1 BALDWIN STREET,
MONTPELIER, VT 05633-5701

PHONE: (802) 828-2295
FAX: (802) 828-2483

STATE OF VERMONT
JOINT FISCAL OFFICE

MEMORANDUM

To: James Reardon, Commissioner of Finance & Management

From: Nathan Lavery, Fiscal Analyst

Date: September 22, 2010

Subject: JFO #2454, #2455, #2456

No Joint Fiscal Committee member has requested that the following items be held for review:

JFO #2454 — $75,000 donation from the American Association of State Highway and Transportation Officials (AASHTO) to the Agency of Transportation (AOT). This donation will be used to perform a field evaluation of crack sealing materials. The donation consists of approximately $30,000 worth of crack sealing materials and installation expenses, and approximately $45,000 to reimburse AOT for evaluation of the materials and traffic control for the project.
[*JFO received 8/10/10*]

JFO #2455 — Request to approve the proposed fee structure for online International Registration Plan. This online service would allow individuals to acquire a 72 hour trip permit authorizing them to travel in Vermont under international agreements.
[*JFO received 8/12/10*]

JFO #2456 — Request to approve the proposed fee structure for online property transfer tax return service. This online service would allow Vermont property buyers and sellers to submit a property transfer tax return electronically.
[*JFO received 8/12/10*]

The Governor's approval may now be considered final. We ask that you inform the Secretary of Administration and your staff of this action.

cc: David Dill, Secretary
David Tucker, Commissioner

1 BALDWIN STREET,
MONTPELIER, VT 05633-5701

PHONE: (802) 828-2295
FAX: (802) 828-2483

STATE OF VERMONT
JOINT FISCAL OFFICE

MEMORANDUM

To: Joint Fiscal Committee Members

From: Nathan Lavery, Fiscal Analyst

Date: August 19, 2010

Subject: Grant Requests

Enclosed please find three (3) requests that the Joint Fiscal Office has received from the administration.

JFO #2454 — $75,000 donation from the American Association of State Highway and Transportation Officials (AASHTO) to the Agency of Transportation (AOT). This donation will be used to perform a field evaluation of crack sealing materials. The donation consists of approximately $30,000 worth of crack sealing materials and installation expenses, and approximately $45,000 to reimburse AOT for evaluation of the materials and traffic control for the project.
[*JFO received 8/10/10*]

JFO #2455 — Request to approve the proposed fee structure for online International Registration Plan. This online service would allow individuals to acquire a 72 hour trip permit authorizing them to travel in Vermont under international agreements. This fee request is subject to JFC review in accordance with 22 V.S.A. § 953(c).
[*JFO received 8/12/10*]

JFO #2456 — Request to approve the proposed fee structure for online property transfer tax return service. This online service would allow Vermont property buyers and sellers to submit a property transfer tax return electronically. This fee request is subject to JFC review in accordance with 22 V.S.A. § 953(c).
[*JFO received 8/12/10*]

In accordance with the procedures for processing such requests, we ask you to review the enclosed and notify the Joint Fiscal Office (Nathan Lavery at (802) 828-1488; nlavery@leg.state.vt.us) if you have questions or would like an item held for Joint Fiscal Committee review. Unless we hear from you to the contrary by September 2 we will assume that you agree to consider as final the Governor's acceptance of these requests.

cc: James Reardon, Commissioner
David Dill, Secretary
David Tucker, Commissioner

JFO 2454

STATE OF VERMONT
GRANT ACCEPTANCE FORM

GRANT SUMMARY:	Title: Grant of Crack Sealant This is a request for approval of a grant of crank sealing materials and installation, and reimbursement of staff time for evaluation. There is no required state match.
DATE:	July 21, 2010
DEPARTMENT:	Agency of Transportation – Program Development
GRANT / DONATION:	1) Highway crack sealing materials, with installation, with a value of approximately $30,000.00, and 2) reimbursement of approximately $45,000.00 for staff time in AOT's Materials section to evaluate and report on the materials and in Operations for traffic control for the project. No increase in personal services expense will be incurred and no increase in spending authority as a result of this grant will be requested. Reimbursement will appear as refund of expenditure in the Transportation Fund.
FEDERAL CATALOG No.:	N/A
GRANTOR / DONOR:	American Association of State Highway and Transportation Officials (AASHTO)
AMOUNT / VALUE:	$75,000.00 (Estimate)
POSITIONS REQUESTED:	None
GRANT PERIOD:	9/1/2010 to 6/1/2013

COMMENTS: See attachments.

DEPARTMENT OF FINANCE AND MANAGEMENT:	(INITIAL)	7/23/10
SECRETARY OF ADMINISTRATION	(INITIAL)	7/24/10
SENT TO JOINT FISCAL OFFICE:	DATE:	8/2/2010

RECEIVED
AUG 10 2010
JOINT FISCAL OFFICE

Vermont Agency of Transportation
Program Development Division
Materials and Research Section
Phone (802)828-2561 Fax (802)828-2792

DATE: July 13, 2010

TO: Jason Aronowitz, Budget Analyst

FROM: William Ahearn, P.E., Materials and Research Engineer
Jennifer Fitch, P.E., Research Engineer

SUBJECT: Proposed NTPEP Test Deck for Crack Sealants

Representatives from the National Transportation Product Evaluation Program (NTPEP) approached the Agency about hosting a test deck for evaluating cracking sealing materials in rout and seal and clean and seal applications. As background, the American Association of State Highway and Transportation Officials (AASHTO) is a non-governmental organization chartered to support state transportation programs by facilitating interstate collaboration and standards setting. NTPEP is an AASHTO program that develops product evaluation procedures that are balloted and approved by all 50 states and the territory of Puerto Rico and American Samoa. The key objective of the NTPEP program is to provide for single source testing and evaluation of products, materials, and devices that are commonly used by the AASHTO Member Departments of Transportation. In accordance with the project work plan (see attachment), the evaluation includes both field and laboratory testing. Given the Agency's current resources, we will be limited to performing the field evaluation. The Minnesota Department of Transportation (MnDOT) has offered to perform all laboratory testing.

The field evaluation consists of site selection, sealant installation, and annual data collection for a period of three years. The number of crack sealant products to be evaluated is unknown until the completion of the three month submittal period, or August 20th in our case. For reference, twelve products were recently assessed by MnDOT. The product manufacturer is responsible for supplying all materials for the evaluation of their product along with direct installation at the field site. The host Agency is responsible for supplying traffic control, installation scheduling, and indentifying an installation location as well as data collection and reporting.

In addition to manufacturers supplying and installing crack sealant materials at the field site, the NTPEP organization has offered to reimburse the Agency for our associated efforts including traffic control and staff time. The approximate value of the grant is $30,000 for materials and installation assuming ten products are submitted, and an additional $45,000 for the Materials and Research Section's evaluation efforts including

site visits, data analysis, report compilation, and miscellaneous activities (please see attached budget breakdown) and the Operations Division support of traffic control. All installation activities will be performed in accordance with all State and Agency policies and procedures.

To date there are no other test decks of this kind in New England. Historically, these materials have been evaluated under four types of conditions. They are general climatic associations; 1) hot, dry 2) hot, wet 3) cold, dry and 4) cold, wet. As you may surmise, VT would fit into the cold, wet climate category but is not well represented for its geography, geology and incipient freeze/thaw characteristics. New England conditions in general are not well represented, making participation especially valuable for the State.

Accepting the role as a test deck state would not only provide our Agency with an opportunity to evaluate several different products on behalf of NTPEP in a uniform and consistent manner, but would address climatic conditions and a Vermont setting. For purposes of research design a typical Vermont location with little-to-no-site variation will be selected. The research will provide accurate direct comparison of products. In addition, participation in the study would also allow for professional development of staff members, and participation in a national program. Staff will have an opportunity to perform data collection, participate in analytic review and may provide editing/review of the draft final report. The indirect benefit from a staff development and morale perspective is substantial and worthy of support.

It is important to note that a contract will between NTPEP and the Agency will be established. This contract will identify the roles and responsibilities of each party, will expressly specify a three year commitment from the Agency, and contain a termination clause along with all standard contract language. NTPEP would like the crack sealants installed this fall prior to end of the acceptable period of October 15th. Weather conditions including ambient air and pavement temperatures following this date will likely not meet the minimum requirements per the manufacturer's recommendations.

I respectfully request approval of this grant and authority to accept the donations/reimbursements associated with participating in the NTPEP Crack Sealant Product Evaluation. In order to participate, VTrans should communicate an affirmation of participation during the month of August. We have expressed an interest up to this point in time, but a firm commitment is necessary. Please let me now if you have any questions or need of additional information at your earliest convenience.

Cc: Rich Tetreault, Director PD Division
Lenny LeBlanc, Director F&A Division

STATE OF VERMONT REQUEST FOR GRANT ACCEPTANCE (Form AA-1)

BASIC GRANT INFORMATION				
1. Agency:	Vermont Agency of Transportation			
2. Department:	Program Development			
3. Program:	Materials and Research Section - Research Unit			
4. Legal Title of Grant:	None			
5. Federal Catalog #:	None			
6. Grant/Donor Name and Address: AASHTO (NTPEP), 444 North Capitol Street N.W., Suite 249, Washington, DC 20001				
7. Grant Period: **From:**	9/1/2010	**To:**	6/1/2013	

8. Purpose of Grant:

To perform a field evaluation of cracking sealing materials in rout and seal and clean and seal applications on behalf of the National Transportation Product Evaluation Program (NTPEP). The NTPEP program provides testing and evaluation of products, materials, and devices that are commonly used by the AASHTO Member Departments of Transportation to eliminate duplication of testing. Crack sealants will be supplied and installed by the manufacturer. The Agency will be responsible for site selection, sealant installation including traffic control, annual data collection for a period of three years, and reporting. All Agency efforts will be reimbursed by NTPEP. Please refer to the attached project work plan.

9. Impact on existing program if grant is not Accepted:

Accepting the role as a test deck state would not only provide our Agency with an opportunity to evaluate several different products on behalf of NTPEP in a uniform and consistent manner, but would address climatic conditions and a Vermont setting. For purposes of research design a typical Vermont location with little-to-no-site variation will be selected. The research will provide accurate direct comparison of products. In addition, participation in the study would also allow for professional development of staff members, and participation in a national program.

10. BUDGET INFORMATION

	SFY 1	SFY 2	SFY 3	Comments
Expenditures:	FY 2011	FY 2012	FY 2013	
Personal Services	$	$	$	
Operating Expenses	$	$	$	
Grants	$	$	$	
Total	$	$	$	
Revenues:				
State Funds:	$	$	$	
Cash	$	$	$	
In-Kind	$	$	$	
Federal Funds:	$	$	$	
(Direct Costs)	$	$	$	
(Statewide Indirect)	$	$	$	
(Departmental Indirect)	$	$	$	
Other Funds:	$	$	$	
Grant (source AASHTO)	$51,280	$9,360	$14,360	$75,000
Total	$51,280	$9,360	$14,360	

RECD JUL 15 2010

STATE OF VERMONT REQUEST FOR GRANT ACCEPTANCE (Form AA-1)

Appropriation No:		Amount:	$
			$
			$
			$
			$
			$
			$
		Total	$

PERSONAL SERVICE INFORMATION

11. Will monies from this grant be used to fund one or more Personal Service Contracts? ☐ Yes ☒ No
If "Yes", appointing authority must initial here to indicate intent to follow current competitive bidding process/policy.

Appointing Authority Name: Agreed by: _____ (initial)

12. Limited Service Position Information:	# Positions	Title
Total Positions		

12a. Equipment and space for these positions: ☐ Is presently available. ☐ Can be obtained with available funds.

13. AUTHORIZATION AGENCY/DEPARTMENT

I/we certify that no funds beyond basic application preparation and filing costs have been expended or committed in anticipation of Joint Fiscal Committee approval of this grant, unless previous notification was made on Form AA-1PN (if applicable):

Signature: Richard Pritchard Date: 7/13/10
Title: VTRANS' DIRECTOR OF PROGRAM DEVELOPMENT

Signature: David C Dill Date: 7/13/10
Title: Secretary

14. SECRETARY OF ADMINISTRATION

☑ Approved: (Secretary or designee signature) Date: 7/14/10

15. ACTION BY GOVERNOR

☑ Check One Box: Accepted — (Governor's signature) Date: 7/28/10

☐ Rejected — Date:

16. DOCUMENTATION REQUIRED

Required GRANT Documentation

☐ Request Memo	☐ Notice of Donation (if any)
☐ Dept. project approval (if applicable)	☐ Grant (Project) Timeline (if applicable)
☐ Notice of Award	☐ Request for Extension (if applicable)

STATE OF VERMONT REQUEST FOR GRANT ACCEPTANCE (Form AA-1)

☐ Grant Agreement ☐ Grant Budget	☐ Form AA-1PN attached (if applicable)
End Form AA-1	

American Association of State Highway and Transportation Officials (AASHTO)

National Transportation Product Evaluation Program (NTPEP)

Project Work Plan for Evaluation of Hot Mix Asphalt Crack Sealing and Filling Materials

Proposed Revision June 2009

Purpose:

The purpose of this work plan is to define the laboratory and field procedures used to evaluate crack sealing materials in rout and seal and clean and seal applications. The current evaluation procedures are for hot poured crack sealants. Additional types of crack sealant materials may be included in this evaluation process at a later date.

The laboratory procedures consist primarily of ASTM test procedures and the field evaluation procedures are based on procedures detailed in the Strategic Highway Research Program (SHRP): Materials and Procedures for Sealing and Filling Cracks in Asphalt-Surfaced Pavements- Manual of Practice.

The evaluation procedures are divided into the following sections:

a) Laboratory Evaluation Procedures
   - Standard Laboratory Conditions
   - Hot Poured Sealants

b) Field Evaluation Procedures
   - Site Selection and Required Quantities
   - Sealer Installation
   - Evaluation
     - Water Infiltration
     - Debris Retention
     - Spall
     - Tracking
     - Crack Movement
     - Photolog

c) Reporting of Results

Referenced Documents:

AASHTO T316-06: Viscosity Determination of Asphalt Binder Using Rotational Viscometer

ASTM D36-06 Test Method for Softening Point of Bitumen (Ring and Ball Apparatus)

ASTM D5167-03: Standard Practice for Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation

ASTM D5329-09: Standard Test Methods for Sealants and Fillers, Hot Applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements ASTM D1985-03: Standard Practice for Preparing Concrete Blocks for Testing Sealants, for Joints and Cracks

ASTM D 6690-07: Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

ASTM E-171-94: Standard Specification for Standard Atmospheres for Conditioning and Testing Flexible Barrier Materials

FHWA-RD-99-147: Materials and Procedures for Sealing and Filling Cracks in Asphalt-Surfaced Pavements- Manual of Practice

Laboratory Evaluation Procedures:

Standard Laboratory Conditions

Standard laboratory conditions are defined as a temperature of 23 ± 2°C (73.4°± 3.6°F) and a relative humidity of 50 ± 5%.

Hot Pour Sealants

The manufacturer shall supply two 11.4 kg (25 pound) blocks of sealant material from the same lot or batch of material used for the field evaluation. One of the 11.4 kg (25 pound) blocks will be used to conduct the laboratory evaluation and the second 11.4 kg (25 pound) block of material will be retained for 1 month after the manufacturer has been notified of the laboratory evaluation results for potential verification testing. No product name changes are allowed during the course of the evaluation. The laboratory evaluation will consist of testing two samples using the following procedures. The laboratory results that are reported will be the average of the individual tests at each heating condition. The report forms for the hot pour sealants are provided in Table 1 of the Report section.

1. Sample Preparation

The crack sealant samples shall be prepared in accordance with ASTM D 5167-03 using a sample size of approximately 2,200 grams (4.9 pounds). If the capacity of the sealant melter will not accommodate a 2,200 g sample, the sample will be split into two 1,100-gram samples and will be melted on both sides of the melter at the same time. The test specimens will be prepared by heating sealant to the manufacturer's maximum heating temperature after which the initial set of test specimens for bond to concrete, softening point, resilience, asphalt compatibility, fingerprinting and penetration will be prepared. The sealant material remaining in the melter will be kept at the manufacturer's maximum heating temperature for 6 hours ±15 minutes, after which a second set of test specimens for bond to concrete, softening point, resilience, asphalt compatibility, fingerprinting and penetration will be prepared.

2. Sealant Laboratory Testing

The sealant shall be evaluated in accordance with ASTM D 6690-06a and the methods described

in the following paragraphs.

A. Bond to Concrete
Three non-immersed bond specimens will be prepared and tested in accordance with ASTM D5329-04, Section 9 and ASTM D 6690-06a Table 1. The blocks will be prepared in accordance with ASTM D 1985. Only Type III sealant as defined by D6690-06a shall be tested for water –immersed bond. Three additional bond specimens will be conditioned and tested per ASTM 6690-06a Section 7.5 for the water-immersed bond testing. The result of each extension cycle for each specimen will be reported as the amount of adhesion and/or cohesion failure in square centimeters (square inches).

B. Resilience - The resilience specimens will be prepared and in accordance with ASTM D5329-04, Section 12 and tested at 25°C (77°F). The resilience results will be reported as the percent recovery.

C. Cone Penetration - Two penetration specimens will be prepared in accordance with ASTM D5329-04, Section 6. One penetration specimen will be tested in accordance with ASTM D5329-04, Section 6. The second specimen will be tested in accordance with ASTM D5329-04, Section 6 with the following exceptions; the specimen will be allowed to cool to standard laboratory conditions for 17 ± 2 hours, the specimen will then be placed in a freezer at -18°C ± 1°C (0°F ± 2°F) for 4 hours ±15 minutes prior to testing. One hour before testing, the penetrometer cone attachment will also be placed in the freezer at -18°C ±1°C (0°F ±2°F). At the end of the 4-hour specimen-conditioning period, remove the test specimen and cone from the freezer, place the cone in the penetrometer and immediately conduct the test. After making the measurement, clean the cone attachment and place the specimen and cone back in the freezer for 10 ± 2 minutes before making two successive measurements for a total of three measurements. The penetration results will be averaged and the average value reported.

D. Asphalt Compatibility- The HMA and crack sealer specimens shall be prepared in accordance with ASTM 5329-04 Section 14.

E. Rotational Viscosity- Crack sealer specimens shall be prepared in accordance with AASHTO T-316-04. The viscosity shall be measured at the manufacturer's maximum heating temperature and reading shall be taken at 30 seconds and at 60RPM.

F. Fingerprinting- A reference infrared spectrum shall be obtained from a representative sample using an Attenuated Total Reflectance (ATR) attachment. This reference spectrum shall be used for future comparison to verify no change in formulation has been made.

G. **Softening Point**- Ring and Ball Softening Point determination will be conducted according to ASTM D36.

Field Evaluation Procedures

Site Selection and Quantities

The member department will select a field evaluation site consisting of at least 500 feet of pavement for each sealant material evaluated. All transverse and longitudinal sealed cracks or joints will be evaluated. The application may be rout and seal or clean and seal. Site selection criteria should include pavement age, roadway history and crack spacing. Efforts will be made to host test sites in various climatic regions of the United States.

Sealant Installation

The manufacturer will supply all materials for the evaluation of their product. The manufacturer and the test state will mutually agree upon the equipment and labor required to prepare the cracks and install the crack sealant material. The manufacturers will either supply all labor and equipment required or the test state will provide a single contractor for all manufacturers at the manufacturers' expense. Traffic control, installation scheduling, and installation location will be provided by the test state. The manufacturer should have a technical representative present at the installation of the sealant to certify that the material is installed in accordance with their recommended procedures. If the representative believes that the installation is not in accordance with the recommended procedures, they will inform the designated representative of the member department of this fact in writing within one week of the installation of the material. If this occurs, the member department may eliminate that manufacturer's installation from further evaluation without a refund of fees. If no letter is received within this first week, the installation will be accepted and included in the field evaluation.

Before installation, GPS or Reference Point stationing of test sections shall be documented. For ease of conducting the field installation, the 500' test section may be separated into smaller subsections. A pavement condition survey and detailed sketching of the cracks including crack spacing shall be done. The average crack spacing along with standard deviation for each test section shall be reported. Three transverse cracks and three longitudinal cracks will be pinned with PK nails on each side of the cracks. These pins shall be used to monitor crack movement during the course of the evaluation.

During the installation, a drawing will be prepared to show the location of each sealant, provide the slope of the pavement, the crack spacing and the crack width. The average daily traffic and the closest Strategic Highway Research Program (SHRP) weather data station will also be reported. The manufacturer will supply with the application for evaluation the recommended shape factor if routing is done and performance characteristics such as the amount of crack movement the sealant is capable of withstanding or the sealant working range, the maximum and minimum crack width for satisfactory performance of the sealant, the recommended crack preparation and sealant installation procedures, and when the area can be reopened to traffic. These conditions will apply if they do not conflict with the agency's construction practices.

The crack preparation and sealant installation techniques used during the installation will be recorded. Any deviation from the manufacturer's recommendations will be noted. Additionally, the manufacturer's representative will be allowed to provide comments on the crack preparation and sealant installation. If the manufacturer's representative does provide such comments, they will be included with the installation report. The weather conditions during the installation will also be recorded.

Field Evaluation Observations

Water Infiltration

Water infiltration will be measured as the percentage of the overall crack length where water can bypass the sealant and enter the crack either through complete adhesion or cohesion failure. Adhesion and cohesion failures will be determined through the visual inspection method. All cracks in the driving lane shall be inspected to determine the percent allowing water infiltration. Any visual cracks, splits or openings in the sealant or between the sealant and asphalt shall be examined to determine the depth of the opening. Instruments such as a dull knife or a thin blade spatula may be used to assist in the evaluation.

The percentage of cracks that allow water infiltration will be determined by the equation:

$$\%L = (L_f / L_{tot}) * 100$$

where:

%L = Percent length of the crack allowing water infiltration
L_f = Total length of the crack sealant field evaluation section allowing the Infiltration of water (inches)
L_{tot} = Total length of the crack sealant field evaluation section (inches)

Debris or Stone Retention

Stone or debris retention will be rated as follows:

No Debris Retention: No stones or debris are stuck to the top of the sealant or embedded on the surface of the sealant/ HMA interface.
Low Severity: Occasional stones and/or debris are stuck to the top of the sealant, or debris embedded on the surface of the sealant/HMA interface.
Medium Severity: Stones or debris are stuck to the sealant and some debris is deeply embedded in the sealant or material embedded between the sealant and the crack face but not entering the crack below the sealant.
High Severity: A large amount of stones and debris are stuck to and deeply embedded in the

sealant or filling the crack, or a considerable amount of debris is embedded between the sealant and the crack face and entering the crack below the sealant.

Spalling

Spalling is the length of any cracking, breaking, chipping or fraying of crack edges. The length and severity of spalling shall be measured along each crack.

Crack Movement

Longitudinal and transverse crack movements shall be measured by installing pins or PK nails on both sides of three transverse and longitudinal cracks. A drill should be used to make a pilot hole for the installation of the pins. Pins shall be place far enough away from the cracks so as not to cause further deterioration in the pin installation process. At each evaluation, crack movement shall be measured as the distance between the pins measured by a caliper minus the spacing between the pins at installation.

Vertical movements at the cracks or routs shall be measured by the Georgia Faultmeter or a straightedge, wedge and caliper.

Both joint movement measurements shall be an average of three measurements per crack.

Crack Spacing

The average crack spacing along with the spacing standard deviation shall be reported. This information is acquired from the crack map done prior to installation of products.

Photo Log

Photographs of the cracks shall be taken and included in the report.

Tracking

Tracking of sealant by traffic will be measured as linear distance in inches that the sealant tracks from the sealed crack in the direction of traffic. The distance of tracking and photographs may be used to determine levels of severity.

Additional information such as the pavement condition, environmental conditions, and traffic conditions will also be recorded. Specific items that are to be recorded are provided in Table 2 in the Report section.

Quality Control/Quality Assurance

To ensure accuracy and precision in lab testing and field evaluation data collection, the following controls have been instituted in this work plan.

Lab Testing-

The testing lab shall have AMRL or other NTPEP approved laboratory accreditation. All equipment is to be calibrated, verified or checked according to the lab quality system manual and ASTM, AASHTO or lab test methods. The testing lab shall have applicable standards available to technicians testing sealants for the NTPEP program and shall verify that the correct versions of applicable standards are being used per the appropriate NTPEP Crack Sealant or Joint Sealant work plan.

Technicians conducting sealant testing shall undergo a training program on methods, procedures and practices detailed in this work plan. Training shall be conducted by a technician with a minimum of a Bachelors of Science degree and five years of sealant testing experience. Proficiency of technicians shall be determined using ASTM or DOT sponsored Round robin testing program. Training records shall be documented per the lab QSM.

Sealant samples shall be tested according to referenced standards. Replicate tests shall all fall within limits established by the standards precision and bias statement (P&B). If a test fails to meet the P&B, the test will be repeated until the P&B is met.

Field Evaluation-

The field evaluation shall be conducted according to the NTPEP Crack and Joint Sealant Field Evaluation Standard Operating Procedure and this work plan. The field evaluation team shall consist of state DOT and/or consultants. To insure quality of field measurements the same evaluation team shall take reading at all test sites. When this is not possible, the evaluation team shall conduct a two day training program for new field evaluators.

The average of percent adhesion failure for the test site shall be tracked for field evaluators. One evaluator shall measure even numbered cracks or joints in a test section while the second evaluator measures the odd numbered cracks or joints. The coefficient of variation (COV) between the evaluators shall be < 15%. If the COV is greater than 15%, an investigation shall be made to determine causes for this difference. When questions related to how to evaluate sealant distresses occur, the field evaluation team shall meet and come to consensus. This will allow the evaluators to remain consistent in evaluation techniques.

Reporting-

Before creating evaluation reports or uploading data to Data Mine, a review of report or data shall take place by the Report Review Team consisting of technical committee members and

field evaluators. Timing for review of reports by vendors and NTPEP can be viewed in the Time Line seen below.

NTPEP Project Timeline

1. Submittal package shall be posted on the NTPEP webpage 3 months before installation of products. The host state DOT will set date of installation.
2. Prior to installation a manufacturer may withdraw product(s) if a written notification is received by the NTPEP Manager 5 days prior to installation of products. A 10% handling fee will be applied.
3. After installation of products, a manufacturer may withdraw product(s) 1 week after installation- if the manufacturer's technical representative details in writing that the installation wasn't done according to the manufacturer's recommendations. No refund of fees.
4. 90 days after installation- completion of laboratory tests and start of industry review
5. 120 days after installation- deadline of industry review and comments
6. First report due 90 days after yearly field evaluations. Report includes lab data and 1st year field report
7. Second Report due 90 days after yearly field evaluations- First year report plus second year field data
8. Final Report due 90 days after final field evaluation

Reporting of Results:

The results of the sealant evaluations will consist of the appropriate laboratory evaluation form and the field evaluation form.

Table l. Hot Pour Sealant Laboratory Evaluation.

Joint Sealant Test	Test Cycle	Results from Initial Heating	Results from 2nd Heating
Bond To Concrete, -29°C (-20°F), 3 cycles, 200% Extension, non-immersed	1		
	2		
	3		
Bond To Concrete, -29°C (-20°F), 3 cycles, 50% Extension, non-immersed	1		
	2		
	3		
Bond To Concrete, -29°C (-20°F), 3 cycles, 50% Extension, water-immersed	1		
	2		
	3		
Bond To Concrete, -18°C (0°F), 5 cycles, 50% Extension, non-immersed	1		
	2		
	3		
	4		
	5		
Softening Point, ° C (° F)			
Resilience, % Recovery			
Penetration @ 25°C (77°F)			
Penetration @ -18°C (0°F)			
Asphalt Compatibility			
Rotational Viscosity , Pa.S			

Table 2: Field Evaluation Form

Test Section ID	NTPEP #	Company
Installation Date	Technical Contact	Product Lot #
Average Crack Spacing	Crack Spacing Standard Deviation	
Application Conditions	Comments	

Transverse Crack Sealant Failure				Debris Retention (Severity)	Tracking (inch)	Crack Movement (inches)	
Date of Test	% Adhesion Failure	% Cohesion Failure	% Total Seal Failure			vertical	horizontal

Longitudinal Crack Seal Failure				Debris Retention (Severity)	Tracking (inch)	Crack Movement (inches)	
Date of Test	% Adhesion Failure	% Cohesion Failure	% Total Seal Failure			vertical	horizontal

Table 3: Crack Sealant Field Evaluation Worksheet - 0-100' Test Sub-Section

NTPEP #:_____

Test Section:_____

Crack ID:_____

Longitudinal ID-L

Transverse ID-T

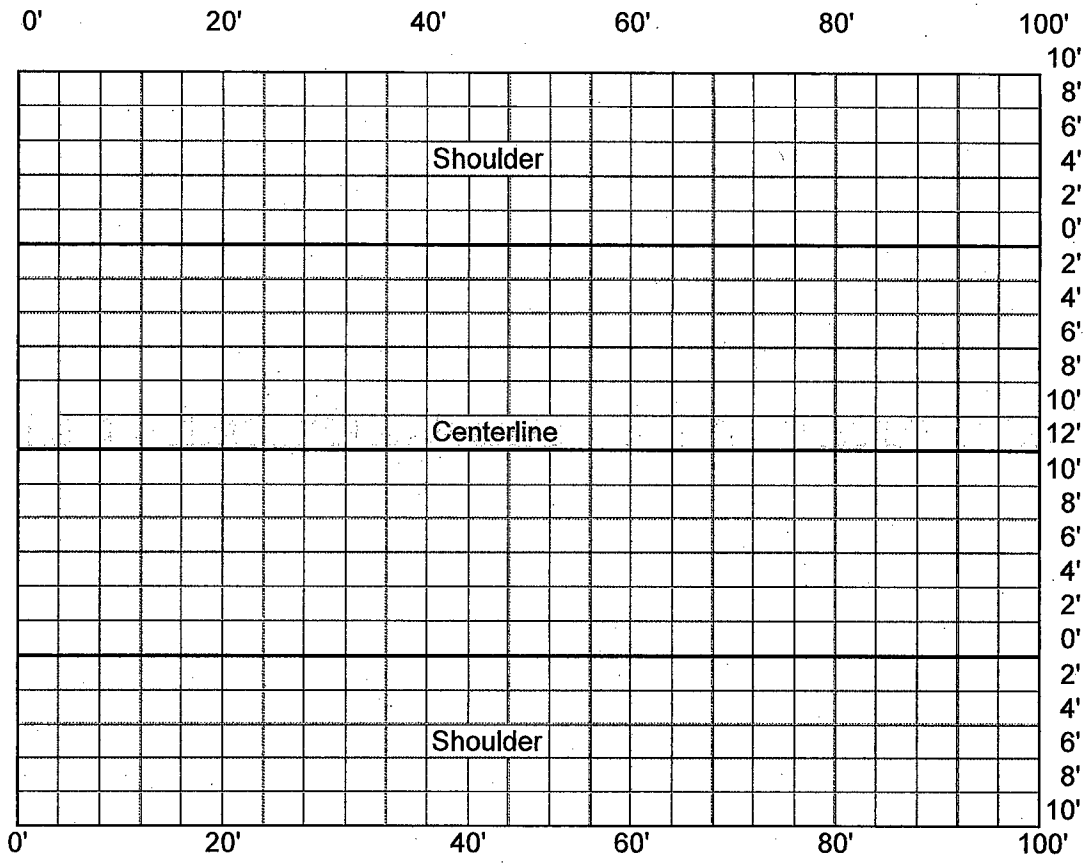
Location:_____

Ref. Point:_____

Date:_____

Evaluator:_____

Notes:



Comments:_____

Table 4: Crack Sealant Field Evaluation Worksheet - 100'-200' Test Sub-Section

NTPEP #:_____

Test Section:_____

Crack ID:_____

Longitudinal ID-L

Transverse ID-T

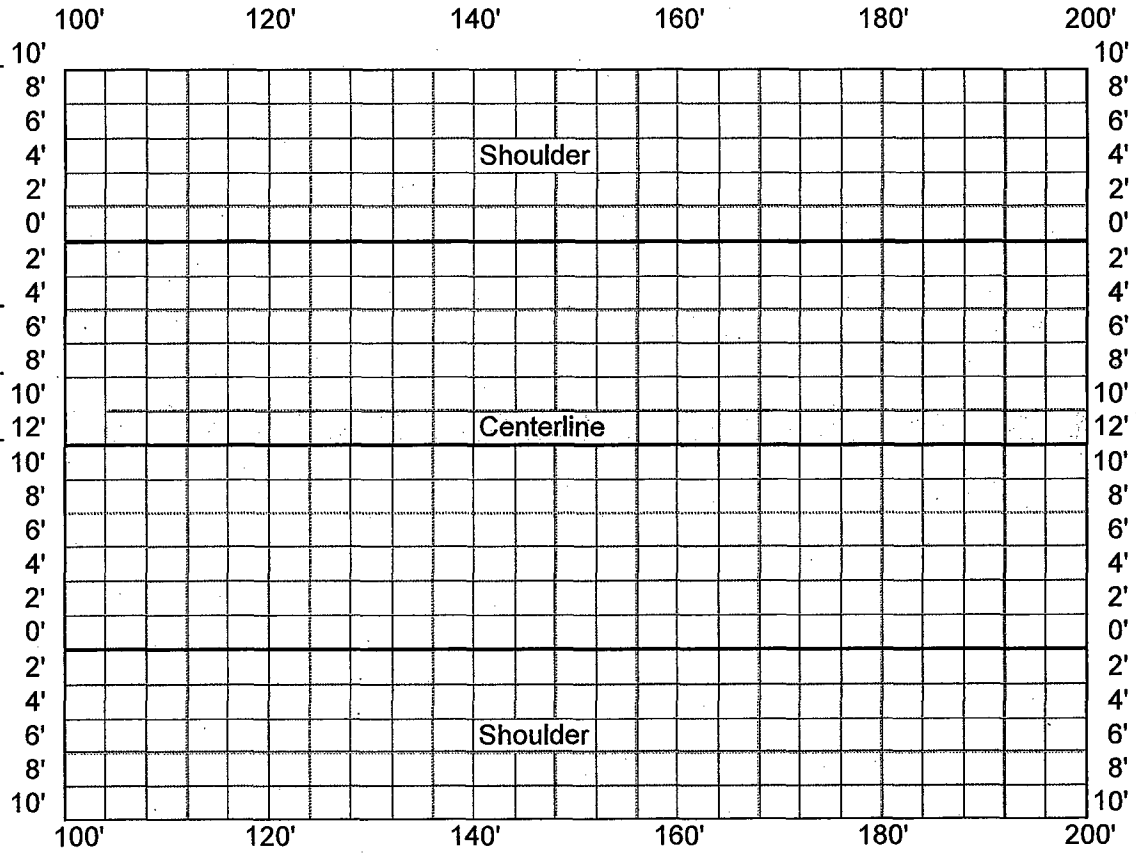
Location:_____

Ref. Point:_____

Date:_____

Evaluator:_____

Notes:



Comments:_____

Table 5: Crack Sealant Field Evaluation Worksheet - 200'-300' Test Sub-Section

NTPEP #:_____

Test Section:_____

Crack ID:_____

Longitudinal ID-L

Transverse ID-T

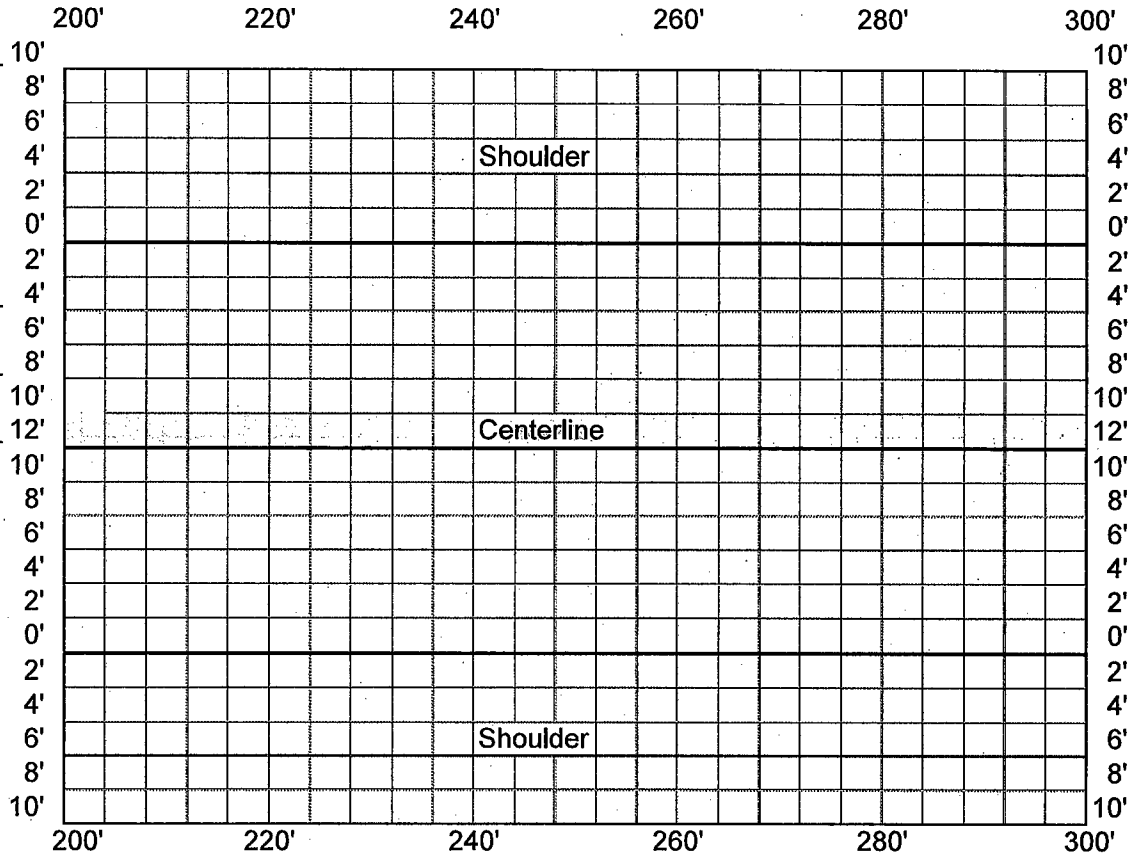
Location:_____

Ref. Point:_____

Date:_____

Evaluator:_____

Notes:



Comments:_____

Table 6: Crack Sealant Field Evaluation Worksheet - 300'-400' Test Sub-Section

NTPEP #:_____

Test Section:_____

Crack ID:_____

Longitudinal ID-L

Transverse ID-T

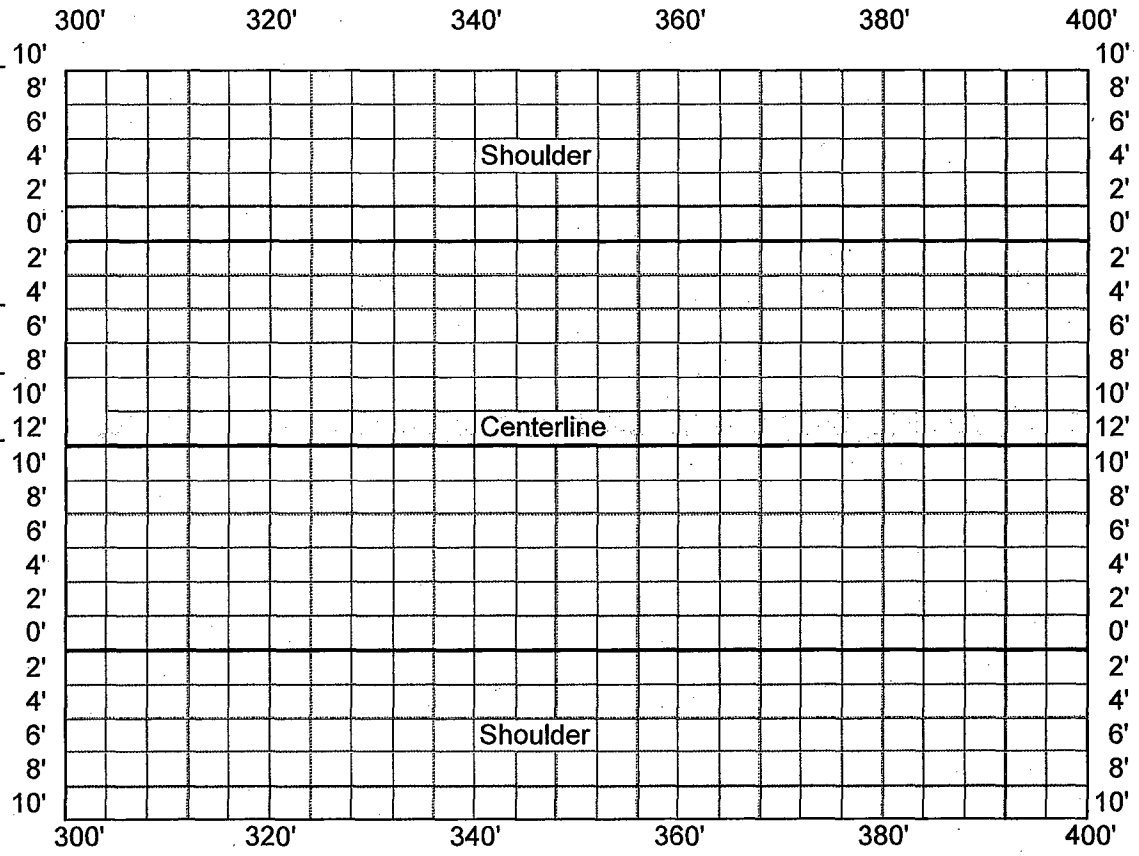
Location:_____

Ref. Point:_____

Date:_____

Evaluator:_____

Notes:



Comments:_____

Table 7: Crack Sealant Field Evaluation Worksheet - 400'-500' Test Sub-Section

NTPEP #:_____

Test Section:_____

Crack ID:_____

Longitudinal ID-L

Transverse ID-T

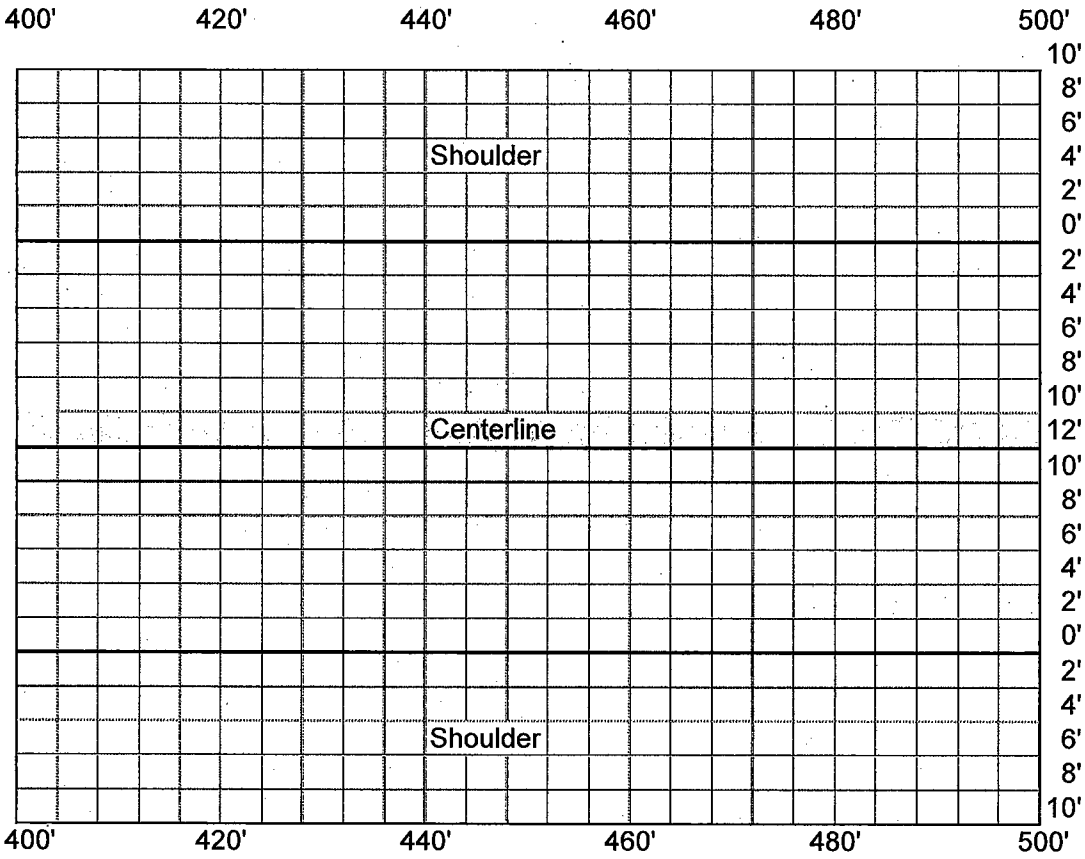
Location:_____

Ref. Point:_____

Date:_____

Evaluator:_____

Notes:



Comments:_____

		Staff Time[2][3] Hours	Cost ($)	Cost with Overhead
Pre-Installation	**Site Selection and Admin**	24	600	1080
	Crack Mapping, GPS, Nails	48	1200	2160
	Traffic Control (days)[1]	1	1000	1800
Installation		48	1200	2160
	Traffic Control (days)	2	2000	3600
Annual Measurements	**Winter, Year 1**	48	1200	2160
	Traffic Control (days)	2	2000	3600
	Winter, Year 2	48	1200	2160
	Traffic Control (days)	2	2000	3600
	Winter, Year 3	48	1200	2160
	Traffic Control (days)	2	2000	3600
Data Analysis & Reporting	**Year 1 Report**	80	2000	3600
	Year 2 Report	80	2000	3600
	Year 3 Report	80	2000	3600
Miscellaneous Equipment & Supplies				1120
Conferences & Travel[4]				5000
	Total Cost		$21,600	$45,000
	Total Labor		504	hours
	Total Traffic		9	days

[1]Traffic Control at $1000 per day

[2]Labor at $25 per hour

[3]Overhead charged at a rate of 80%

[4] To pay for travel and attendance at annual NTPEP Conference to report results from study

JFO 2454

STATE OF VERMONT
GRANT ACCEPTANCE FORM

GRANT SUMMARY:	Title: Grant of Crack Sealant This is a request for approval of a grant of crank sealing materials and installation, and reimbursement of staff time for evaluation. There is no required state match.
DATE:	July 21, 2010
DEPARTMENT:	Agency of Transportation – Program Development
GRANT / DONATION:	1) Highway crack sealing materials, with installation, with a value of approximately $30,000.00, and 2) reimbursement of approximately $45,000.00 for staff time in AOT's Materials section to evaluate and report on the materials and in Operations for traffic control for the project. No increase in personal services expense will be incurred and no increase in spending authority as a result of this grant will be requested. Reimbursement will appear as refund of expenditure in the Transportation Fund.
FEDERAL CATALOG No.:	N/A
C	American Association of State Highway and Transportation Officials (AASHTO)
A	$75,000.00 (Estimate)
F ED:	None
GRANT PERIOD:	9/1/2010 to 6/1/2013

COMMENTS: See attachments.

DEPARTMENT OF FINANCE AND MANAGEMENT:	(INITIAL) 7/23/10
SECRETARY OF ADMINISTRATION	(INITIAL) 7/24/10
SENT TO JOINT FISCAL OFFICE:	DATE: 8/2/2010

RECEIVED
AUG 10 2010
JOINT FISCAL OFFICE

Vermont Agency of Transportation
Program Development Division
Materials and Research Section
Phone (802)828-2561 Fax (802)828-2792

DATE: **July 13, 2010**

TO: **Jason Aronowitz, Budget Analyst**

FROM: **William Ahearn, P.E., Materials and Research Engineer**
Jennifer Fitch, P.E., Research Engineer

SUBJECT: **Proposed NTPEP Test Deck for Crack Sealants**

Representatives from the National Transportation Product Evaluation Program (NTPEP) approached the Agency about hosting a test deck for evaluating cracking sealing materials in rout and seal and clean and seal applications. As background, the American Association of State Highway and Transportation Officials (AASHTO) is a non-governmental organization chartered to support state transportation programs by facilitating interstate collaboration and standards setting. NTPEP is an AASHTO program that develops product evaluation procedures that are balloted and approved by all 50 states and the territory of Puerto Rico and American Samoa. The key objective of the NTPEP program is to provide for single source testing and evaluation of products, materials, and devices that are commonly used by the AASHTO Member Departments of Transportation. In accordance with the project work plan (see attachment), the evaluation includes both field and laboratory testing. Given the Agency's current resources, we will be limited to performing the field evaluation. The Minnesota Department of Transportation (MnDOT) has offered to perform all laboratory testing.

The field evaluation consists of site selection, sealant installation, and annual data collection for a period of three years. The number of crack sealant products to be evaluated is unknown until the completion of the three month submittal period, or August 20th in our case. For reference, twelve products were recently assessed by MnDOT. The product manufacturer is responsible for supplying all materials for the evaluation of their product along with direct installation at the field site. The host Agency is responsible for supplying traffic control, installation scheduling, and indentifying an installation location as well as data collection and reporting.

In addition to manufacturers supplying and installing crack sealant materials at the field site, the NTPEP organization has offered to reimburse the Agency for our associated efforts including traffic control and staff time. The approximate value of the grant is $30,000 for materials and installation assuming ten products are submitted, and an additional $45,000 for the Materials and Research Section's evaluation efforts including

site visits, data analysis, report compilation, and miscellaneous activities (please see attached budget breakdown) and the Operations Division support of traffic control. All installation activities will be performed in accordance with all State and Agency policies and procedures.

To date there are no other test decks of this kind in New England. Historically, these materials have been evaluated under four types of conditions. They are general climatic associations; 1) hot, dry 2) hot, wet 3) cold, dry and 4) cold, wet. As you may surmise, VT would fit into the cold, wet climate category but is not well represented for its geography, geology and incipient freeze/thaw characteristics. New England conditions in general are not well represented, making participation especially valuable for the State.

Accepting the role as a test deck state would not only provide our Agency with an opportunity to evaluate several different products on behalf of NTPEP in a uniform and consistent manner, but would address climatic conditions and a Vermont setting. For purposes of research design a typical Vermont location with little-to-no-site variation will be selected. The research will provide accurate direct comparison of products. In addition, participation in the study would also allow for professional development of staff members, and participation in a national program. Staff will have an opportunity to perform data collection, participate in analytic review and may provide editing/review of the draft final report. The indirect benefit from a staff development and morale perspective is substantial and worthy of support.

It is important to note that a contract will between NTPEP and the Agency will be established. This contract will identify the roles and responsibilities of each party, will expressly specify a three year commitment from the Agency, and contain a termination clause along with all standard contract language. NTPEP would like the crack sealants installed this fall prior to end of the acceptable period of October 15th. Weather conditions including ambient air and pavement temperatures following this date will likely not meet the minimum requirements per the manufacturer's recommendations.

I respectfully request approval of this grant and authority to accept the donations/reimbursements associated with participating in the NTPEP Crack Sealant Product Evaluation. In order to participate, VTrans should communicate an affirmation of participation during the month of August. We have expressed an interest up to this point in time, but a firm commitment is necessary. Please let me now if you have any questions or need of additional information at your earliest convenience.

Cc: Rich Tetreault, Director PD Division
Lenny LeBlanc, Director F&A Division

STATE OF VERMONT REQUEST FOR GRANT ACCEPTANCE (Form AA-1)

BASIC GRANT INFORMATION	
1. Agency:	Vermont Agency of Transportation
2. Department:	Program Development
3. Program:	Materials and Research Section - Research Unit
4. Legal Title of Grant:	None
5. Federal Catalog #:	None
6. Grant/Donor Name and Address: AASHTO (NTPEP), 444 North Capitol Street N.W., Suite 249, Washington, DC 20001	
7. Grant Period: From: 9/1/2010 **To:** 6/1/2013	

8. Purpose of Grant:

To perform a field evaluation of cracking sealing materials in rout and seal and clean and seal applications on behalf of the National Transportation Product Evaluation Program (NTPEP). The NTPEP program provides testing and evaluation of products, materials, and devices that are commonly used by the AASHTO Member Departments of Transportation to eliminate duplication of testing. Crack sealants will be supplied and installed by the manufacturer. The Agency will be responsible for site selection, sealant installation including traffic control, annual data collection for a period of three years, and reporting. All Agency efforts will be reimbursed by NTPEP. Please refer to the attached project work plan.

9. Impact on existing program if grant is not Accepted:

Accepting the role as a test deck state would not only provide our Agency with an opportunity to evaluate several different products on behalf of NTPEP in a uniform and consistent manner, but would address climatic conditions and a Vermont setting. For purposes of research design a typical Vermont location with little-to-no-site variation will be selected. The research will provide accurate direct comparison of products. In addition, participation in the study would also allow for professional development of staff members, and participation in a national program.

10. BUDGET INFORMATION

	SFY 1	SFY 2	SFY 3	Comments
Expenditures:	FY 2011	FY 2012	FY 2013	
Personal Services	$	$	$	
Operating Expenses	$	$	$	
Grants	$	$	$	
Total	$	$	$	
Revenues:				
State Funds:	$	$	$	
Cash	$	$	$	
In-Kind	$	$	$	
Federal Funds:	$	$	$	
(Direct Costs)	$	$	$	
(Statewide Indirect)	$	$	$	
(Departmental Indirect)	$	$	$	
Other Funds:	$	$	$	
Grant (source AASHTO)	$51,280	$9,360	$14,360	
Total	$51,280	$9,360	$14,360	$75,000

STATE OF VERMONT REQUEST FOR GRANT ACCEPTANCE (Form AA-1)

Appropriation No:		Amount:	$
			$
			$
			$
			$
			$
			$
		Total	$

PERSONAL SERVICE INFORMATION

11. Will monies from this grant be used to fund one or more Personal Service Contracts? ☐ Yes ☒ No
If "Yes", appointing authority must initial here to indicate intent to follow current competitive bidding process/policy.

Appointing Authority Name: Agreed by: _____ (initial)

12. Limited Service Position Information:	# Positions	Title
Total Positions		

12a. Equipment and space for these positions: ☐ Is presently available. ☐ Can be obtained with available funds.

13. AUTHORIZATION AGENCY/DEPARTMENT

I/we certify that no funds beyond basic application preparation and filing costs have been expended or committed in anticipation of Joint Fiscal Committee approval of this grant, unless previous notification was made on Form AA-1PN (if applicable):

Signature: Richard Pethaud Date: 7/13/10
Title: VTRANS' DIRECTOR OF PROGRAM DEVELOPMENT

Signature: David C Dill Date: 7/13/10
Title: Secretary

14. SECRETARY OF ADMINISTRATION

☑ Approved: (Secretary or designee signature) Date: 7/26/10

15. ACTION BY GOVERNOR

☑ Check One Box: Accepted (Governor's signature) Date: 7/28/10

☐ Rejected Date:

16. DOCUMENTATION REQUIRED

Required GRANT Documentation

☐ Request Memo	☐ Notice of Donation (if any)
☐ Dept. project approval (if applicable)	☐ Grant (Project) Timeline (if applicable)
☐ Notice of Award	☐ Request for Extension (if applicable)

STATE OF VERMONT REQUEST FOR GRANT ACCEPTANCE (Form AA-1)

☐ Grant Agreement ☐ Grant Budget	☐ Form AA-1PN attached (if applicable)
End Form AA-1	

American Association of State Highway and Transportation Officials (AASHTO)

National Transportation Product Evaluation Program (NTPEP)

Project Work Plan for Evaluation of Hot Mix Asphalt Crack Sealing and Filling Materials

Proposed Revision June 2009

Purpose:

The purpose of this work plan is to define the laboratory and field procedures used to evaluate crack sealing materials in rout and seal and clean and seal applications. The current evaluation procedures are for hot poured crack sealants. Additional types of crack sealant materials may be included in this evaluation process at a later date.

The laboratory procedures consist primarily of ASTM test procedures and the field evaluation procedures are based on procedures detailed in the Strategic Highway Research Program (SHRP): Materials and Procedures for Sealing and Filling Cracks in Asphalt-Surfaced Pavements- Manual of Practice.

The evaluation procedures are divided into the following sections:

a) Laboratory Evaluation Procedures
   - Standard Laboratory Conditions
   - Hot Poured Sealants

b) Field Evaluation Procedures
   - Site Selection and Required Quantities
   - Sealer Installation
   - Evaluation
     - Water Infiltration
     - Debris Retention
     - Spall
     - Tracking
     - Crack Movement
     - Photolog

c) Reporting of Results

Referenced Documents:

AASHTO T316-06: Viscosity Determination of Asphalt Binder Using Rotational Viscometer

ASTM D36-06 Test Method for Softening Point of Bitumen (Ring and Ball Apparatus)

ASTM D5167-03: Standard Practice for Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation

ASTM D5329-09: Standard Test Methods for Sealants and Fillers, Hot Applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements ASTM D1985-03: Standard Practice for Preparing Concrete Blocks for Testing Sealants, for Joints and Cracks

ASTM D 6690-07: Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

ASTM E-171-94: Standard Specification for Standard Atmospheres for Conditioning and Testing Flexible Barrier Materials

FHWA-RD-99-147: Materials and Procedures for Sealing and Filling Cracks in Asphalt-Surfaced Pavements- Manual of Practice

Laboratory Evaluation Procedures:

Standard Laboratory Conditions

Standard laboratory conditions are defined as a temperature of 23 ± 2°C (73.4°± 3.6°F) and a relative humidity of 50 ± 5%.

Hot Pour Sealants

The manufacturer shall supply two 11.4 kg (25 pound) blocks of sealant material from the same lot or batch of material used for the field evaluation. One of the 11.4 kg (25 pound) blocks will be used to conduct the laboratory evaluation and the second 11.4 kg (25 pound) block of material will be retained for 1 month after the manufacturer has been notified of the laboratory evaluation results for potential verification testing. No product name changes are allowed during the course of the evaluation. The laboratory evaluation will consist of testing two samples using the following procedures. The laboratory results that are reported will be the average of the individual tests at each heating condition. The report forms for the hot pour sealants are provided in Table 1 of the Report section.

1. Sample Preparation

The crack sealant samples shall be prepared in accordance with ASTM D 5167-03 using a sample size of approximately 2,200 grams (4.9 pounds). If the capacity of the sealant melter will not accommodate a 2,200 g sample, the sample will be split into two 1,100-gram samples and will be melted on both sides of the melter at the same time. The test specimens will be prepared by heating sealant to the manufacturer's maximum heating temperature after which the initial set of test specimens for bond to concrete, softening point, resilience, asphalt compatibility, fingerprinting and penetration will be prepared. The sealant material remaining in the melter will be kept at the manufacturer's maximum heating temperature for 6 hours ±15 minutes, after which a second set of test specimens for bond to concrete, softening point, resilience, asphalt compatibility, fingerprinting and penetration will be prepared.

2. Sealant Laboratory Testing

The sealant shall be evaluated in accordance with ASTM D 6690-06a and the methods described

in the following paragraphs.

A. Bond to Concrete
Three non-immersed bond specimens will be prepared and tested in accordance with ASTM D5329-04, Section 9 and ASTM D 6690-06a Table 1. The blocks will be prepared in accordance with ASTM D 1985. Only Type III sealant as defined by D6690-06a shall be tested for water –immersed bond. Three additional bond specimens will be conditioned and tested per ASTM 6690-06a Section 7.5 for the water-immersed bond testing. The result of each extension cycle for each specimen will be reported as the amount of adhesion and/or cohesion failure in square centimeters (square inches).

B. Resilience - The resilience specimens will be prepared and in accordance with ASTM D5329-04, Section 12 and tested at 25°C (77°F). The resilience results will be reported as the percent recovery.

C. Cone Penetration - Two penetration specimens will be prepared in accordance with ASTM D5329-04, Section 6. One penetration specimen will be tested in accordance with ASTM D5329-04, Section 6. The second specimen will be tested in accordance with ASTM D5329-04, Section 6 with the following exceptions; the specimen will be allowed to cool to standard laboratory conditions for 17 ± 2 hours, the specimen will then be placed in a freezer at -18°C ± 1°C (0°F ± 2°F) for 4 hours ±15 minutes prior to testing. One hour before testing, the penetrometer cone attachment will also be placed in the freezer at -18°C ±1°C (0°F ±2°F). At the end of the 4-hour specimen-conditioning period, remove the test specimen and cone from the freezer, place the cone in the penetrometer and immediately conduct the test. After making the measurement, clean the cone attachment and place the specimen and cone back in the freezer for 10 ± 2 minutes before making two successive measurements for a total of three measurements. The penetration results will be averaged and the average value reported.

D. Asphalt Compatibility- The HMA and crack sealer specimens shall be prepared in accordance with ASTM 5329-04 Section 14.

E. Rotational Viscosity- Crack sealer specimens shall be prepared in accordance with AASHTO T-316-04. The viscosity shall be measured at the manufacturer's maximum heating temperature and reading shall be taken at 30 seconds and at 60RPM.

F. Fingerprinting- A reference infrared spectrum shall be obtained from a representative sample using an Attenuated Total Reflectance (ATR) attachment. This reference spectrum shall be used for future comparison to verify no change in formulation has been made.

G. **Softening Point-** Ring and Ball Softening Point determination will be conducted according to ASTM D36.

Field Evaluation Procedures

Site Selection and Quantities

The member department will select a field evaluation site consisting of at least 500 feet of pavement for each sealant material evaluated. All transverse and longitudinal sealed cracks or joints will be evaluated. The application may be rout and seal or clean and seal. Site selection criteria should include pavement age, roadway history and crack spacing. Efforts will be made to host test sites in various climatic regions of the United States.

Sealant Installation

The manufacturer will supply all materials for the evaluation of their product. The manufacturer and the test state will mutually agree upon the equipment and labor required to prepare the cracks and install the crack sealant material. The manufacturers will either supply all labor and equipment required or the test state will provide a single contractor for all manufacturers at the manufacturers' expense. Traffic control, installation scheduling, and installation location will be provided by the test state. The manufacturer should have a technical representative present at the installation of the sealant to certify that the material is installed in accordance with their recommended procedures. If the representative believes that the installation is not in accordance with the recommended procedures, they will inform the designated representative of the member department of this fact in writing within one week of the installation of the material. If this occurs, the member department may eliminate that manufacturer's installation from further evaluation without a refund of fees. If no letter is received within this first week, the installation will be accepted and included in the field evaluation.

Before installation, GPS or Reference Point stationing of test sections shall be documented. For ease of conducting the field installation, the 500' test section may be separated into smaller subsections. A pavement condition survey and detailed sketching of the cracks including crack spacing shall be done. The average crack spacing along with standard deviation for each test section shall be reported. Three transverse cracks and three longitudinal cracks will be pinned with PK nails on each side of the cracks. These pins shall be used to monitor crack movement during the course of the evaluation.

During the installation, a drawing will be prepared to show the location of each sealant, provide the slope of the pavement, the crack spacing and the crack width. The average daily traffic and the closest Strategic Highway Research Program (SHRP) weather data station will also be reported. The manufacturer will supply with the application for evaluation the recommended shape factor if routing is done and performance characteristics such as the amount of crack movement the sealant is capable of withstanding or the sealant working range, the maximum and minimum crack width for satisfactory performance of the sealant, the recommended crack preparation and sealant installation procedures, and when the area can be reopened to traffic. These conditions will apply if they do not conflict with the agency's construction practices.

The crack preparation and sealant installation techniques used during the installation will be recorded. Any deviation from the manufacturer's recommendations will be noted. Additionally, the manufacturer's representative will be allowed to provide comments on the crack preparation and sealant installation. If the manufacturer's representative does provide such comments, they will be included with the installation report. The weather conditions during the installation will also be recorded.

Field Evaluation Observations

Water Infiltration

Water infiltration will be measured as the percentage of the overall crack length where water can bypass the sealant and enter the crack either through complete adhesion or cohesion failure. Adhesion and cohesion failures will be determined through the visual inspection method. All cracks in the driving lane shall be inspected to determine the percent allowing water infiltration. Any visual cracks, splits or openings in the sealant or between the sealant and asphalt shall be examined to determine the depth of the opening. Instruments such as a dull knife or a thin blade spatula may be used to assist in the evaluation.

The percentage of cracks that allow water infiltration will be determined by the equation:

$$\%L = (L_f / L_{tot}) * 100$$

where:

%L = Percent length of the crack allowing water infiltration
L_f = Total length of the crack sealant field evaluation section allowing the Infiltration of water (inches)
L_{tot} = Total length of the crack sealant field evaluation section (inches)

Debris or Stone Retention

Stone or debris retention will be rated as follows:

No Debris Retention: No stones or debris are stuck to the top of the sealant or embedded on the surface of the sealant/ HMA interface.
Low Severity: Occasional stones and/or debris are stuck to the top of the sealant, or debris embedded on the surface of the sealant/HMA interface.
Medium Severity: Stones or debris are stuck to the sealant and some debris is deeply embedded in the sealant or material embedded between the sealant and the crack face but not entering the crack below the sealant.
High Severity: A large amount of stones and debris are stuck to and deeply embedded in the

sealant or filling the crack, or a considerable amount of debris is embedded between the sealant and the crack face and entering the crack below the sealant.

Spalling

Spalling is the length of any cracking, breaking, chipping or fraying of crack edges. The length and severity of spalling shall be measured along each crack.

Crack Movement

Longitudinal and transverse crack movements shall be measured by installing pins or PK nails on both sides of three transverse and longitudinal cracks. A drill should be used to make a pilot hole for the installation of the pins. Pins shall be place far enough away from the cracks so as not to cause further deterioration in the pin installation process. At each evaluation, crack movement shall be measured as the distance between the pins measured by a caliper minus the spacing between the pins at installation.

Vertical movements at the cracks or routs shall be measured by the Georgia Faultmeter or a straightedge, wedge and caliper.

Both joint movement measurements shall be an average of three measurements per crack.

Crack Spacing

The average crack spacing along with the spacing standard deviation shall be reported. This information is acquired from the crack map done prior to installation of products.

Photo Log

Photographs of the cracks shall be taken and included in the report.

Tracking

Tracking of sealant by traffic will be measured as linear distance in inches that the sealant tracks from the sealed crack in the direction of traffic. The distance of tracking and photographs may be used to determine levels of severity.

Additional information such as the pavement condition, environmental conditions, and traffic conditions will also be recorded. Specific items that are to be recorded are provided in Table 2 in the Report section.

Quality Control/Quality Assurance

To ensure accuracy and precision in lab testing and field evaluation data collection, the following controls have been instituted in this work plan.

Lab Testing-

The testing lab shall have AMRL or other NTPEP approved laboratory accreditation. All equipment is to be calibrated, verified or checked according to the lab quality system manual and ASTM, AASHTO or lab test methods. The testing lab shall have applicable standards available to technicians testing sealants for the NTPEP program and shall verify that the correct versions of applicable standards are being used per the appropriate NTPEP Crack Sealant or Joint Sealant work plan.

Technicians conducting sealant testing shall undergo a training program on methods, procedures and practices detailed in this work plan. Training shall be conducted by a technician with a minimum of a Bachelors of Science degree and five years of sealant testing experience. Proficiency of technicians shall be determined using ASTM or DOT sponsored Round robin testing program. Training records shall be documented per the lab QSM.

Sealant samples shall be tested according to referenced standards. Replicate tests shall all fall within limits established by the standards precision and bias statement (P&B). If a test fails to meet the P&B, the test will be repeated until the P&B is met.

Field Evaluation-

The field evaluation shall be conducted according to the NTPEP Crack and Joint Sealant Field Evaluation Standard Operating Procedure and this work plan. The field evaluation team shall consist of state DOT and/or consultants. To insure quality of field measurements the same evaluation team shall take reading at all test sites. When this is not possible, the evaluation team shall conduct a two day training program for new field evaluators.

The average of percent adhesion failure for the test site shall be tracked for field evaluators. One evaluator shall measure even numbered cracks or joints in a test section while the second evaluator measures the odd numbered cracks or joints. The coefficient of variation (COV) between the evaluators shall be $< 15\%$. If the COV is greater than 15%, an investigation shall be made to determine causes for this difference. When questions related to how to evaluate sealant distresses occur, the field evaluation team shall meet and come to consensus. This will allow the evaluators to remain consistent in evaluation techniques.

Reporting-

Before creating evaluation reports or uploading data to Data Mine, a review of report or data shall take place by the Report Review Team consisting of technical committee members and

field evaluators. Timing for review of reports by vendors and NTPEP can be viewed in the Time Line seen below.

NTPEP Project Timeline

1. Submittal package shall be posted on the NTPEP webpage 3 months before installation of products. The host state DOT will set date of installation.
2. Prior to installation a manufacturer may withdraw product(s) if a written notification is received by the NTPEP Manager 5 days prior to installation of products. A 10% handling fee will be applied.
3. After installation of products, a manufacturer may withdraw product(s) 1 week after installation- if the manufacturer's technical representative details in writing that the installation wasn't done according to the manufacturer's recommendations. No refund of fees.
4. 90 days after installation- completion of laboratory tests and start of industry review
5. 120 days after installation- deadline of industry review and comments
6. First report due 90 days after yearly field evaluations. Report includes lab data and 1st year field report
7. Second Report due 90 days after yearly field evaluations- First year report plus second year field data
8. Final Report due 90 days after final field evaluation

Reporting of Results:

The results of the sealant evaluations will consist of the appropriate laboratory evaluation form and the field evaluation form.

Table l. Hot Pour Sealant Laboratory Evaluation.

Joint Sealant Test	Test Cycle	Results from Initial Heating	Results from 2nd Heating
Bond To Concrete, -29°C (-20°F), 3 cycles, 200% Extension, non-immersed	1		
	2		
	3		
Bond To Concrete, -29°C (-20°F), 3 cycles, 50% Extension, non-immersed	1		
	2		
	3		
Bond To Concrete, -29°C (-20°F), 3 cycles, 50% Extension, water-immersed	1		
	2		
	3		
Bond To Concrete, -18°C (0°F), 5 cycles, 50% Extension, non-immersed	1		
	2		
	3		
	4		
	5		
Softening Point, °C (°F)			
Resilience, % Recovery			
Penetration @ 25°C (77°F)			
Penetration @ -18°C (0°F)			
Asphalt Compatibility			
Rotational Viscosity , Pa.S			

Table 2: Field Evaluation Form

Test Section ID	NTPEP #	Company
Installation Date	**Technical Contact**	**Product Lot #**
Average Crack Spacing	**Crack Spacing Standard Deviation**	
Application Conditions	**Comments**	

Transverse Crack Sealant Failure				Debris Retention (Severity)	Tracking (inch)	Crack Movement (inches)	
Date of Test	% Adhesion Failure	% Cohesion Failure	% Total Seal Failure			vertical	horizontal

Longitudinal Crack Seal Failure				Debris Retention (Severity)	Tracking (inch)	Crack Movement (inches)	
Date of Test	% Adhesion Failure	% Cohesion Failure	% Total Seal Failure			vertical	horizontal

Table 3: Crack Sealant Field Evaluation Worksheet - 0-100' Test Sub-Section

NTPEP #:_____

Test Section:_____

Crack ID:_____

Longitudinal ID-L

Transverse ID-T

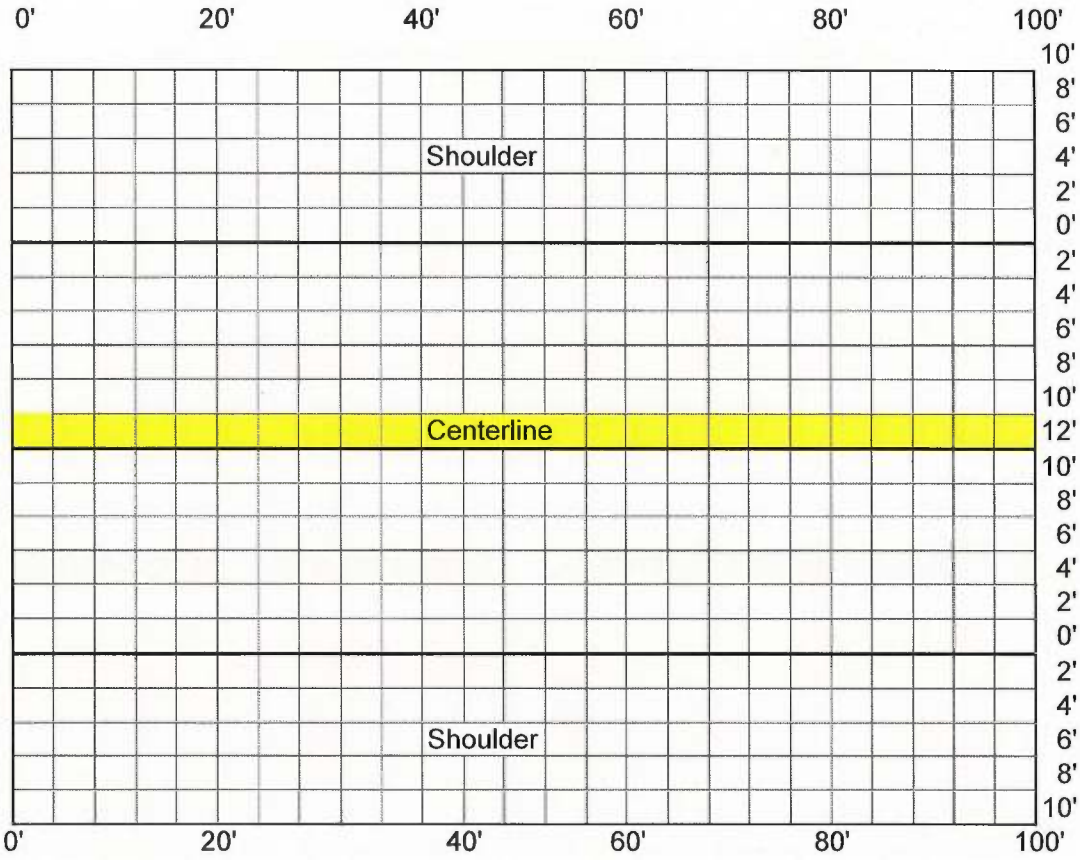
Location:_____

Ref. Point:_____

Date:_____

Evaluator:_____

Notes:



Comments:_____

Table 4: Crack Sealant Field Evaluation Worksheet - 100'-200' Test Sub-Section

NTPEP #:_____

Test Section:_____

Crack ID:_____

Longitudinal ID-L

Transverse ID-T

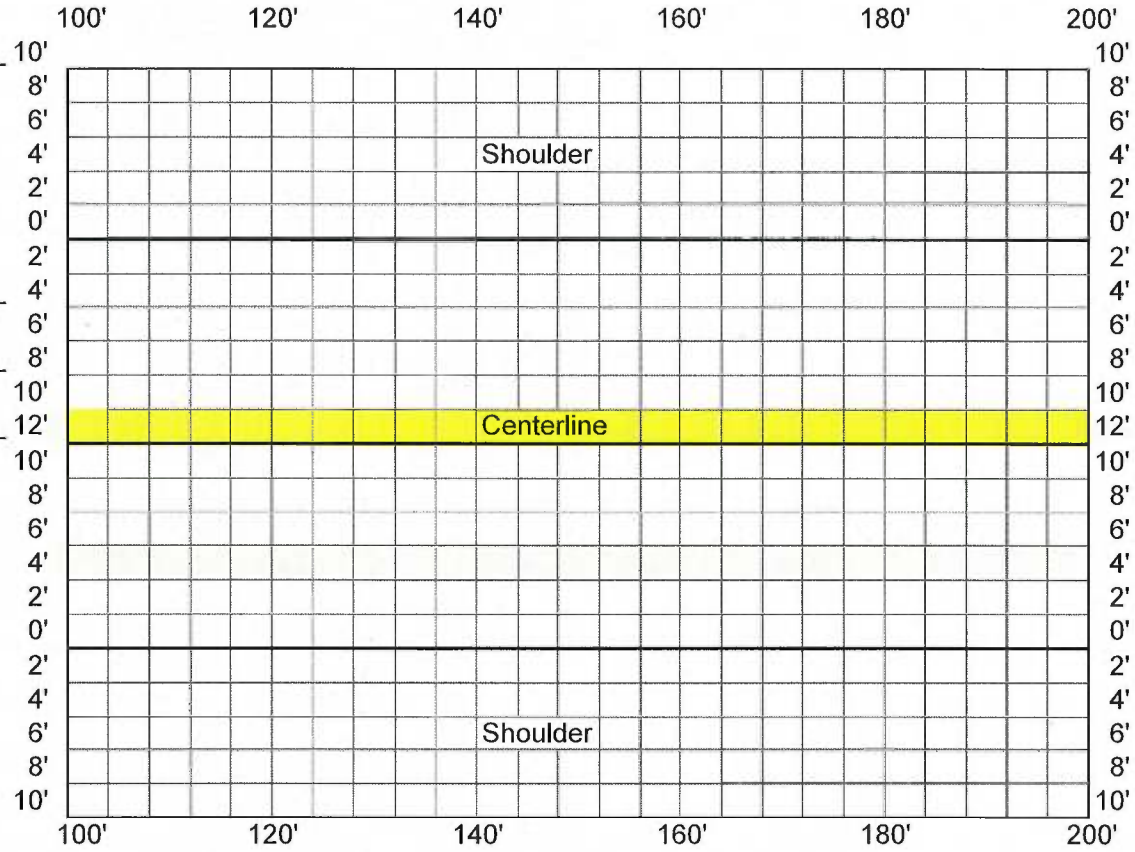
Location:_____

Ref. Point:_____

Date:_____

Evaluator:_____

Notes:



Comments:_____

Table 5: Crack Sealant Field Evaluation Worksheet - 200'-300' Test Sub-Section

NTPEP #:_____

Test Section:_____

Crack ID:_____

Longitudinal ID-L

Transverse ID-T

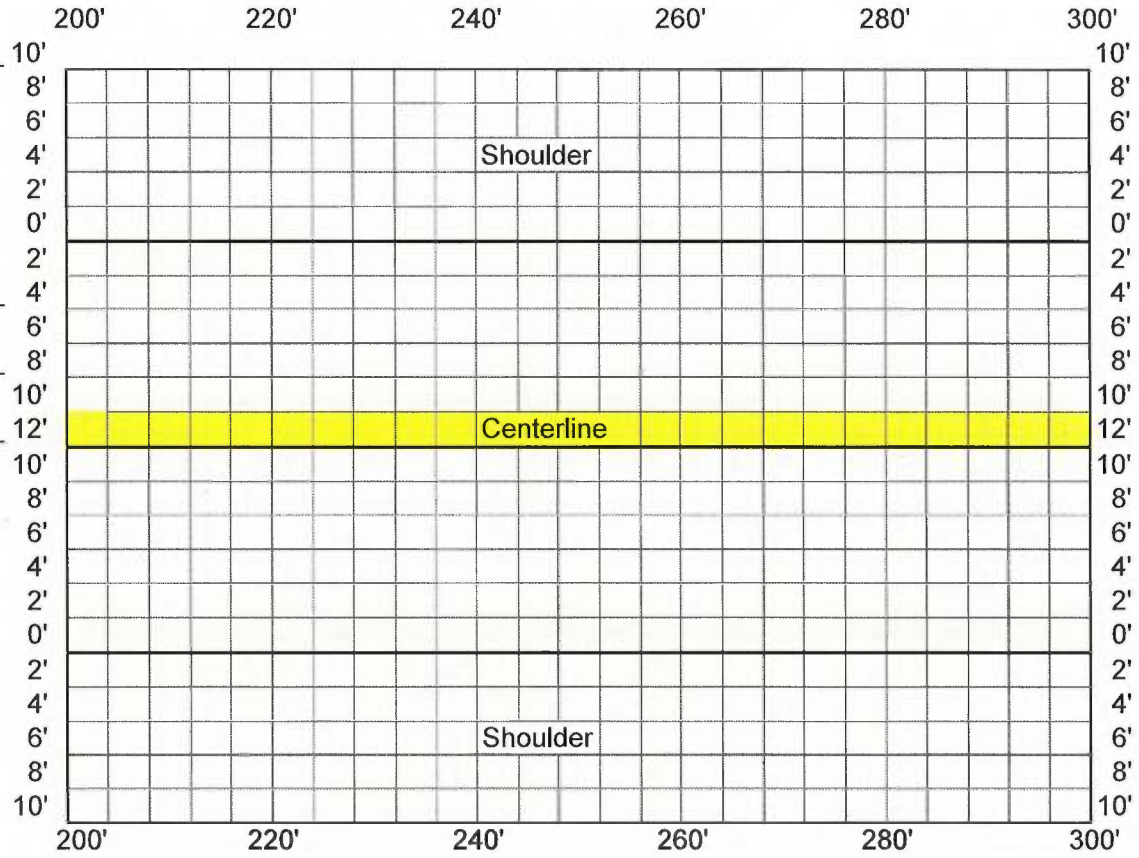
Location:_____

Ref. Point:_____

Date:_____

Evaluator:_____

Notes:



Comments:_____

Table 6: Crack Sealant Field Evaluation Worksheet - 300'-400' Test Sub-Section

NTPEP #:_____

Test Section:_____

Crack ID:_____

Longitudinal ID-L

Transverse ID-T

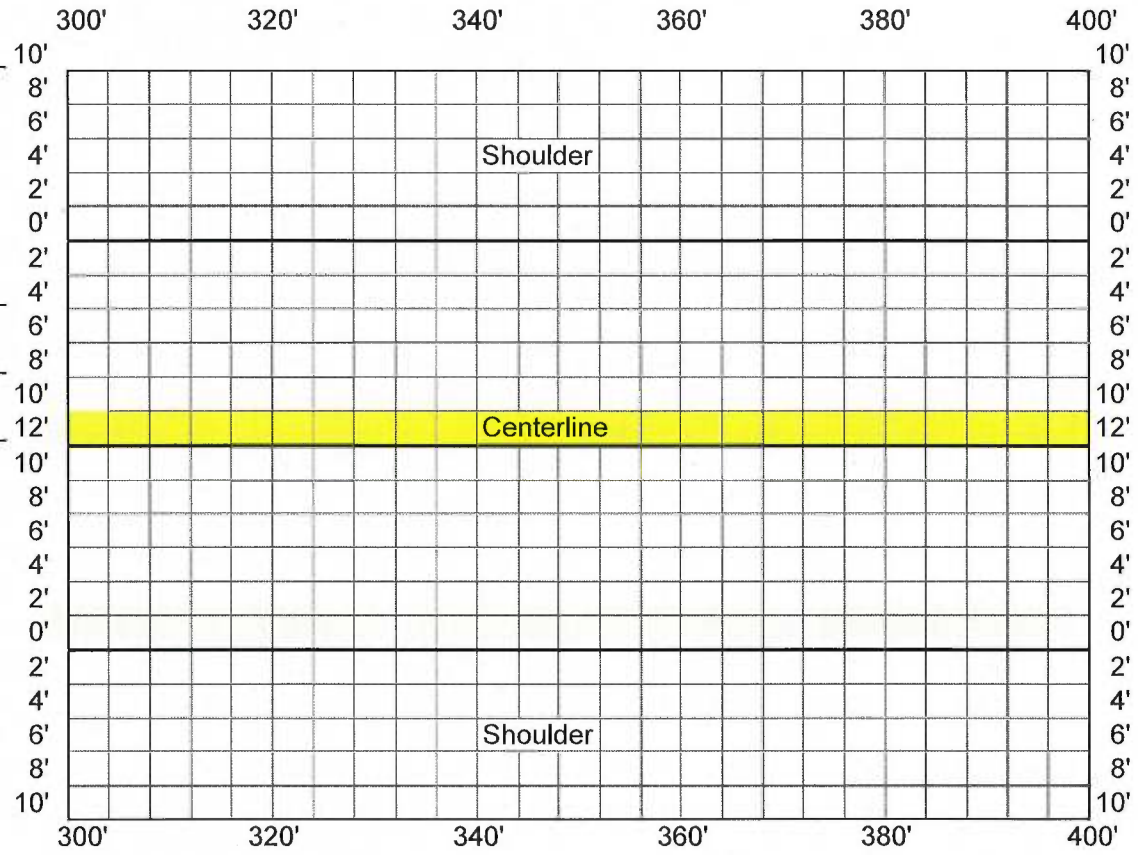
Location:_____

Ref. Point:_____

Date:_____

Evaluator:_____

Notes:



Comments:_____

Table 7: Crack Sealant Field Evaluation Worksheet - 400'-500' Test Sub-Section

NTPEP #:_____

Test Section:_____

Crack ID:_____

Longitudinal ID-L

Transverse ID-T

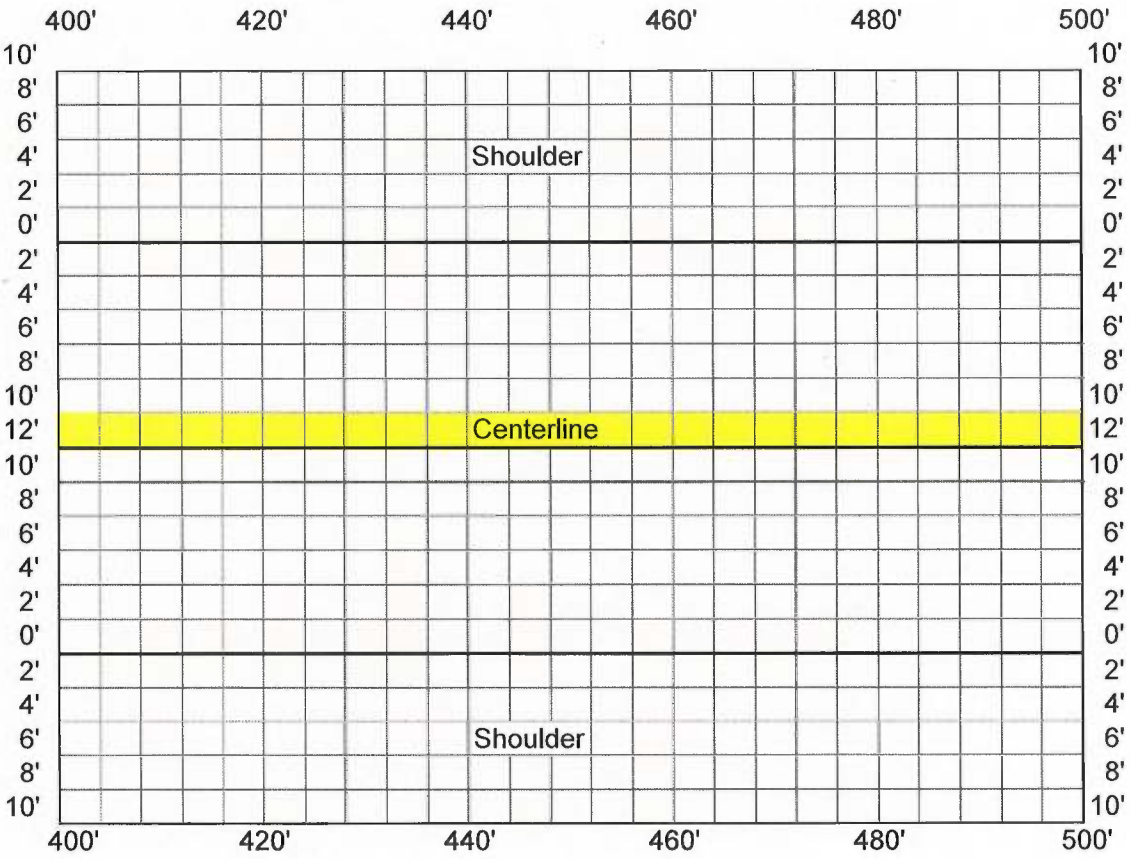
Location:_____

Ref. Point:_____

Date:_____

Evaluator:_____

Notes:



Comments:_____

		Staff Time[2][3] Hours	Cost ($)	Cost with Overhead
Pre-Installation	**Site Selection and Admin**	24	600	1080
	Crack Mapping, GPS, Nails	48	1200	2160
	Traffic Control (days)[1]	1	1000	1800
Installation		48	1200	2160
	Traffic Control (days)	2	2000	3600
Annual Measurements	**Winter, Year 1**	48	1200	2160
	Traffic Control (days)	2	2000	3600
	Winter, Year 2	48	1200	2160
	Traffic Control (days)	2	2000	3600
	Winter, Year 3	48	1200	2160
	Traffic Control (days)	2	2000	3600
Data Analysis & Reporting	**Year 1 Report**	80	2000	3600
	Year 2 Report	80	2000	3600
	Year 3 Report	80	2000	3600
Miscellaneous Equipment & Supplies				1120
Conferences & Travel[4]				5000
	Total Cost		$21,600	$45,000
	Total Labor		504	hours
	Total Traffic		9	days

[1]Traffic Control at $1000 per day

[2]Labor at $25 per hour

[3]Overhead charged at a rate of 80%

[4] To pay for travel and attendance at annual NTPEP Conference to report results from study