The heat transfer oil in the melting kettle shall not be heated in excess of 50°C above the safe heating temperature of the crack sealant.

Routed cracks shall be filled with crack sealant such that upon cooling, the filled crack is as shown on the drawings.

Excessive crack sealant shall be removed from the pavement surface immediately following application. Traffic shall be kept off sealed cracks until the crack sealant has cured. At locations such as intersections where this is not practical, the Contractor shall prevent tracking by applying a blotting agent to the crack sealant. When a blotting agent is used, it shall not be applied until the sealant has cooled sufficiently to prevent inclusion of the blotting agent into the sealant.

Fuel, asphalt and any other spills shall be cleaned up to the satisfaction of the Engineer at the Contractor's expense.

53.5.5 SAMPLING AND TESTING

53.5.5.1 General

Within this specification, certain requirements, limits and tolerances are specified regarding the quality of materials and workmanship supplied. Compliance with these requirements where so specified shall be judged by sampling and testing as described in this section.

Acceptance testing is the responsibility of the Engineer. The Engineer may not necessarily perform acceptance testing on each lot. Also, the Engineer may not necessarily test both the crack sealant material and the routing and sealing in a particular lot.

Quality control, including the provision of quality control test results for the crack sealant materials, is the responsibility of the Contractor.

Accommodation of traffic for all sampling and testing is the responsibility of the Contractor.

53.5.5.2 Definitions

A lot is defined as 1 day's production of crack sealing of at least 1500 linear metres of crack. If a day's production is less than 1500 linear metres, it shall be added to the production of subsequent days until a minimum of 1500 linear metres is obtained for the Lot. If the last day's production is less than 1500 linear metres of crack, it shall be added to the previous Lot.

53.5.5.3 Test Methods

The latest edition of the following standard Alberta Transportation and Utilities test methods (ATT) will be used for acceptance sampling and testing.

Test Description	Test Method
1. Sampling Crack Sealant	ATT-42
2. Measurement of Rout Cross-section	ATT-73
3. Measurement of Sealant Filling	ATT-73
4. Measurement of Crack Missed	ATT-73
5. Appeal of Quality Assurance Results	ATT-73
6. Random Test Site Selection	ATT-56 Part III

53.5.5.4 Acceptance Sampling and Testing of Crack Sealant Material

If a lot is being tested the Engineer will obtain a sample of crack sealant material for the Lot in accordance with ATT-42. Testing of crack sealant material will be in accordance to the procedures established for the specific materials being used. The Department will determine the frequency of testing of sealant. Sealant test results will be reported within seven days of sampling. Materials that do not conform to the stated tolerance shall result in a unit price adjustment for the linear metres of crack sealant for the Lot, or rejection as specified in Table 53.5.7(A).

The Engineer may measure the sealant temperatures. Temperatures measured in excess of 10°C above the manufacturer's specified safe heating temperature will result in the rejection of the material in use and the Contractor shall dispose of the overheated materials in a manner acceptable to the Engineer.

53.5.5.5 Acceptance Sampling and Testing of Routing and Sealing

If a lot is being tested, the Engineer will measure sections of routed transverse and longitudinal cracks to determine compliance to the specified rout cross-section and the conformance of the rout to the path of the crack being routed. If the existing crack is partially or entirely outside the rout cross-section or is within the rout cross-section but touching the side edge of the rout, it shall be considered "crack missed." The Engineer will measure sections of sealed crack to determine compliance with the specified filling requirements. All sample locations will be determined on the basis of stratified random sampling in accordance with ATT-56 Part III.

The random sites inspected by the Engineer will be a minimum of 1 m in length and, for the purpose of price adjustment, there will be a minimum of 6 sites measured per lot for rout cross-section, crack missed and for filling of the rout with sealant. Sites will be inspected for rout cross-section after routing and before sealant is placed. Sites will be inspected for filling a minimum of 1 hour after the cracks are filled. Inspection for rout cross-section, crack missed and rout filling shall be performed in accordance with ATT-73.

The Contractor shall cooperate with the Engineer obtaining test measurements and the Department will not be responsible for any costs due to delays in the Contractor's operation due to testing activities.

53.5.5.6 Appeal of Acceptance Test Results and Appeal Testing

The following procedures will apply for an appeal:

- Appeals will only be considered if the Contractor can demonstrate to the satisfaction of the Engineer that there is sufficient cause to support the appeal.
- Acceptance test results for any rejected or penalized Lot may be appealed only once.
- The Contractor shall serve notice of an appeal to the Engineer, in writing, within 24 hours of receipt of the test results.
- For an appeal of the rout cross-sections, the Contractor shall locate and prepare the appeal sites at the locations determined by the Engineer. The cracks shall be cleaned to an acceptable condition to allow for the measurement of the rout cross-section and the percent of the crack missed. When the Engineer has completed the measurements, the Contractor shall immediately reseal the test sites. No separate payment will be made for site preparation for retesting and the resealing of cracks.
- For an appeal of the percent of crack filled, the Engineer will determine new test sites and evaluate the filling of the routed crack at these new sites. The Contractor shall provide assistance as required for this appeal testing.
- For an appeal of the materials characteristics testing, the Engineer will conduct a retest on the original material sample for the Lot.
- The results of the original measurements will be averaged with the results of the new tests and the new averages shall form the basis for payment except for Compatibility and Bond tests, where a single acceptable test result will be considered sufficient for acceptance of the applicable characteristic.

If the new averages indicate that an increased penalty or rejection still apply for the Lot or sublot then the Contractor shall be responsible for the costs of the retesting. The costs for retesting of crack sealant or rout cross-sections shall be $500.00 per Lot. The cost of retesting for the percent of crack filled shall be $100.00 per Lot. If the results of retesting indicate that the subject lot has a reduced penalty then the Department will be responsible for the cost of retesting.

53.5.6 TIME TO COMPLETE

The Contractor shall complete the Work within 180 days of the issuance of the Work Order.

53.5.7 MEASUREMENT AND PAYMENT

Measurement will be made in metres of the length of cracks on which crack routing and sealing has been performed.

Payment will be made at the unit price bid per metre for "Crack Routing and Sealing" subject to the unit price adjustments specified herein. This payment will be full compensation for routing, cleaning and drying the cracks, cleaning the pavement surface, supplying and applying the crack sealant, quality control, traffic accommodation and signing and all labour, materials, equipment, tools and incidentals necessary to complete the Work.

When payment adjustments equal 100% or greater, the Contractor may be required to remedy the Lot to meet specified tolerances. This shall include removing all sealant, preparing the routs and resealing. Payment for the Lot shall be based on the new work.

TABLE 53.5.7 (A)

LOT UNIT PRICE ADJUSTMENTS

Parameter	Limits	Adjustment Factor
Crack Sealant Material	**(based on material specification for each product)**	**100% penalty if all 5 material parameters exceed specified requirements**
Flow	+ 25%	No individual penalty
Cone Penetration	+ 20%	1% per dmm outside limit
Bond Test	Pass	No individual penalty
Resilience	- 20%	1% per point outside limit
Compatibility	Pass	No individual penalty
Rout Cross-section, Crack Missed and Crack Filled	**(Function of the specified rout cross-section)**	
Width	Maximum of 10% deviation less than the specified width	Penalty equal to 0.5 times the % of crack with 10% deviation less than the specified width
Depth	Maximum of 20% deviation less than the specified depth	Penalty equal to 0.5 times the % of crack with 20% deviation less than the specified depth
% of crack missed	maximum 5% missed	Penalty equal to the total % of crack missed when 5% has been missed
Filling of routed crack	maximum 30 % subsidence from flush fill	Penalty equal to 0.5 times the % of crack underfilled

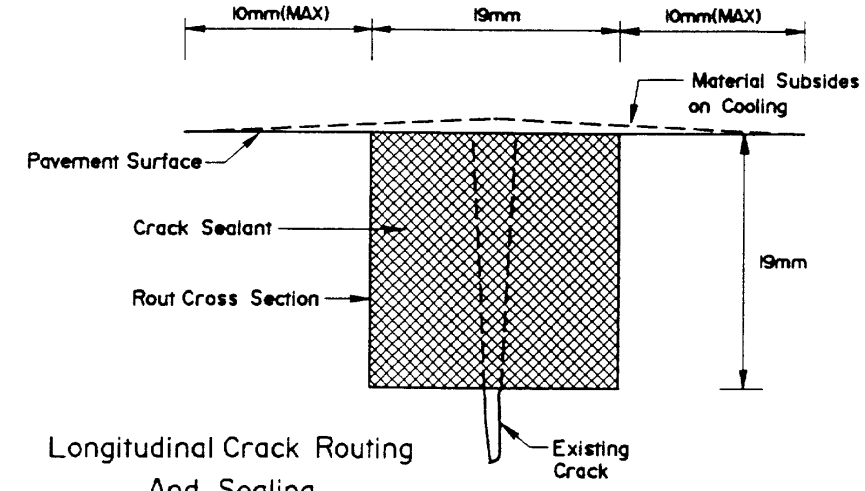
The unit price applicable to each Lot quantity of "Crack Routed and Sealed" shall be as follows:

LU = BP - (BP X (AF + CA))

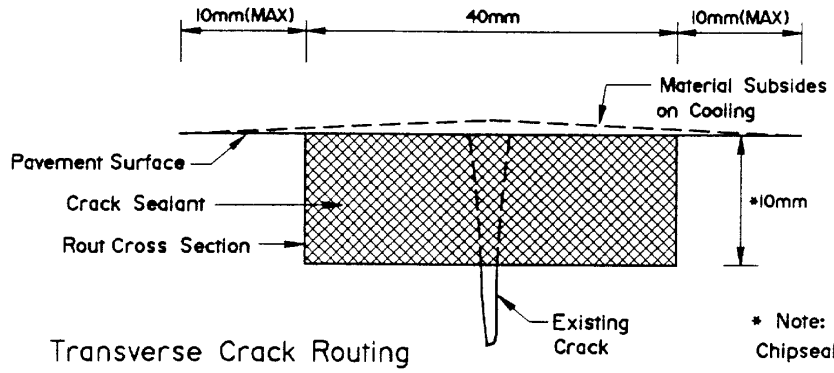
Where: LU is the Lot Unit Price per metre,
BP is the unit price bid per metre for "Crack Routing and Sealing",
AF is the sum of the Adjustment Factors for the Crack Sealant, and
CA is the sum of the Adjustments for Crack Missed, Crack Filled and Cross-section deviations.

53.5.8 WARRANTY

The warranty period for this Work shall be 2 years.



Longitudinal Crack Routing And Sealing



Transverse Crack Routing And Sealing

* Note: 15mm For Chipseal Surfaces.

No.	REVISIONS	BY	DATE
2			
1			

Approved:

Executive Director,
Roadway Engineering Branch

Date: FEBRUARY 24, 1995

Alberta
TRANSPORTATION AND UTILITIES
Engineering Division

NOTE:
THIS DRAWING SUPPLEMENTS SPECIFICATION 10.6 ASPHALT PAVEMENT CRACK ROUTING AND SEALING.

TYPICAL CROSS SECTIONS CRACK ROUTING AND SEALING ASPHALT CONCRETE PAVEMENT

Prepared By: J.H.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: CB6-10.6MI