



CONSTRUCTION LEADERS

LETTER OF TRANSMITTAL	
DATE: <b>August 6, 2015</b>	PCL JOB NO: <b>5515002</b>
ATTN: <b>Chris Barker</b>	TRANSMITTAL NO: <b>087</b>

To: **State of Vermont Agency of Transportation**  
 One National Life Drive  
 Montpelier, VT 05633-5001  
 (802) 828-0053

Re: Hartford Lateral Slide  
 Project No.: IM 091-2(79)  
 Contract ID.: 12A132

County: Windsor

PCL FILE NO: 5515002-054

WE ARE SENDING  Attached  Under separate cover via   **Email & SP**   the following:  
 Shop drawings  Prints  Plans  Samples  Specifications  
 Copy of Letter  Change Order  Other

COPIES	SPEC.	REVISION	DESCRIPTION
<b>1</b>	<b>490.03</b>		<b>Asphalt Quality Control Plan</b>

TRANSMITTED for as checked below:

For approval  Approved as submitted  Resubmit  Copies for approval  
 For your use  Approved as noted  Submit  Copies for distribution  
 As requested  Returned for corrections  Return  Corrected prints  
 For review and comment

**Remarks:**

Please return an email of this approved submittal to Erich Heymann ([ewheymann@pcl.com](mailto:ewheymann@pcl.com)) and Jeremy Mackling ([jmackling@pcl.com](mailto:jmackling@pcl.com)).

We request the review and return of this submittal within **5 days**. Please advise if this request cannot be met so we can plan accordingly.

---

By: **Erich Heymann**, Project Engineer

COPY TO: Project Files



**CONSTRUCTION LEADERS**

**SUBMITTAL NO. : 54**  
**Asphalt Quality Control Plan**

<b>Item No.</b>	<b>Specification</b>	<b>Description</b>
1	490.03	Asphalt Quality Control Plan

***PROJECT:***  
**HARTFORD LATERAL SLIDE**  
**PROJECT NO.: IM 091-2(79)**  
**CONTRACT ID.: 12A132**

***OWNER:***  
**STATE OF VERMONT AGENCY OF TRANSPORTATION**

***ENGINEER OF RECORD:***  
**STATE OF VERMONT AGENCY OF TRANSPORTATION**

***CONTRACTOR:***  
**PCL CIVIL CONSTRUCTORS, INC.**

**AUGUST 6, 2015**

**Pike Industries Inc  
Quality Control Plan**

For

Hartford

Vermont Agency of Transportation Contract Number  
IM 091-2(79)

Supply of Hot Mix Asphalt  
490.30

Type IIS & IVS 80gyr

From

PII Plant: P720

W. Lebanon, NH

Submitted by: Brian Hricay

08/06/15

Pike Industries Inc

Date

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## **Applicable Specifications**

The relevant specifications for all Hot Mix Asphalt activities are as indicated below:

### Standard Specifications

This QC Plan applies to all production by the following sections of 2011 Vermont Highway Standard Specifications.

Section 106.03s & 490: Hot Mix Asphalt Pavement  
Section 702.02 Performance Grade Binder  
Section 704.10 Aggregate for Bituminous Concrete Pavement  
General and Special Provisions for this project

## **Quality Control Organization**

### **QC Plan Administrator (Contractor QC Manager)**

The QC Plan Administrator is Mr. Brian Hricay employed by Pike Industries Inc. He is certified by the NETTCP as a Quality Assurance Technologist (cert. #342) and can be contacted as follows:

Office Phone: (802) 661-3082

Cell Phone: (802) 316-9621

The QC Plan Administrator has responsibility and authority for the following items:

- . Preparation and submittal of this QC Plan for VAOT approval
- . Ensure that all requirements outlined in QC plan are met
- . Managing and communicating with all QC personnel performing QC inspection, sampling, and testing at the Plant and on site field operations.
- . Insuring producers have required certifications and laboratories.
- . Review and submittal of proper Quality Control documentation and records

. Initiate work suspension and appropriate corrective action when testing or inspection identifies nonconforming materials or construction.

Mary Wescott may be submitted as the Plan Administrator upon notification to the Engineer.

### **Production Quality Control Personnel**

The production Quality Control personnel by Pike Industries Inc. will be responsible for all lab duties and to perform quality control as needed to assure the quality of material being produced is met. Personnel assigned to perform QC sampling, testing, and inspection of hot mix asphalt materials are identified in the table below.

QC Position	Name & Company	NETTCP Cert. #'s
QC Manager	Mary Wescott, Pike Industries Inc	355
QC Technician	Dana Dickson	197
QC Technician	Doug MacDougall*	603
QC Technician	Jeff Greer	367m

Note: \* indicates plant personal at plant

QC personnel have the responsibility and authority for the following items:

- Implementing the QC requirements contained in this QC Plan including sampling of materials, testing of materials, Preparing and submitting of standard test reports for each test completed.
- If materials and operations that fall out of JMF action or suspension limits changes will be made to insure the product is acceptable.
- Identify or Suspend production of HMA materials that appear unacceptable or not in compliance with current specifications upon notification of the QC Manager and Agency Personnel.

### **Quality Control Laboratories**

The laboratory to be used on this project will be located in W. Lebanon, NH (P720) owned by Pike Industries Inc and inspected by VAOT prior to the commencing of production for the above project. Refer to JMF for this

project and Materials control section below and attached appendix C (testlist) appendix D (Laboratory Equipment List).

## **MATERIALS CONTROL**

The types, sources, properties and procedures for storing of materials to be used for HMA category are as indicated below.

### **Material Types and Sources of Supply**

- ¾", ½"3/8" crushed stone-W. Lebanon Crushed Stone (Pike Industries Inc), W. Lebanon, NH.
- Washed Stone Screenings-W. Lebanon Crushed Stone (Pike Industries Inc), W. Lebanon, NH.
- Natural Sand- W. Lebanon Crushed Stone (Pike Industries Inc), W. Lebanon, NH.
- RAP (Recycled Asphalt Pavement) - Pike Industries Inc, W. Lebanon, NH.
- PG Asphalt Binder – Reference the approved mixed design.
- Bag house fines produce by plant and can be controlled with a meter.
- Anti-strip N/A

### **Material Properties and Mix Designs**

The materials and Job Mix Formulas were designed in Pike Industries Inc lab located in W. Lebanon, NH and it was done according the AASHTO M-323. Superpave Volumetric Mix Design SP15-754WMA type IIS, and SP15-752WMA type IVS with 20% RAP and using 58-28 from Pike or other sources that are approved by VAOT.

### **Processing of Existing Materials**

The binder content and gradation of the RAP will be determined on a daily basis and additionally during construction of the stockpile in accordance with ASSHTO T-164, or T-308an effort will be made to have sufficient quantity to do the entire job. The binder content of the RAP will be determined daily in accordance with ASSHTO T-164, or T-308. In addition, the RAP binder content may be determined as the RAP stockpile is

constructed. The binder content may be adjusted based on the daily test. RAP feed percentages may be adjusted based on daily test. While producing this mix if the PCT finds that the RAP is affecting the quality of mix. The feed percentages may be reduced but cannot be adjusted no more than 5% of JMF.

Prior to offloading PGB for the above referenced job slips will be checked for proper grade and stored in a designated storage tank at required temperatures.

Bag house fines are self contained in plant during production and they are introduced through a mechanical meter. The meter has an adjustable range of 0-60hz. The amount of baghouse fines being returned into the mix will be regulated so that when combined with the other mineral aggregates, the desired JMF is achieved.

### **Material Storage and Stockpiling**

Care shall be taken to maintain consistent stockpile uniformity. Stockpiles shall be kept in a neat and orderly manner. Stockpiles will be separated by distance so as not to allow contamination. Aggregate stockpiles will be sampled and grain size analysis performed at least once a day. In addition to daily required testing Samples may be obtained when the stockpile is constructed. As the stockpile is being built should two consecutive samples be more than 10% off of the mean hauling will be stopped until the material is brought back into tolerance. Samples will be obtained in accordance with AASHTO T-2. Thin and Elongated particles and percent fractured faces of particles retained on the 4.75 mm sieve will be determined during these tests, or if done separately, at least once each day of production. The process control technician will be required to remove any and all materials that contaminate a stockpile. Specific Gravities will be performed on the stockpiled materials at the rate of 1 per week, or every 5000 tons of material used which ever is greater, and when mix test results indicate a zero or negative absorption. Additionally aggregate specific gravities maybe performed as the stockpile is being constructed at the rate of one test per 5000 tons for informational purposes and to determine the variability in the pile.

## **Silo Storage**

Silos utilizing truck scaled load out system.

HMA material may be placed in an empty storage silo(s) for a period not to exceed 24 hours from the time of mixing for the first material placed in the silo. The upper and lower gates when closed shall create an airtight seal. The silo shall be filled to capacity before changing silos. When multiple silos are used for VTrans asphalt material will be discharged from the silos in the same order that the material was stored in the silos if possible.

Twenty-four (24) hour storage will not be allowed if there is any reason to believe there is a problem with the gate seals or excessive heat loss. Prior to shipping HMA out of the silos that have been stored for overnight or longer than fifteen (15) hours the initial two to four tons will be inspected for temperature loss and visually inspected for drain down. If in the opinion of the Process Control Technician the material is deemed suitable the loading of HMA will commence. If the HMA is deemed unsuitable the material will be rejected and another inspection will be performed until the material is deemed acceptable. The material that has been stored overnight or in excess of 15 hours shall be identified by load with confirmation of identity to the paving operation and the RE. Only mixed that has been weighed over the truck scales and transported to the VTrans project will be billed to the VTrans.

When an emergency or faulty weather arises, the engineer may grant additional storage for up to 48

The following items shall be adhered to when introducing overnight storage:

1. The hot oil pump will be ON.
2. The temperature setting in the silo will be set at an approximate minimum 20 - 25°F above temperature of material being stored but not higher than 15F below the binder manufacturer's maximum recommended temperature.
3. The top gate will be closed properly.
4. The silo will be filled to capacity
5. The oil seal switch in the STORE position

# **Quality Control Sampling and Testing**

## **Lot and Sublot Sizes**

Sampling will be performed through stratified random sampling. A lot shall consist of a day's production of approved mix design. Lots will be broken down into 500 ton sublots.

## **Random Sampling Plan**

Random sample points will be selected for each sublot by using random number tables and procedures contained in ASTM D3665 or an electronic random number generator. Random numbers will be supplied to the Agency at their request. The numbers will be recorded on standard forms and placed into project records and shared with Agency inspectors at the beginning of each day. The contractor reserves the option of taking additional tests should he deem necessary for process control.

## **Sample Identification System**

QC tests will be numbered sequentially and begin with a Mix-1 (ex IV-3 type 4 test3) designation. Process control tests will also be numbered sequentially and begin with a PC-1 designation. All test data, partial or complete will be recorded in the database provided by VAOT.

## **QC Sampling and Testing Requirements**

1. Sampling of Stockpiles
  - a. Gradation of stockpiles, and Thin and Elongated % fractured faces(dry sieve only) Once per day
  - b. Moisture Content(s) Twice per day
  - c. Aggregate specific gravities. Initially and once per week or every 5000 tons of HMA, whichever is greater.
  - d. Rap Binder content. Once per day

2. Sampling of HMA
  - a. Once every 500 tons to determine volumetric properties, binder content and gradation.
  - b. Additional test will be performed when necessary. They will be called “Process Control Checks”.
  - c. Test results will be compared to action and suspension limits found in Appendix A.
  
3. Temperature Recordation
  - a. Mix temperature at plant– every 250 tons.

Test methods used can be located in Appendix C (Test Method)

### **QC Test Result Reporting**

QC sampling and testing of materials will be documented on the Agency software program. All QC tests will be recorded complete and made available to the resident engineer and the plan administrator. All QC data will be provided to the Agency utilizing software provided by the Agency. The data will be provided to the Agency at the completion of the project, end of the production season, upon request or whichever occurs first. The report will show the project name and number, item designation, date, time and ticket number and designated test number. The report will include slip ac, extracted ac, gradation, and volumetric properties. All testing will be performed utilizing calibrated / verified testing equipment in accordance with VAOT specifications. Records of the equipment calibrations / verifications will be on file at the plant laboratory, and are available for review upon request.

QC sampling of PG Binder will be sampled by Pike in conjunction with Agency Acceptance sampling of binder. Samples will be labeled and stored at Pike facility and held until Agency results are available. If results meet specifications, samples will be stored for later use and if results do not meet specifications, we will send out to our lab to verify test results.

#### **Warm Mix Asphalt:**

Under the additional special provision warm mix asphalt is allowed under contract item 490.30.

We will be using the Terex Foaming system. It is run by a PLC Control System which is located in the plant automation. From this automation we can control the rate of water going into the asphalt which is displayed on the screen and recorded on the demand report. The water will introduce into the asphalt at a rate between 1-2 percent this can vary depending of field performance. The mixing and compacting temperatures are stated on approved mix design. The first few loads at the beginning of each day may have an increased temperature of traditional temperatures to facilitate the heating of equipment and also to ensure correct compaction temps out in the field.

In the event the foaming system is not working or if there are any issues with the warm mix asphalt we will request to start a new lot and go to traditional HMA. We will produce this mix until WMA system is working but will not go back on WMA until we have produce enough mix to close out the current HMA lot.

## **Production Facility Management**

The activities and procedures to be followed for quality control production of Hot Mix Asphalt materials are as indicated below.

### **Schedule of Production Operations**

Pike Industries Inc will provide the VAOT Bituminous Concrete Field Unit Supervisor and the Resident Engineer with a reasonably achievable schedule no later than 2 days before any anticipated production of HMA. The schedule will identify the estimated production, quantity, material type and anticipated start time. Tentative schedules will be provided weekly on Thursday's and confirmation on Friday's to reasonably project the following week's schedule. In addition all efforts will be made to Keep Agency personnel apprised of any changes in schedule.

### **Production Facilities & Equipment**

Pike Industries plants P-720 will produce the hot mix or mixes for the project. Plant 720 is located in West Lebanon NH. This plant will be approved by the Vermont Agency of Transportation and will meet the requirements for bituminous hot mix plants as contained in AASHTO M 156.

The Cedar Rapids Drum is capable of running up to 400 tons/hr and run two types of RAP simultaneously. The automation that is used to run the plant is a Cedar Rapids system. In the future warm mix Asphalt foaming system with bag house dust return system may be added.

The plant has eight cold bins and 4-200 ton silos capable of overnight storage

There are two laboratories that can be used on this project and located at p-720 and inspected by VAOT prior to the commencing of production for the above project

### **Pre-Production QC Activities**

The asphalt plant Operator(s) will inspect the plant prior to each production day to insure that it is in proper working order including the Terex Foaming System for warm mix, and meets the required specifications.

- Gradation on stockpiles that will be used in approved JMF.
- Run aggregate moistures (drum plant only)
- Run RAP moisture
- Determine, record and share with Agency inspector random numbers and sample points for the production day
- Verify production schedule and anticipated production totals for determination of lots and sublots with Agency inspector.
- Verify Job Mix Formula, mix type, materials to ensure proper storage and quantity, verify mixing/compaction temperatures.
- Turn on any equipment and inspect for proper operation.
- Perform any calibration and/or verification of lab equipment.

### **Production QC Activities**

The asphalt plant operator will also make periodic inspections during production, and have the authority to halt production if equipment failure renders the plant incapable of producing satisfactory mix, or if unsafe conditions exist at the plant site.

Temperature at the start of production and after a long shutdown period (45minutes or longer) shall be checked on the first couple of trucks after startup. The temperature of the mix in the truck shall be uniform and adequate.

- Ensure the QC plan is being followed perform routine sampling and testing as outlined in this QC plan, prepare and submit standard test forms, Plot QC test results on control charts and evaluate to ensure process is under control.
- Communicate with on site field techs.
- Monitor and visually inspect production and process to assure quality so that practices or materials to the relevant specifications or QC plan are identified.
- When making WMA we will periodically observe the demand report to ensure the correct rate of water being introduced into the asphalt.
- Make and discuss corrective action if material falls out of action or suspension limits with plant foremen and plan administrator and Agency inspector.
- The PCT and the plant operator shall have continuous communication capability. There shall be a properly operating communication system between the plant and paving foremen. The PCT shall make the Agency representative aware of any process changes. If the plant ceases production for any quality related failures the Plan Administrator or designee shall participate with the Engineer in the determination of resumption of HMA. Communication systems shall be capable of transmitting voice and essential data among all parties.
- **Termination Test:** In the event that the first two sub lot test results indicate a sub-par PWL for voids may occur, the supplier (Pike Industries Inc.) reserves the right to request the execution of a lot/day termination test. This termination test will be the final test used to calculate the lot PWL. This option will be executed after consultation with the Engineer.

- In the event of scheduled low production days or when Method Specifications for acceptance are in place, The QC testing frequencies will remain the same as above however, additional process control samples will be taken to monitor quality. The producer shall plan their operations to minimize low production days and intermittent operations this is however job specific
- **Personnel Substitution** Personnel may have to be rotated during this project due to production demands. Replacements will be selected from the list submitted. The replacement will have prior experience with the plant and be thoroughly introduced to the plant and project prior to assuming a role under this plan the engineer will be notified of any personnel changes.
- **Equipment Substitution** Equipment may have to be rotated during this project to meet production demands. Replacements will be selected from the list submitted. Confirmation of the adequacy, accuracy and reliability of the substitute equipment will be available on request no later than the installation of the substitute.

### **Production Facility Control Charts**

The contractor shall maintain linear control charts showing individual test measurements for slip asphalt content gradation, VMA, mix temperature and voids. As a minimum, the control charts shall identify the project name and number, the contract item number, the test number, each test parameter, upper and lower suspension limits, job aim, upper and lower action limits, and the contractor's test result. In addition a notation on the control charts will be made when changes are made in the process. A sample control chart is located in appendix B.

The contractor will use the control charts as part of the process control system for identifying potential problems and assignable cause before they occur. The plan administrator and process control technician(s) shall have the authority and responsibility to alter operations based on information contained on the control charts. Control charts shall be kept and available to the engineer during production hours, and shall be kept current. Hard copies of all test results will be kept in a loose-leaf binder and made available within one hour of completion of the test. Quality Control Charts will be posted on the wall of the Laboratory.

## Procedures for Corrective Action on Non-Conforming Materials

After running of each test it will be compared to the action and suspension limits found in appendix A and see if HMA is within the specifications.

- If tests are found out of spec. we will identify the cause and take corrective action depending upon reason for non-specification material and the plan administrator will be notified.
- Possible corrective action to resolve the following non conforming materials:
  - o Voids, VMA,:
    - Inspect batch ticket to assure that batch ticket weights, tare weights, RAP ac content and moisture are not in error.
    - Sand blend will be checked to assure proper proportions of fine aggregate and adjusted if needed with the cold feeds.
    - Batch weights on the JMF will be changed to bring material back into compliance.
    - Check Plant feeders and dust system to make sure they are running properly and all materials are being fed into the plant at the desired proportions.
    - Calibration of cold feeds or Binder (Drum Plant only) will be done in the event that the most common corrective actions do not bring materials into compliance or if there is reason to believe that calibrations have been compromised.
    - AC content adjustment will be made if we find that gradation is within reasonable compliance with the JMF.
    - Check Hot Bins (Batch Plant only) will be checked to verify plant operation if we find that the stockpiles and cold feeds are acceptable. The plant operations will be analyzed and corrected if needed.
    - Check moisture, gradation and AC content of RAP to ensure that we are feeding the plant with the correct pile and make sure the moisture is the same after a rain event.
    - Check moisture of aggregates to ensure to the right moisture content is being used after a rain event.

- Check specific gravities of aggregate
- Gradation
  - Check stockpiles to ensure proper gradation and if found out of tolerance the material will be removed from stockpile.
  - Check plant feeders and dust system to ensure right material is being feed to the plant. If not corrective action will be taken.
  - Batch weight and cold feed percentages may be adjusted to get gradation back into specification.
  - Check hot bin gradations for batch plants only will be checked to verify plant operation if we find that the stockpiles and cold feeds are acceptable. The plant operations will be analyzed and corrected if needed.
  - Check cold feed calibration for drum plants will be done in the event that the most common corrective actions do not bring materials into compliance or if there is reason to believe that calibrations have been compromised.
- If two consecutive QC test fall outside the suspension limits we will shut down and make corrective actions to address problem.
- If two consecutive QC test fall outside the action limits and indicate that the process is deviating from the JMF, corrective action will be taken to bring the material closer to the JMF. If through corrective action, the JMF is not reasonably achievable a request to change the JMF will be submitted to the Agency.
- The plan administrator, Agency Inspector and field personal will be notified of any changes.

**Production QC Inspection Reporting**

All QC test will be put into the VAOT data base provided by them.

- Mix tests
- Temperatures
- Stockpile gradations
- Control charts

All test data will be available by request.

# APPENDIX A

## Action and Suspension Limits

Hartford IM 091-2(79)							
PIKE IND.	W. Leb	SP15-754WMA			T-IIS 80 Gyr		
P720	JMF	ACTION LIMITS			SUSPENSION LIMITS		
% PASSING		1 TEST			2 CONSECUTIVE TESTS SAME DEFICIENCY		
25.0	100		100			100	
19.0	99	94	100	93		100	
12.5	84	79	89	78		90	
9.5	74	69	79	68		80	
4.75	52	47	57	46		58	
2.36	35	32	38	31		39	
1.18	24	21	27	20		28	
0.6	15	12	18	11		19	
0.3	10	7	13	6		14	
0.15	6	3	9	2		10	
0.75	3.5	2.8	4.2	2.5		4.5	
VOIDS	4.0	3.3	4.7	3.0		5.0	
VMA	14.5	13.8	15.2	13.5		15.5	
SLIP AC	4.30	4.25	4.35	4.20		4.40	
CHARTS REFLECTING THE ABOVE LIMITS WILL BE POSTED IN THE LAB PRIOR TO PRODUCTION							

Hartford IM 091-2(79)							
PIKE IND.	W. Leb	SP15-752wma			T-IVS 80Gyr		
P720	JMF	ACTION LIMITS			SUSPENSION LIMITS		
% PASSING		1 TEST			2 CONSECUTIVE TESTS SAME DEFICIENCY		
		<	>		<	>	
19.0	100	100	-		100	-	
12.5	100	100	-		100	-	
9.5	99	94	100		93	100	
4.75	73	68	78		67	79	
2.36	47	44	50		43	51	
1.18	32	29	35		28	36	
0.6	22	19	25		18	26	
0.3	11	8	14		7	15	
0.15	6	3	9		2	10	
0.75	3.5	2.8	4.2		2.5	4.5	
VOIDS	4.0	3.3	4.7		3.0	5.0	
VMA	16.5	15.8	17.2		15.5	17.5	
SLIP AC	5.60	5.55	5.65		5.50	5.70	
CHARTS REFLECTING THE ABOVE LIMITS WILL BE POSTED IN THE LAB PRIOR TO PRODUCTION							

## **Appendix B**

### **Sample Control Chart**

# Sample:

Item 406.25  
Type 75 Blow

Size 25.0

Lunenburg

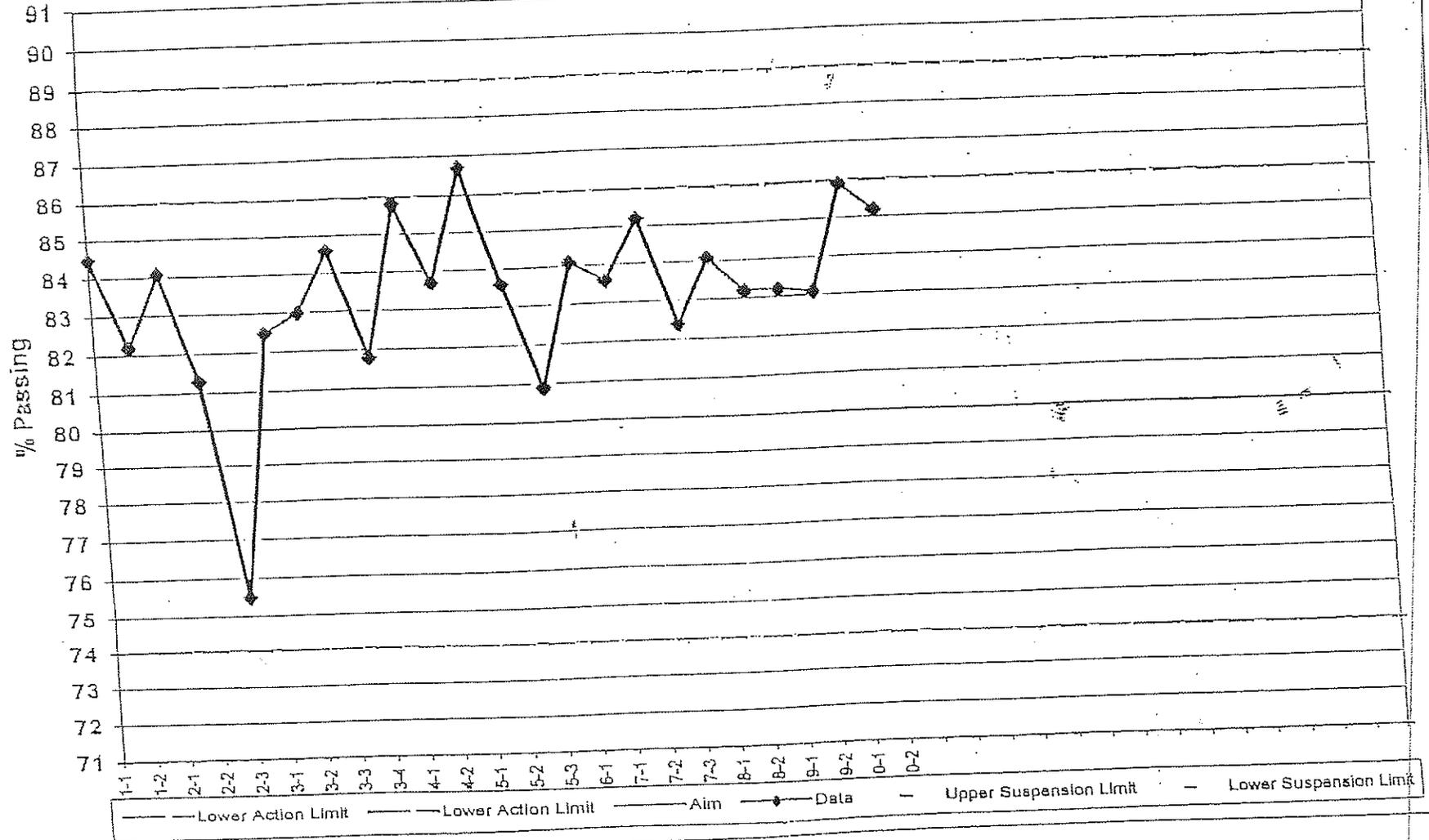
19.0 mm Sieve

STP 2301(7)S

Plant # 702

PII Job # 35012

Location: Waterford, VT



## APPENDIX C

### Test List

#### AASHTO

T-2	Sampling of Aggregates
T-27	Sieve Analysis of Fine and Coarse Aggregates (Dry Sieving Only)
T-30	Mechanical Analysis of Extracted Aggregate
T-40	Sampling Bituminous Materials
T-84	Specific Gravity and Absorption of Fine Aggregate <sup>1</sup>
T-85	Specific Gravity and Absorption of Coarse Aggregate
T-164	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
T-166	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
T-168	Sampling Bituminous Paving Mixtures
T-209	Maximum Specific Gravity of Bituminous Paving Mixtures
T-248	Reducing Field Samples of Aggregate to Testing Size
T-255	Total Moisture Content of Aggregate by Drying
T-269	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
T-308	Determining the Asphalt Binder Content of Hot-Mix Asphalt (HMA) by the Ignition Method
T-312	Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyrotory Compactor
VT-AOT-MRD 10-94	Vermont Test for Effectiveness of Anti-Strip Additive in Asphalt Cement

## **Appendix D**

### **Laboratory Equipment List**

A laboratory of a size and quality approved by the materials and research engineer will be furnished, staffed, and maintained by the contractor. It shall be equipped with all the testing equipment and laboratory supplies necessary for performing the required quality control tests. Such equipment will include, but is not limited to:

- 1 - Centrifugal Extractor with 1500g and 3000g bowls
- 1 - Themolyne N.C.A.T Ignition Oven
- 1 - SuperPave Gyratory Compactor
  
- 1 - Complete set (37.5 to .075 mm) of 200 or 305 mm diameter full height sieves, pans and covers necessary for testing all aggregate and bituminous items required on the project
- 1 - Electronic balance, 12000 g minimum capacity
- 1 - Platform beam scale, 45 kg minimum capacity
- 1 - Motorized sieve shaker with either rocking and tapping action or circular and tapping action capable of holding at least 6 sieves and 1 pan
- 2 - Shovels
- 2 - Sample splitters, 2" and 1" openings
- 2 - Double burner hot plates, variable temperature
- 12 - Metal drying pans
- 1 - One cubic foot minimum capacity electric oven
- 1 - One cubic foot minimum capacity, 700 watt, microwave oven
- 2 - Microwaveable 2 quart glass bowls
- 1 - Brass wire bristle brush
- 1 - Standard floor brush
- 1 - Standard table brush
- 2 - 1 1/2" soft bristle paint brushes
- 1 - Automatic timer (minimum interval 0-30 minutes)
- 1 - 10 quart pail
- 2 - Pairs of heat resistant gloves
- 1 - Sampling scoop
- 2 - Metal AC thermometers, 10 degrees to 260 degrees C
- 2 - Laboratory glass thermometers, capable of reading at least 60 degree C in 1 degree C increments
- 2 - Volumetric flask having a capacity of at least 2000 ml
- 2 - Volumetric flask having a capacity of at least 4000 ml
- 1 - Vacuum pump and tubing capable of performing AASHTO T-209 (or aspirator)
- 1 - Vacuum gauge
- 1 - Dropper
- Assorted spoons, spatulas, and other bench supplies
- Asphalt solvent furnished by the contractor for the duration of the project
- Other laboratory equipment as needed or desired by the technician (s) performing the process control testing