

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION



TRANSPORTATION RESEARCH DIVISION
BUREAU OF PLANNING, RESEARCH & COMMUNITY SERVICES



November 2000

EXPERIMENTAL CONSTRUCTION PROJECT 00-18

LONGITUDINAL JOINT TREATMENT

First Interim Report

INTRODUCTION

Maine highways have been showing signs of longitudinal joint failure for a number of years. In an effort to reduce the amount of joint failures the Maine Department of Transportation (MDOT) is currently evaluating two projects. One project is monitoring the results of using multiple rolling techniques and a proprietary precompaction device. The other project is developing a longitudinal joint density specification for Superpave mixes.

This experimental project will evaluate the application of a joint sealer and joint adhesive in an effort to reduce the amount of longitudinal joint separation.

PROJECT DESCRIPTION

Project number IM-95-6596(00)E on I-95 in the town of Waterville was selected to apply the joint sealer and adhesive. This is a pavement rehabilitation project which consists of milling 40 mm of existing pavement then paving with an intermediate course of 40 mm of 12.5 mm Superpave mix and 35 mm of 9.5 mm Superpave surface mix. The project begins at Webb Road bridge and extends northerly 6.59 km to Maine Central Railroad bridge (see attached map). The experimental area begins at station 196+780 and ends at station 200+370.

PRODUCT DESCRIPTION

Three products were used to seal the longitudinal joints. One is a rubberized joint sealer labeled CMC #102 manufactured by Crackfiller Manufacturing Corporation. Another is a joint adhesive labeled KOCH PRODUCT #9005-HV manufactured and supplied by KOCH Materials

Company. The third product, which is a standard joint sealer for most projects and will be used as a control section, is an emulsified asphalt grade HFMS-1. A copy of SPECIAL PROVISION SECTION 424 JOINT SEALER describing construction requirements and copies of product data sheets for CMC #102 and KOCH #9005-HV are attached at the end of this report.

CONSTRUCTION PROCEDURES

The centerline longitudinal joints were constructed with 75 mm offsets between the intermediate and surface course. The same product was used to seal both the intermediate and wearing course in each section. A typical cross-section is attached to the end of this report.

Section I contains the joint sealant CMC #102. This section begins at Webb Road bridge at station 196+780 and ends at station 197+780. The intermediate course travel lane was paved first then the centerline longitudinal joint was sealed with CMC #102 ahead of the paving train paving the passing lane. A crew of three people applied the sealant using a handheld wand that had a shoe attachment on the end in the shape of an inverted L. The sealant was heated and pumped thru the wand to the shoe which was dragged across the joint spreading sealant along the face. The CMC #102 joint sealant had a rubbery appearance and slowly flowed down covering most of the joint face but leaving a few gaps in the coverage. When the operator slowed the application rate to cover more of the joint face an undesirable amount of the product would settle on the bottom of the joint. The wearing course was paved and sealed in the same sequence as the intermediate course. Both the intermediate and wearing course joints for this section were sealed at a rate of 0.13 kg/m at 190° C.

Section II was sealed with emulsified asphalt grade HFMS-1. This section begins and ends at stations 197+780 and 198+785 respectively. This section was paved in the same sequence as Section I. The emulsified asphalt was applied with a handheld spray bar covering a large portion of the top, face and bottom of the joint in a uniform layer leaving few exposed surfaces. The application rate and temperature are not available.

Section III was sealed with KOCH PRODUCT #9005-HV joint adhesive. This section begins at Kennedy Memorial Bridge at station 199+370 and ends at station 200+370. This section was also paved in the same sequence as Section I. The same heater and wand used to apply sealant on Section I was used to apply joint adhesive for this section. The KOCH #9005-HV joint adhesive had a granular appearance and was more fluid than the CMC #102 allowing the product to cover slightly more of the joint face than in Section I. Once again the application rate had to be steady to avoid adhesive settling at the bottom of the joint. The rate of application was 0.18 kg/m at a temperature of 190° C.

SUMMARY

A visual inspection of the experimental project was conducted on October 3, 2000.

The centerline joint in all three Sections looked very tight and well bonded. No joint separation or raveling was observed. Winter plowing had worn the surface of the joint in small areas along each Section.

All three treatments are performing as expected after one year of traffic.

Prepared by:

Reviewed by:

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**STATE OF MAINE
 DEPARTMENT OF TRANSPORTATION**

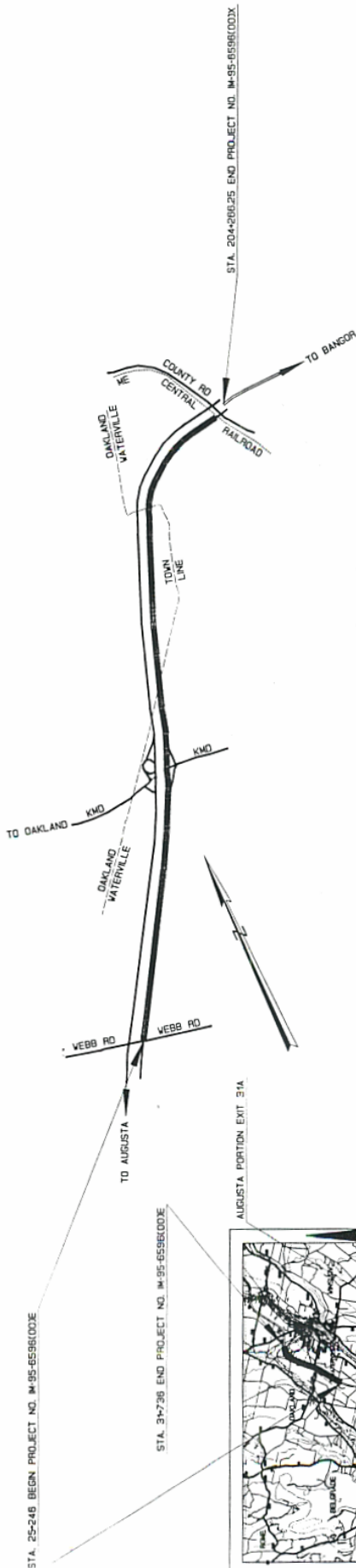
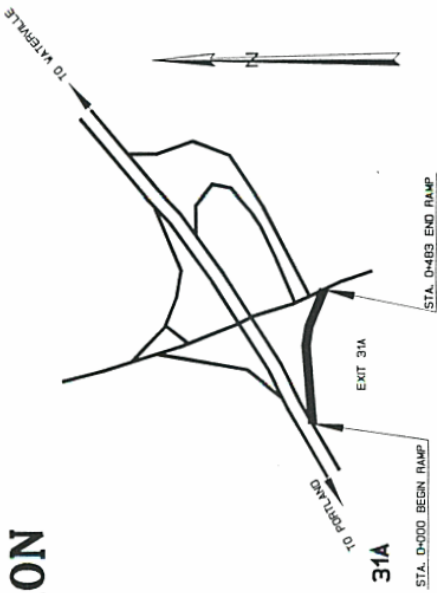


**AUGUSTA - WATERVILLE
 KENNEBEC COUNTY**

INTERSTATE 95

PROJECT NO. IM-95-6596(00)E

**PROJECT LENGTH : 6.590 KM ON I-95 NB & 0.480 KM ON EXIT 31A
 PAVEMENT REHABILITATION**



LAYOUT NOT TO SCALE

TRAFFIC DATA

DESCRIPTIONS OF SECTIONS	NB FROM WEBB RD TO RT 104		I-95 NB AT EXIT 31A RAMP		EXIT 31A RAMP		EXIT 31A RAMP	
	SECT. 1	SECT. 2	SECT. 1	SECT. 2	SECT. 3	SECT. 3	SECT. 3	SECT. 3
NB ONLY	NB ONLY	NB ONLY	1-95 NB	1-95 NB	1-95 NB	1-95 NB	1-95 NB	1-95 NB
EXIT	EXIT	EXIT	EXIT	EXIT	EXIT	EXIT	EXIT	EXIT
32-33	33-34	34-35	5/0	5/0	5/0	5/0	5/0	5/0
17760	18700	18700	17470	13510	13510	13510	13510	13510
13	13	13	14	14	14	14	14	14
2511	2561	2561	2448	1882	554	554	554	554
15	15	15	12	12	12	12	12	12
AS POSTED	AS POSTED	AS POSTED	100	100	100	100	100	100
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1576	1576	1576	1552	1278	469	469	469	469

UNITED STATES
 DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION
 REGION 1

APPROVED _____
 DIVISION ADMINISTRATOR

DATE _____

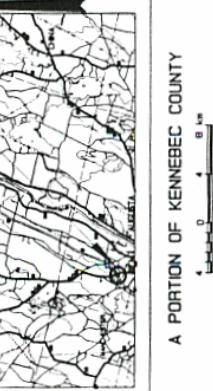
STATE OF MAINE
 DEPARTMENT OF TRANSPORTATION

APPROVED _____
 COMMISSIONER

DATE _____

CHIEF ENGINEER _____

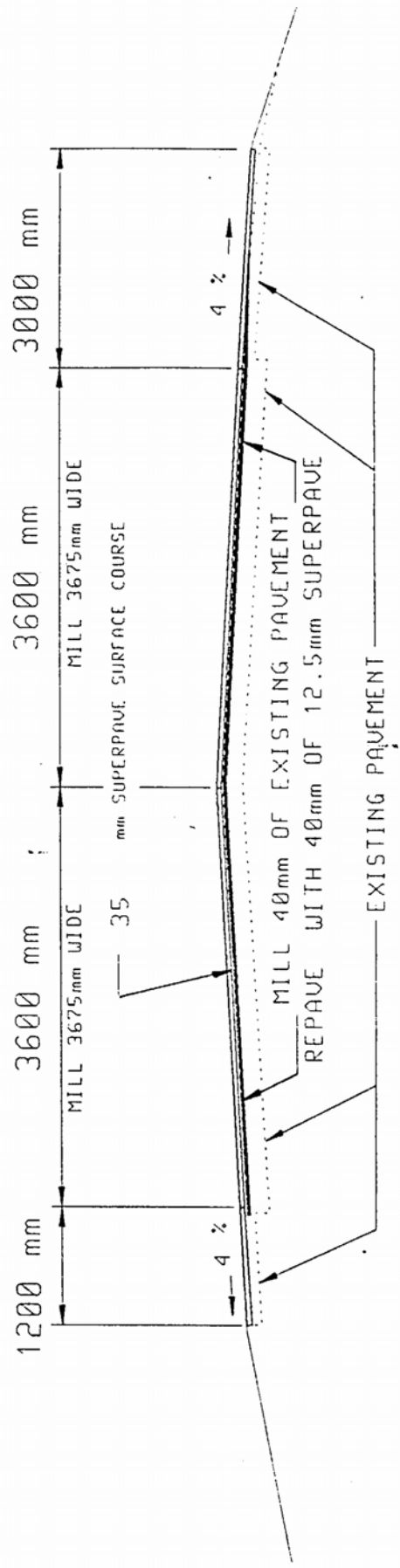
ALL WORK CONTAINED UNDER THIS CONTRACT IS TO BE COVERED BY THE BOARD OF APRA, 1995 AND SUPPLEMENTALS THERE TO, TOGETHER WITH THE STANDARD SPECIFICATIONS FOR MAINE HIGHWAYS. THIS WORK IS TO BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR MAINE HIGHWAYS.



A PORTION OF KENNEBEC COUNTY

SCALE IN KILOMETERS

35 mm HOT BITUMINOUS OVERLAY WITH 40 mm MILL AND REPAVE



NORMAL MAINLINE
WITH PAVED SHOULDERS

NOTE:
CENTERLINE LONGITUDINAL JOINTS TO
BE CONSTRUCTED WITH 75mm OFFSETS
BETWEEN THE INTERMEDIATE AND SURFACE COURSE.
JOINTS TO BE SEALED WITH A HOT RUBBERIZED SEALER ; TYPICAL.

STATE OF MAINE DEPARTMENT OF TRANSPORTATION
TYPICAL SECTION Augusta - Waterville I-95 NB. IM-95-6596(00)E

M.L. DETAIL 1
3/1/99

SPECIAL PROVISION
SECTION 424
JOINT SEALER

Description. This work shall consist of furnishing all labor, equipment and materials necessary to clean and seal longitudinal and transverse joints that result in the construction of bituminous concrete pavement courses. This material is to be thoroughly applied to the joints during the construction of bituminous pavement courses, to seal the construction joint from deterioration due to the elements, and to adhere the joint materials together.

MATERIALS

General. Pavement joint adhesive shall be a hot applied modified asphalt designed to seal and adhere the cold longitudinal construction joints to adjacent courses. The specified material shall be a Pavement Joint Adhesive manufactured by Craftco Inc., or a verifiable equivalent.

The emulsion shall conform to the applicable provisions of Section 409 - bituminous Tack Coat and to the requirements of Section 700 of the Standard Specifications

Asphalt rubber crack sealer shall be an asphalt and rubber compound designed for sealing and improving the strength and performance of the base asphalt cement and shall conform to ASTM D-3405.

CONSTRUCTION REQUIREMENTS

Weather. Asphalt rubber crack sealer, pavement joint adhesive, and emulsion shall not be applied on a wet surface, after sunset or before sunrise, or when the atmospheric temperature is below 10°C in a shaded area at the job site, or when weather conditions are otherwise unfavorable to proper construction procedures. An atmospheric temperature of 2°C and rising will be permitted on intermediate and base courses, with the time and weather constraints remaining.

Preparation and Placement. This work shall include three 1000 meter test sections, beginning at the construction joint at the **Webb Road** bridge. The first section shall be constructed with a pavement joint adhesive that conforms to ASTM D - 3405 . The second test section shall be constructed with an HFMS-1 emulsion (tack) meeting 409.15 requirements. The third section and remaining project length will be constructed using a rubberized sealer that conforms to ASTM D - 3405.

Asphalt rubber sealer and pavement joint adhesive shall be heated and applied at a temperature between 170°C - 200°C or as specified by the manufacturer and approved by the Construction Manager. Sealer shall be delivered to the crack through a pressure hose line and applicator shoe. The shoe width and the sealer overbanding area shall vary from 35mm - 40mm depending on the joint height variability. These materials will not be applied at no more than 12hrs. prior to the placement of any pavement course. Emulsions shall be heated and applied in accordance with the applicable provisions of Section 409 - Bituminous Tack Coat.

Preparations of Joints. All joints shall be swept or blown free of loose material, dirt, vegetation, and other debris. Material removed from the joint shall be removed from the pavement surface by means of a power sweeper or appropriate hand tools as required. Joints shall additionally cleaned by appropriate hand tools if contaminants remain on the face. All debris, vegetation, and water shall be removed to enhance adhesion of the crack sealing material. **THIS WORK SHALL NOT BE DONE IN INCLEMENT WEATHER.**

Equipment. Equipment used in the performance of the work shall be subject to the Construction Manager's approval and shall be maintained in a satisfactory working condition at all times.

- (a) Sweeper: The sweeper shall be a manually operated, gas powered air-broom, or self-propelled sweeper designed especially for use in cleaning pavements shall be used to remove all debris, dirt, and dust from the joints.
- (b) Hand Tools: Hand tools shall consist of brooms, shovels and any other tools which may be satisfactorily used to accomplish this work.
- (c) Melting Kettle: The unit used to melt the joint sealing compound shall be a double boiler, indirect fired type. The space between inner and outer shells shall be filled with a suitable heat transfer oil or substitute having a flash point of not less than 320°C. The kettle shall be equipped with a satisfactory means of agitating and mixing the joint sealer at all times. This may be accomplished by continuous stirring with mechanically operated paddles and /or a continuous circulating gear pump attached to the heating unit. The kettle must be equipped with thermostatic control calibrated between 94°C and 290°C.

Workmanship. All workmanship shall be of the highest quality. Excess sealer shall be removed from the pavement by approved methods and discarded. Any workmanship determined to be below normal acceptable standards will not be accepted, and will be corrected and/or replaced as directed by the Construction Manager.

Method of Measurement. Asphalt rubber sealer and pavement joint adhesive will be measured by the linear meter applied.

Basis of Payment. The accepted quantity of asphalt rubber sealer and pavement joint adhesive will be paid for at the contract unit price per linear meter complete in place, which price shall be full compensation for furnishing and placing sealer or adhesive, including all cleaning of joints, and furnishing and placing all materials necessary to perform the work.

There will be no separate payment for furnishing and applying HFMS-1 emulsion; this work will be considered incidental to the pavement items in the contract.

Payment will be made under:

Pay Item		Pay Unit
424.36	Asphalt Rubber Joint Adhesive, Applied	linear meter
424.321	Asphalt Rubber Crack Sealer, Applied	linear meter