STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

November 17, 2014

NOTICE TO PROSPECTIVE BIDDERS

Subject: Invitation to attend a Mandatory Pre-Bid Conference

Airfield Maintenance Activities at North Carolina Airports

The North Carolina Department of Transportation – Division of Aviation is requesting bids for a purchase order contract involving airfield maintenance activities at North Carolina airports. The contract includes full depth asphalt patching, crack sealing, concrete and asphalt pavement repair, joint sealing, sealing/rejuvenation, rubber removal, airfield painting, marking removal, pressure washing, micro-surfacing, polyurethane foam systems, seeding and mulching, and other additional items. A Contract will be awarded to the three lowest responsible Bidders. The Contractor is to furnish labor, materials, equipment and traffic control and be available to perform work at any airport within North Carolina.

A **Mandatory Pre-Bid Conference** will be held at the NCDOT – Division of Aviation building (1050 Meridian Drive, RDU Airport, NC) in the second floor conference room on November 21, 2014 at 10:30 A.M. Contractors may call-in as an alternative to attending in-person. A call-in number and electronic copy of the Contract Proposal will be available at **https://connect.ncdot.gov/letting/Pages/Aviation.aspx**

The NCDOT, in accordance with the provisions of Title VI of the Civil Rights of 1964 (78 Stat.252) and the Regulations of the Department of Transportation (49 C.F.R., Part 21), issued pursuant to such act, hereby notifies all bidders that it will affirmatively insure that the contract entered into pursuant to this notice will be awarded to the lowest responsible bidders without discrimination on the grounds of sex, race, color, or national origin.

MAILING ADDRESS:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF AVIATION
1560 MAIL SERVICE CENTER
RALEIGH NC 27699-1560

TELEPHONE: 919-814-0550
Fax: 919-840-0645

http://www.ncdot.org/aviation/

LOCATION:

RDU AIRPORT
1050 MERIDAN DRIVE
RDU NC 27623

Statements of Minority and Women Business Enterprises participation must be presented with the bids.

In order to be awarded this Purchase Order Contract, your pre-qualification status with the NCDOT Contractual Services Unit **http://www.ncdot.org/business/ocs/** must be Prime or POC Prime. All subcontractors utilized will need to obtain Subcontractor status before beginning work on a job site. Also, we are requiring that the prime contractor be a licensed General Contractor in the state of North Carolina under the Highway classification. You do not have to obtain these requirements to attend the pre-bid conference or bid, but all requirements must be met no later than two (2) weeks after the "date of availability" in order to be awarded the contract. The date of availability is set for December 11, 2014, and will be confirmed at the pre-bid.

If you have questions, or need additional information concerning this pre-bid meeting, please contact me or my associate Matt Hilderbran at 919-814-0550.

Sincerely,

Philip Lanier

Philip Lanier
NCDOT Airport Project Manager

MAILING ADDRESS:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF AVIATION
1560 MAIL SERVICE CENTER
RALEIGH NC 27699-1560

TELEPHONE: 919-814-0550
Fax: 919-840-9267

http://www.ncdot.org/aviation/

LOCATION:

RDU AIRPORT
1050 MERIDAN DRIVE
RDU NC 27623

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF AVIATION

CONTRACT PROPOSAL

LOCATION: North Carolina Airports **COUNTY:** Various

DESCRIPTION: Airfield Maintenance Activities at North Carolina Airports

BID OPENING: Thursday, December 11th, 2014 at 2:00 P.M.

NOTICE: ALL BIDDERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE BIDDER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS $30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD OR SBE PROJECT. BIDDERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA.

_____

NAME OF BIDDER **N.C. CONTRACTOR'S LICENSE NUMBER**

_____

ADDRESS OF BIDDER

RETURN BIDS TO:

MAIL:
NCDOT – DIVISION OF AVIATION
ATTN: MATT HILDERBRAN
1560 MAIL SERVICE CENTER
RALEIGH, NC 27699-1560
Phone Number: 919-814-0550

COURIER:
NCDOT – DIVISION OF AVIATION
ATTN: MATT HILDERBRAN
1050 MERIDIAN DRIVE
RDU AIRPORT, NC 27623
Phone Number: 919-814-0550

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INSTRUCTIONS TO BIDDERS

PLEASE READ ALL INSTRUCTIONS CAREFULLY
BEFORE PREPARING AND SUBMITTING YOUR BID.

All bids shall be prepared and submitted in accordance with the following requirements. Failure to comply with any requirement shall cause the bid to be considered irregular and shall be grounds for rejection of the bid.

1. The bid sheet furnished by NCDOT with the proposal shall be used and shall not be altered in any manner. **DO NOT SEPARATE THE BID SHEET FROM THE PROPOSAL!**
2. All entries on the bid sheet, including signatures, shall be written in ink.
3. The Bidder shall submit a unit price for every item on the bid form. The unit prices for the various contract items shall be written in figures. **Unit prices must be limited to two decimal places.**
4. An amount bid shall be entered on the bid sheet for every item. The amount bid for each item shall be determined by multiplying each unit bid by the quantity for that item, and shall be written in figures in the "Amount Bid" column of the sheet.
5. The total amount bid shall be written in figures in the proper place on the bid sheet. The total amount shall be determined by adding the amounts bid for each item.
6. Changes in any entry shall be made by marking through the entry in ink and making the correct entry adjacent thereto in ink. A representative of the Bidder shall initial the change in ink.
7. The bid shall be properly executed. All bids shall show the following information:
   a. Name of individual, firm, corporation, partnership, or joint venture submitting bid.
   b. Name and signature of individual or representative submitting bid and position or title.
   c. Name, signature, and position or title of witness.
   d. Federal Identification Number (or Social Security Number of Individual)
   e. Contractor's License Number (if Applicable)
8. Bids submitted by corporations shall bear the seal of the corporation.
9. The bid shall not contain any unauthorized additions, deletions, or conditional bids.
10. The bidder shall not add any provision reserving the right to accept or reject an award, or to enter into a contract pursuant to an award.

11. **THE PROPOSAL WITH THE BID SHEET STILL ATTACHED SHALL BE PLACED IN A SEALED ENVELOPE AND SHALL HAVE BEEN DELIVERED TO AND RECEIVED IN THE NCDOT – DIVISION OF AVIATION OFFICE AT RDU AIRPORT ON MERIDIAN DRIVE BY 2:00 P.M. ON DECEMBER 11, 2014.**

12. The sealed bid must display the following statement on the front of the sealed envelope:
QUOTATION(S) FOR AIRFIELD MAINTENANCE ACTIVITIES AT NORTH CAROLINA AIRPORTS TO BE OPENED AT THE NCDOT-DIVISION OF AVIATION ON DECEMBER 11, 2014 AT 2:00 P.M.

13. If delivered by mail, the sealed envelope shall be placed in another sealed envelope and the outer envelope shall be addressed as follows. If hand-delivered, please deliver to same address as listed for Courier:

MAIL:	**COURIER:**
NCDOT – DIVISION OF AVIATION	**NCDOT – DIVISION OF AVIATION**
ATTN: MATT HILDERBRAN	**ATTN: MATT HILDERBRAN**
1560 MAIL SERVICE CENTER	**1050 MERIDIAN DRIVE**
RALEIGH, NC 27699-1560	**RDU AIRPORT, NC 27623**

14. **AWARD OF CONTRACT: The award of the contract, if it be awarded, will be made to the three lowest responsible Bidders in accordance with Section 102 *(excluding 102-2 and 102-11)* of the Standard Specifications for Roads and Structures 2012. The lowest responsible Bidders will be notified that their bid has been accepted and that they have been awarded the contract. NCDOT reserves the right to reject all bids.**

Standard Provisions

GENERAL

This contract is for airfield maintenance activities at publicly owned, publicly operated NPIAS airports located in North Carolina. The Contractor shall provide and furnish all the materials, machinery, implements, traffic control devices, appliances and tools, and perform the work and required labor to fully complete requested projects.

All work and materials shall be in accordance with the provisions of the General Guidelines of this contract, the Special Provisions, the North Carolina Department of Transportation - Standard Specifications for Roads and Structures (2012 or newer adopted version), the Federal Highway Administration - Manual of Uniform Traffic Control Devices (2009 with rev 1 & 2 or newer adopted version), the Federal Aviation Administration - Advisory Circular 150/5370-10F Standards for Specifying Construction of Airports (9/30/2011 or newer adopted version), and the Federal Aviation Administration - Advisory Circular 150/5370-2F Operational Safety on Airports During Construction (09/29/2011 or newer adopted version), with the exception that bid bonds are not required.

The Contractor shall keep himself fully informed of, and in full compliance with, all Federal, State and local laws, ordinances, and regulations, and shall comply with the provisions of Section 107 of the Standard Specifications for Roads and Structures.

TERM OF CONTRACT

The term of this contract is from **December 11, 2014 until December 10, 2015**. The Contractor shall submit his bid for this one (1) year term. At the option of the Division of Aviation, this contract may be extended for two (2) additional periods of one (1) year each, for a maximum period of three (3) years total. The unit bid prices will be increased by three percent (3%) for each one-year extension. No changes in the terms, conditions, etc. of this contract will be made when an extension to the contract is implemented. The Engineer will notify the Contractor in writing twenty (20) calendar days prior to the term ending date if the contract may be extended. The Contractor must notify the Engineer in writing within fifteen (15) calendar days of his/her acceptance or rejection of this offer. Failure on the part of the Contractor to reply will be considered as a rejection of contract extension.

CONTRACT TIME

The date of availability for this contract is upon notification of approval of the purchase order, no earlier than December 11, 2014. The Contractor shall not begin work prior to this date without written approval from the Engineer.

No work will be permitted and no purchase order will be issued until all required bonds, prerequisite conditions, and certifications have been satisfied.

The completion date for this contract is December 10, 2015. No extensions will be authorized except as authorized by Article 108-10 of the Standard Specifications for Roads and Structures.

NON-EXCLUSIVE CONTRACT

The Department may, as it deems to be in the best interest of the State and the Department of Transportation, execute more than one contract based on this proposal. The Contractor(s) understands and agrees, by signature on the Purchase Order Contract Bid Form, that this agreement **does not** constitute an exclusive contract. If awarded, the contracts will be executed with the lowest responsible bidders. The Department of Transportation reserves the right to make multiple awards for the services provided by this contract. Furthermore, The Department reserves the right to reject all bids received.

NOTIFICATION OF WORK

The Engineer will notify the Contractor when a project is required at an airport. A project will consist of any combination and quantity of contract items needed for maintenance and repair at an airport. The Engineer's notification to the Contractor will consist of a project scope, necessary project details, and a completed "Airport Maintenance Project Estimate."

When notified by the Engineer that an airport project is required, the Contractor shall respond and begin work at the airport within thirty (30) calendar days after the date of notification.

The Contractor shall notify the Engineer and the Airport Manager three (3) days in advance of arriving and/or beginning work on any project, at any airport for this contract. The Contractor shall give the Engineer sufficient notice of all his operations for any sampling, inspection or acceptance testing required.

INTERMEDIATE CONTRACT TIME AND LIQUIDATED DAMAGES

The intermediate contract time for a project under this contract is the number of calendar days that is allotted for completion of a given project at one airport. Intermediate contract time for projects is based on the productivity factors shown on the "Airport Maintenance Project Estimate" worksheet as included in this contract. The Contractor shall complete, and the Engineer shall accept, all work required at the respective airport within the number of days as shown on the "Airport Maintenance Project Estimate" sheet that will be provided to the Contractor on the date of notification. Contractor will be allotted additional time based on any additional items added by the Engineer during the course of a project.

The **beginning date** for each project's intermediate contract time will be the date the Contractor first arrives and begins work at the airport, *which will be no sooner than the date of the pre-construction conference for that project.*

In the event that the Contractor fails to begin work within **thirty (30) calendar days** from the date of notification that maintenance and repair is required at an airport, liquidated damages will be charged against the contractor for each calendar day beyond the thirty (30) calendar day period for which he fails to begin work at the airport.

The **completion date** for each project's intermediate contract time will be the date which is the number of consecutive calendar days determined and noted in the "Airport Maintenance Project Estimate" after and including the date the Contractor begins this work. This intermediate completion date may only be extended as authorized by Article 108-10 of the Standard Specifications for Roads and Structures.

Liquidated damages for each project's intermediate contract time are **Eight Hundred Dollars ($800.00)** per calendar day.

PRE-CONSTRUCTION CONFERENCE AND WORK PLAN

In accordance with Section 108-3 of the Standard Specifications for Roads and Structures, a pre-construction conference will be required prior to beginning work at each airport. Immediately after being notified of work being required at an airport, the Engineer and Contractor will establish a mutually agreeable date, time, and location of the pre-construction conference. Attendance by the Contractor is mandatory and attendance by subcontractors is as required by the Engineer. In addition, the Airport Manager and all other stakeholders should be in attendance.

The Contractor shall prepare and submit to the Engineer a proposed work plan no later than one (1) day prior to the pre-construction conference. The work plan should indicate the proposed chronological sequence of operations including duration of activities, and may be revised within the limits of the contract with the approval of the Engineer. This work plan will also be used to advise the Airport regarding the impact of the work being performed on its daily operations so that the Airport can communicate this information to its users and the public.

PROSECUTION AND PROGRESS

The Contractor shall pursue the work diligently with workmen in sufficient numbers, abilities, and supervision, and with equipment, materials, and methods of construction as may be required to complete the work described in the contract by the Intermediate Contract Time limit and in accordance with Section 108 of the Standard Specifications for Roads and Structures.

The Contractor's operations are restricted to areas and times that are approved by the Engineer and Airport Manager. No work may be performed on Sundays and legal State holidays. Work shall only be performed when weather and visibility conditions allow safe operations.

The Contractor shall temporarily remove his equipment from the travelway for declared emergencies, emergency vehicles, traffic, or as directed by the Engineer.

Once work begins at an airport, the work must be completed without interruptions or breaks in the project. For example, the Contractor will not be allowed to start work on an airport and work for a day then stop work and begin there again the next week without approval from the Engineer. The work is to be completed in consecutive contract days once work has begun. One example exception is the required application of a herbicide and the required period of time necessary to allow the chemical to effectively work prior to the commencement of further work.

PURCHASE ORDER CONTRACT PREQUALIFICATION

Any firm that wishes to perform work on Division of Aviation Purchase Order Contracts as either the prime contractor or as a subcontractor on the project must be prequalified with the NCDOT Contractual Services Unit. Firms that wish to bid as the prime contractor must be prequalified as a “Prime” or “POC Prime” no later than two (2) weeks after the "date of availability" in order to be awarded the contract. Firms that wish to perform as a subcontractor to the prime contractor must be prequalified to at least “Subcontractor” prior to beginning work on a project.

Information regarding the requirements to become prequalified with NCDOT Contractual Services Unit, including the application to become prequalified if you are not already prequalified, can be found at the following website:

http://www.ncdot.gov/business/

BRAND REFERENCE SPECIFICATIONS

Any listing of manufacturers or products stated within this contract is for guidance purposes only and not intended as an endorsement nor exclusion of any product meeting or exceeding the requirements listed. Cited examples are used only to denote the quality standard of products desired and do not restrict bidders to a specific brand, make, manufacturer or specific name; they are used only to set forth and convey to bidders the general style, type, character and quality of product desired; and equivalent products will be acceptable. Bidders who wish to substitute items of equal or equivalent design for a product not listed is to submit those items to the Engineer for approval or disapproval no later than seven days prior to the bid opening. The Engineer must approve or disapprove any substitute items submitted by bidders, and will notify the bidders of their approval or disapproval, before the bid opening.

AUTHORITY OF THE ENGINEER

The Engineer for this contract shall be the Airport Program Manager, Division of Aviation, North Carolina Department of Transportation, acting directly or through his duly authorized representatives.

In accordance with Article 105-1 of the Standard Specifications for Roads and Structures, the Engineer will decide all questions which may arise as to the quality and acceptability of work performed and as to the rate of progress of the work; all questions which may arise as to the interpretation of the contract; and all questions as to the acceptable fulfillment of the contract on the part of the Contractor. His decision shall be final and he shall have executive authority to enforce and make effective such decisions and orders as the Contractor fails to carry out promptly.

CONTRACT ITEM ADJUSTMENTS

The Contractor shall note that the contract quantities are considered to be approximate only, and are given as the basis for comparison of bids. The Engineer reserves the right to increase or decrease contract item quantities, or completely delete contract items. Due to the variable parameters of maintenance projects, the requirements of Article 104-5 of the Standard Specifications for Roads and Structures, pertaining to revised contract prices for overruns and underruns will not apply to items in this contract. No minimum amount of work is guaranteed under this contract.

BIDS

In accordance with GS 136-28.1(b), if the total bid amount for the contract exceeds $2,500,000, the bid will not be considered for award.

PLAN & DETAIL ALTERATIONS

NCDOT reserves the right, at any time during the progress of the work, to make alterations in the plans, details, or scope of the projects as may be found necessary or desirable by the Engineer to complete the project. Corresponding adjustments of a projects completion date as result of alterations will be determined by the Engineer.

AVAILABILITY OF FUNDS – CONTRACT TERMINATION

Payments on this contract are subject to availability of funds as allocated by the General Assembly. If the General Assembly fails to allocate adequate funds, the Department reserves the right to terminate this contract.

In the event of termination, the Contractor shall be given a written notice of termination at least sixty (60) days before completion of scheduled work for which funds are available. In the event of termination, the Contractor shall be paid for the work already performed in accordance with the contract specifications.

SUBLETTING OF CONTRACT

The Contractor shall not sublet, sell, transfer, assign or otherwise dispose of this contract or any portion thereof; or his right, title, or interest therein; without written consent of the Engineer. Subletting of this contract or any portion of the contract shall be in accordance to Article of 108-6 of the Standard Specifications for Roads and Structures.

DEFAULT OF CONTRACT

The Department of Transportation shall have the right to declare a default of contract for breach by the Contractor of any material term or condition of the contract. Default of contract shall be in accordance to Article 108-9 of the Standard Specifications for Roads and Structures.

BANKRUPTCY

The Department of Transportation, at its option, may terminate the contract upon filing by the Contractor of any petition for protection under the provisions of the Federal Bankruptcy Act.

COOPERATION BETWEEN CONTRACTORS

The Contractors attention is directed to Article 105-7 of the Standard Specifications for Roads and Structures, as the Department reserves the right at any time to contract for and perform other or additional work on or near the work covered by the contract.

It is common for multiple contractors to be working on unique and different projects within or adjacent to the limits of the airport. The Contractor shall conduct his work so as not to interfere with or hinder in any way the progress of completion of the work being performed by other contractors, and shall work in cooperation with and to the best advantage of all who are concerned.

The Department will under no circumstances be liable for any claim for additional compensation due to acts of one Contractor holding up the work of another.

The Department will under no circumstances be liable for any damages experienced by one Contractor as a result of the presence and operations of other contractors working within or adjacent to the limits of the airport.

TEMPORARY SUSPENSION OF WORK

In accordance with Article 108-7 of the Standard Specifications for Roads and Structures, the Engineer will have the authority to suspend the work wholly or in part, any written order for such periods as he may deem necessary for any of the following reasons.

Conditions considered unfavorable for the suitable prosecution of the work, or

the Contractor’s failure to correct conditions unsafe for workmen or the general public, or

the Contractor has not carried out orders given to him by the Engineer, or

the Contractor’s failure to perform any provisions of the contract.

No extension of projects’ completion date will be allowed for the above suspensions except as may be provided for in Article 108-10.

LIABILITY INSURANCE

Page 1-59, Article 107-15 of the Standard Specifications for Roads and Structures:

The Contractor shall be liable for any losses resulting from a breach of the terms of this contract. The Contractor shall be liable for any losses due to the negligence or willful misconduct of its agents, assigns and employees including any sub-contractors which causes damage to others for which the Department is found liable under the Torts Claims Act, or in the General Courts of Justice, provided the Department provides prompt notice to the Contractor and that the Contractor has an opportunity to defend against such claims. The Contractor shall not be responsible for punitive damages.

The Contractor shall at its sole cost and expense obtain and furnish to the Department an original standard ACORD form certificate of insurance evidencing commercial general liability with a limit for bodily injury and property damage in the amount of **$5,000,000.00** per occurrence and general aggregate, covering the Contractor from claims or damages for bodily injury, personal injury, or for property damages which may arise from operating under the contract by the employees and agents of the Contractor. The required limit of insurance may be obtained by a single general liability policy or the combination of a general liability and excess liability or umbrella policy. The State of North Carolina shall be named as an additional insured on this commercial general liability policy. The policy may contain the following language as relates to the State as an additional insured: "This insurance with respect to the additional insured applies only to the extent that the additional insured is held liable for your or your agent's acts or omissions arising out of and in the course of operations performed for the additional insured."

The Contractor shall maintain all legally required insurance coverage, including without limitation, worker's compensation and vehicle liability, in the amounts required by law. Providing and maintaining adequate insurance coverage is a material obligation of the contractor and is of the essence of this contract. All such insurance shall meet all laws of the State of North Carolina. Such insurance coverage shall be obtained from companies that are authorized to provide such coverage and that are authorized by the Commissioner of Insurance to do business in North Carolina. The Contractor shall at all times comply with the terms of such insurance policies.

Upon execution of the contract, provide evidence of the above insurance requirements to the Engineer. When required by the contract, the Contractor shall carry insurance of the kinds and in the amounts specified therein in addition to any other forms of insurance or bonds required under the terms of the contract, or any other insurance carried by the Contractor.

CONTRACT PAYMENT AND PERFORMANCE BOND

Bonds can be for either one hundred percent (100%) of the contract amount, maintained for the duration of the contract, or can be for one hundred percent (100%) of the estimated amount for each project that totals more than $300,000, for the duration of that particular project. When required, the Contractor must provide proof of bonds before any work will be allowed.

A performance bond in the amount of one hundred percent (100%) of the project amount, conditioned upon the faithful performance of the contract in accordance with specifications and conditions of the contract is required for Construction contracts of $300,000 or more. Such bond shall be solely for the protection of the North Carolina Department of Transportation, the State of North Carolina, and the airports included in this contract.

A payment bond in the amount of one hundred percent (100%) of the project amount, conditioned upon the prompt payment for all labor or materials for which the Contractor or his subcontractors are liable, is required for Construction contracts greater than $300,000. The payment bond shall be solely for the protection of persons or firms furnishing materials or performing labor for this contract for which the Contractor is liable.

The Contractor, within fourteen (14) days after notification of a project, shall provide the Department with a contract payment bond and a contract performance bond each in an amount equal to one hundred percent (100%) of the amount of the total contract or for one hundred percent (100%) of the estimated amount for the current project if the estimated amount for that project exceeds $300,000.

INSPECTION

All work shall be subject to inspection by the Engineer at any time. Routinely, the Engineer will make periodic inspections of the completed work. It will be the responsibility of the Contractor to keep the Engineer informed of his proposed work plan and to submit written reports of work accomplished on a frequency to be determined by the Engineer.

The Contractor shall not perform work without the presence of the Engineer or his authorized representative(s), unless previously approved by the Engineer. Any work done without the presence of the Engineer is subject to nonpayment, unless approved by the same.

MATERIALS AND TESTING

The Engineer reserves the right to perform all sampling and testing in accordance with Section 106 of the Standard Specifications for Roads and Structures and the Department's "Materials and Test Manual." However the Engineer may reduce the frequency of sampling and testing where he deems it appropriate for the project under construction.

The Contractor shall furnish the applicable certifications and documentation for all materials as required by the Standard Specifications for Roads and Structures. Material, which is not properly certified, will not be accepted.

SUPERVISION BY CONTRACTOR

At all times during the life of the project the Contractor shall provide one permanent employee who shall have the authority and capability for overall responsibility of the project, and who shall be personally available at the work site within twenty-four (24) hours notice. Such an employee shall be fully authorized to conduct all business with the subcontractors, to negotiate and execute all supplemental agreements, and to execute the orders or directions of the Engineer.

At all times that work is actually being performed, the Contractor shall have present on the project one competent individual who is authorized to act in a supervisory capacity over all work on the project, including work subcontracted. The individual who has been so authorized shall be experienced in the type of work being performed and shall be fully capable of managing, directing, and coordinating the work; shall have a copy of this complete contract with them and be capable of reading and thoroughly understanding the contract; and receiving and carrying out directions from the Engineer or his authorized representatives. He shall be an employee of the Contractor unless otherwise approved by the Engineer.

The Contractor may, at his option, designate one employee to meet the requirements of both positions. However, whenever the designated employee is absent from the work site, an authorized individual qualified to act in a supervisory capacity on the project shall be present.

PAYMENT AND RETAINAGE

Payment requests shall be made by Contractor's Invoice to the Engineer after project completion and final inspection. All invoice items and unit costs shall correspond to contract items. In the event of error or discrepancy in items or unit costs, the Department may return the invoice to the contractor for correction. The invoice shall be completely and legibly filled out with all appropriate information and shall be signed by an authorized representative of the Contractor. Compensation for all contract items shall be in accordance with Article 109 of the Standard Specifications for Roads and Structures.

Contractor shall provide a signed NCDOT DBE-IS Form attached to all invoicing:

Partial Payment requests may be submitted by the Contractor on a monthly basis, or other interval as approved by the Engineer. The amount of partial payments will be based on the work accomplished and accepted.

Electronic Requests (preferred method) for payment shall be made by signed and certified pdf invoice submitted to:

Matt Hilderbran
mrhilderbran@ncdot.gov

Hardcopy Requests for payment shall be made by a signed Contractor's invoice and submitted to:

NCDOT – Division of Aviation
Attn: Matt Hilderbran
1560 Mail Service Center
Raleigh, NC 27699-1560

Telephone: (919) 814-0550
Fax: (919) 840-9267

Minority Business Enterprise (MBE) and Women Business Enterprise (WBE) participation shall be listed in the appropriate spaces on all requests for payment. If there is no participation the word "None" or the figure "0" shall be entered.

Due to the nature of the contract, no retainage will be withheld. However, the Department reserves the right to withhold payment for a specific project until after successful completion of all work as verified by the final inspection of that project. One hundred percent (100%) payment shall be made after successful completion of the project as verified by final inspection.

CLAIMS FOR ADDITIONAL COMPENSATION OR EXTENSION OF TIME

Any claims for additional compensation and/or extensions of the project completion date shall be submitted to the Engineer with detailed justification within seven (7) days after project completion, and prior to project final inspection. The failure of the Contractor to submit the claim(s) within thirty (30) days shall be a bar to recovery.

PROMPT PAYMENT OF SUBCONTRACTORS AND SUPPLIERS

Contractors at all levels; prime, subcontractor, or second tier contractor, shall within seven calendar days of receipt of monies, resulting from work performed on the project or services rendered, pay subcontractors, second tier subcontractors, or material suppliers, as appropriate. This seven-day period begins upon knowledgeable receipt by the contracting firm obligated to make a subsequent periodic or final payment. These prompt payment requirements will be met if each firm mails the payment to the next level firm by evidence of postmark within the seven-day period.

This provision for prompt payment shall be incorporated into each subcontract or second tier subcontract issued for work performed on the project or for services provided.

The Contractor may withhold up to 3% retainage if any subcontractor does not obtain a payment and performance bond for their portion of the work. If any retainage is held on subcontractors, all retainage shall be released within seven calendar days of satisfactory completion of all work. For the purpose of release of retainage, satisfactory completion is defined as completion of all physical elements and corresponding documentation as defined in the contract, as well as agreement between the parties as to the final quantities for all work performed in the subcontract. The Department will provide internal controls to expedite the determination and processing of the final quantities for the satisfactorily completed subcontract portions of the project.

Failure of any entity to make prompt payment as defined herein may result in (1) withholding of money due to that entity in the next partial payment until such assurances are made satisfactory to this provision; or (2) removal of an approved contractor from the prequalified bidders list or the removal of other entities from the approved subcontractors list.

WASTE MATERIAL DISPOSAL

All waste material shall be removed from the project site prior to one hundred percent (100%) project completion. All waste disposal shall be in accordance with Federal, State, and local regulations regarding the disposal of waste material(s). All permits and fees for any such disposal shall be the responsibility of the Contractor, and the Department shall not be held liable for any such disposal of material(s). No separate payment will be made for waste material disposal.

GIFTS FROM VENDORS AND CONTRACTORS

(12-15-09) SP1 G152

By Executive Order 24, issued by Governor Perdue, and *N.C. G.S.§ 133-32*, it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional, engineer, landlord, offeror, seller, subcontractor, supplier, or vendor), to make gifts or to give favors to any State employee of the Governor's Cabinet Agencies (i.e. Administration, Commerce, Correction, Crime Control and Public Safety, Cultural Resources, Environment and Natural Resources, Health and Human Services, Juvenile Justice and Delinquency Prevention, Revenue, Transportation, and the Office of the Governor). This prohibition covers those vendors and contractors who:

(1) have a contract with a governmental agency; or
(2) have performed under such a contract within the past year; or
(3) anticipate bidding on such a contract in the future.

For additional information regarding the specific requirements and exemptions, vendors and contractors are encouraged to review Executive Order 24 and *G.S. § 133-32*.

Executive Order 24 also encouraged and invited other State Agencies to implement the requirements and prohibitions of the Executive Order to their agencies. Vendors and contractors should contact other State Agencies to determine if those agencies have adopted Executive Order 24.

OUTSOURCING OUTSIDE THE USA

(9-21-04) (5-16-06) SP1 G150

All work on consultant contracts, services contracts, and construction contracts shall be performed in the United States of America. No work shall be outsourced outside of the United States of America. *Outsourcing* for the purpose of this provision is defined as the practice of subcontracting labor, work, services, staffing, or personnel to entities located outside of the United States. The North Carolina Secretary of Transportation shall approve exceptions to this provision in writing.

DOMESTIC STEEL AND IRON PRODUCTS (Buy America):

SP1 G97

All steel and iron products which are permanently incorporated into this project shall be produced in the United States except minimal amounts of foreign steel and iron products may be used provided the combined project cost of the bid items involved does not exceed one-tenth of one percent (0.1 percent) of the total amount bid for the entire project or $2,500.00, whichever is greater. This minimal amount of foreign produced steel and iron products permitted for use by this Special Provision is not applicable to fasteners. Domestically produced fasteners are required for this project.

All steel and iron products furnished as "domestic products" shall be melted, cast, formed, shaped, drawn, extruded, forged, fabricated, produced, or otherwise processed and manufactured in the United States. Raw materials including pig iron and processed pelletized and reduced iron ore used in manufacturing "domestic" steel products may be imported; however, all manufacturing processes to produce the products, including coatings, must occur in the United States.

Before each steel or iron product is incorporated into this project or included for partial payment on a monthly estimate, the Contractor shall furnish the Engineer a notarized certification certifying that the product conforms to the above requirements of this Special Provision. The Engineer will forward a copy of each certification to the Materials and Tests Unit.

Each purchase order issued by the Contractor or a subcontractor for steel and iron products to be permanently incorporated into this project shall contain in bold print a statement advising the supplier that all manufacturing processes to produce the steel or iron shall have occurred in the United States. The Contractor and all affected subcontractors shall maintain a separate file for steel products permanently incorporated into this project so that verification of the Contractor's efforts to purchase "domestic" steel and iron products can readily be verified by an authorized representative of the Department or the Federal Highway Administration.

POSTED WEIGHT LIMITS

The Contractor's attention is directed to the fact that many primary and secondary roads and bridges are posted with weight limits less than the legal limit. The Contractor will not be allowed to exceed the posted weight limits in transporting materials or equipment to the project. The Contractor should make a thorough examination of all maps and haul routes leading to each airport prior to mobilization.

EROSION, SILTATION, AND POLLUTION CONTROL

The Contractor shall exercise every reasonable precaution and take all necessary measures throughout the life of the project to prevent erosion, siltation, and pollution in accordance with Section 107-12 of the Standard Specifications. Silt fence and erosion control measures shall be installed in accordance with Section 1605 of the Standard Specifications and in locations directed by the Engineer or his representative.

NCDOT GENERAL SEED SPECIFICATION FOR SEED QUALITY

(11-18-08)

Seed shall be sampled and tested by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory. When said samples are collected, the vendor shall supply an independent laboratory report for each lot to be tested. Results from seed so sampled shall be final. Seed not meeting the specifications shall be rejected by the Department of Transportation and shall not be delivered to North Carolina Department of Transportation warehouses. If seed has been delivered it shall be available for pickup and replacement at the supplier’s expense.

Any re-labeling required by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory, that would cause the label to reflect as otherwise specified herein shall be rejected by the North Carolina Department of Transportation.

Seed shall be free from seeds of the noxious weeds: Johnsongrass, Balloonvine, Jimsonweed, Witchweed, Itchgrass, Serrated Tussock, Showy Crotalaria, Smooth Crotalaria, Sicklepod, Sandbur, Wild Onion, and Wild Garlic. Seed shall not be labeled with the above weed species on the seed analysis label. Tolerances as applied by the Association of Official Seed Analysts will NOT be allowed for the above noxious weeds except for Wild Onion and Wild Garlic.

Tolerances established by the Association of Official Seed Analysts will generally be recognized. However, for the purpose of figuring pure live seed, the found pure seed and found germination percentages as reported by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory will be used. Allowances, as established by the NCDOT, will be recognized for minimum pure live seed as listed on the following pages.

The specifications for restricted noxious weed seed refers to the number per pound as follows:

Restricted Noxious **Weed**	Limitations per Lb Of Seed	Restricted Noxious **Weed**	Limitations per Lb. of Seed
Blessed Thistle	**4 seeds**	**Cornflower (Ragged Robin)**	**27 seeds**
Cocklebur	**4 seeds**	**Texas Panicum**	**27 seeds**
Spurred Anoda	**4 seeds**	**Bracted Plantain**	**54 seeds**
Velvetleaf	**4 seeds**	**Buckhorn Plantain**	**54 seeds**
Morning-glory	**8 seeds**	**Broadleaf Dock**	**54 seeds**
Corn Cockle	**10 seeds**	**Curly Dock**	**54 seeds**
Wild Radish	**12 seeds**	**Dodder**	**54 seeds**
Purple Nutsedge	**27 seeds**	**Giant Foxtail**	**54 seeds**
Yellow Nutsedge	**27 seeds**	**Horsenettle**	**54 seeds**
Canada Thistle	**27 seeds**	**Quackgrass**	**54 seeds**
Field Bindweed	**27 seeds**	**Wild Mustard**	**54 seeds**
Hedge Bindweed	**27 seeds**		

Seed of Pensacola Bahiagrass shall not contain more than 7% inert matter, Kentucky Bluegrass, Centipede and Fine or Hard Fescue shall not contain more than 5% inert matter whereas a maximum of 2% inert matter will be allowed on all other kinds of seed. In addition, all seed shall not contain more than 2% other crop seed nor more than 1% total weed seed. The germination rate as tested by the North Carolina Department of Agriculture shall not fall below 70%, which includes both dormant and hard seed. Seed shall be labeled with not more than 7%, 5% or 2% inert matter (according to above specifications), 2% other crop seed and 1% total weed seed.

Exceptions may be made for minimum pure live seed allowances when cases of seed variety shortages are verified. Pure live seed percentages will be applied in a verified shortage situation. Those purchase orders of deficient seed lots will be credited with the percentage that the seed is deficient.

FURTHER SPECIFICATIONS FOR EACH SEED GROUP ARE GIVEN BELOW:

Minimum 85% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 83% pure live seed will not be approved.

Sericea Lespedeza
Oats (seeds)

Minimum 80% pure live seed; maximum 1% total weed seed; maximum 2% total other crop; maximum 144 restricted noxious weed seed per pound. Seed less than 78% pure live seed will not be approved.

Tall Fescue (all approved varieties)
Kobe Lespedeza
Korean Lespedeza
Weeping Lovegrass
Carpetgrass
Bermudagrass
Browntop Millet
German Millet – Strain R
Clover – Red/White/Crimson

Minimum 78% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 76% pure live seed will not be approved.

Common or Sweet Sundangrass

Minimum 76% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 74% pure live seed will not be approved.

Rye (grain; all varieties)
Kentucky Bluegrass (all approved varieties)
Hard Fescue (all approved varieties)
Shrub (bicolor) Lespedeza

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 noxious weed seed per pound. Seed less than 70% pure live seed will not be approved.

Centipedegrass
Crownvetch
Pensacola Bahiagrass
Japanese Millet
Reed Canary Grass
Zoysia

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 5% inert matter; maximum 144 restricted noxious weed seed per pound.

Barnyard Grass
Big Bluestem
Little Bluestem
Bristly Locust
Birdsfoot Trefoil
Indiangrass
Orchardgrass
Switchgrass
Yellow Blossom Sweet Clover

(3-18-03) PLANT AND PEST QUARANTINES

(Imported Fire Ant, Gypsy Moth, Witchweed, And Other Noxious Weeds)

Within quarantined area

This project may be within a county regulated for plant and/or pests. If the project or any part of the Contractor's operations is located within a quarantined area, thoroughly clean all equipment prior to moving out of the quarantined area. Comply with federal/state regulations by obtaining a certificate or limited permit for any regulated article moving from the quarantined area.

Originating in a quarantined county

Obtain a certificate or limited permit issued by the N.C. Department of Agriculture/United States Department of Agriculture. Have the certificate or limited permit accompany the article when it arrives at the project site.

Contact

Contact the N.C. Department of Agriculture/United States Department of Agriculture at 1-800-206-9333, 919-733-6932, or *http://www.ncagr.com/plantind/* to determine those specific project sites located in the quarantined area or for any regulated article used on this project originating in a quarantined county.

Regulated Articles Include

1. Soil, sand, gravel, compost, peat, humus, muck, and decomposed manure, separately or with other articles. This includes movement of articles listed above that may be associated with cut/waste, ditch pulling, and shoulder cutting.
2. Plants with roots including grass sod.
3. Plant crowns and roots.
4. Bulbs, corms, rhizomes, and tubers of ornamental plants.
5. Hay, straw, fodder, and plant litter of any kind.
6. Clearing and grubbing debris.
7. Used agricultural cultivating and harvesting equipment.
8. Used earth-moving equipment.
9. Any other products, articles, or means of conveyance, of any character, if determined by an inspector to present a hazard of spreading imported fire ant, gypsy moth, witchweed or other noxious weeds.

WORK ZONE SAFETY AND TRAFFIC CONTROL

In accordance with Article 107-21 of the Standard Specifications, the Contractor shall comply with all applicable Federal, State, and local laws, ordinances, and regulations governing safety, health, and sanitation, and shall provide all safeguards, safety devices, and protective equipment, and shall take any other needed actions, on his own responsibility that are reasonably necessary to protect the life and health of employees on the job and the safety of the public, and to protect property in connection with the performance of the work covered by the contract.

The Contractor shall maintain aviation and vehicular traffic to the extent directed by the Engineer during construction and provide, install, and maintain all traffic control devices in accordance with these *project guidelines*, the Special Provisions, the North Carolina Department of Transportation Standard Specifications for Roads and Structures 2012, the current edition of the Manual of Uniform Traffic Control Devices (MUTCD), and the current edition of FAA AC 150/5370-2F *Operational Safety on Airports During Construction* (09/29/2011).

SAFETY PLAN REQUIREMENTS

Airport Air Operations Areas will be closed to air traffic on an intermittent basis to facilitate operations during this project. However, no areas will be closed unless both the Airport Manager and the Engineer approve.

The Contractor shall not begin work within any Air Operations Area unless and until three (3) days prior notice has been given to the Engineer and the Airport Manager, and approval has been received.

Prior to Contractor entering the Air Operations Area, Contractor shall ensure Airport Manager has issued proper NOTAMs by calling 1-800-WX-Brief, or any other approved source. It should never be taken for granted that a NOTAM was issued by Airport Management, and Contractor shall ensure NOTAMs are in effect at all necessary times. If they are not, Contractor shall immediately notify the Airport Manager and request NOTAMs be issued.

The Contractor shall utilize complete and proper traffic controls and traffic control devices during all operations. All traffic control and traffic control devices required for any operation shall be functional and in place prior to the commencement of that operation. (See enclosed details) Signs for temporary operations shall be removed during periods of inactivity. The Contractor is required to leave the project in a manner that will be safe to aviation, pedestrian and vehicular traffic.

When a runway has to be closed for work on this contract, the Contractor shall furnish and place crosses at each end of the runway prior to commencing any work to the pavement. Crosses shall be in accordance with the details as shown in these plans and in accordance with FAA AC 150/5340-1L (9/27/2013), or current version. Crosses shall remain in good condition until completion of the project. On airports having multiple runways where air traffic will be maintained, the Contractor will be required to furnish, erect, and maintain barricades and/or warning signs necessary to protect the public and the work as deemed necessary by the Engineer and Airport Management. On multiple runway airports one runway must remain open at all times except for time when work is required at intersection of the two runways.

The Contractor shall maintain two-way radio communications with the airport for increased safety at ALL times. Contractor shall maintain proper communication on UNICOM Radio and/or Air Traffic Control Tower at towered airports at ALL times

All equipment, tools, machinery, incidentals, implements, and other devices used in the execution of this contract shall be safe and in good working condition at all times, and shall only be operated by highly skilled and properly trained personnel. The Contractor shall identify each motorized vehicle or piece of construction equipment in reasonable conformance to the FAA Advisory Circular 150/5370-2F

The Contractor shall coordinate ingress-egress requirements with the Airport Manager. The Contractor shall be responsible for securing all gates at the end of each day's operations.

The Contractor shall fully comply with FAA Advisory Circular 150/5370-2F at all times, "Operational Safety on Airports During Construction." (Copies of the Advisory Circular are available upon request and can be viewed online at http://www.faa.gov/)

Equipment and materials shall not be left on or within 200-feet of the runway edges or 50-feet of the taxiway edges after work operations are ceased each day.

The Contractor shall keep all active airfield pavements clear of debris, stones, etc., during construction. These areas shall be cleaned of construction debris and spillage immediately. The Contractor shall visually inspect active airfield pavement after each crossing by vehicles during hauling operations.

The Contractor shall clean all construction areas of litter, loose papers, debris, etc., on a daily basis, or as directed by the Engineer or Airport Manager. All spillage in active Air Operation Areas shall be cleaned up immediately**.** The Contractor will be required to have a power broom available on site whenever crack routing or other maintenance activities generate appreciable foreign object debris (FOD). Other methods of cleaning may be used if approved by the Engineer.

Men, equipment or other construction-related material will be permitted in the approach or departure zones of active runway, provided that the construction activity is conducted below the 20:1 approach plane of reference originating 200-feet from the threshold end of the

runway. Any construction activity that is in the approach zones, which will violate these planes of reference, will require special consideration and specific approval. (See enclosed detail)

Open trenches, excavation, drop-offs, and stockpiled material will not be permitted within 200-feet of active runway edges or within 50-feet of active taxiway edges, unless approved by the Engineer. Coverings for open trenches must be of such strength to support critical vehicles as determined by the Engineer or the Airport Manager.

The Contractor shall furnish flaggers as required by the operation being conducted and as directed by the Engineer. In situations where sight distance is limited, or where greater distances are involved, the Contractor shall provide additional means of controlling traffic, including, but not limited to, two-way radios, pilot vehicles, or additional flaggers.

At all times, all personnel shall wear an approved safety vest, or shirt or jacket which meets the color requirements of the Manual of Uniform Traffic Control Devices (MUTCD).

The Contractor shall provide for the free and unobstructed movement of aircraft on areas of the airport not affected by the project. The Contractor shall at all times conduct his operations as to create no hindrance, hazard, or obstacle to aircraft using the airport and must, at all times, conduct the work in accordance with requirements of the Engineer and Airport Management. Aircraft shall always be given the right-of-way.

Failure to comply with any of the requirements for safety and traffic control of this contract shall result in suspension of work as provided in subarticle 108-7(B) of the Standard Specifications.

All costs incurred in complying with the above requirements shall be considered incidental to this contract and no additional payment therefore shall be made.

STATE APPROVED HOLIDAYS

The following is a listing of legal State holidays during the Term of this Contract:

New Years
MLK, Jr. Birthday
Good Friday
Memorial Day
Independence Day
Labor Day
Veteran's Day
Thanksgiving
Christmas

NIGHT OPERATIONS

This contract is intended for daylight operations only, however the Contractor may, with the approval of the Engineer and Airport, conduct his operations during night hours. Any additional compensation the Contractor requests for conducting night operations at the request of the Airport, shall be funded by the Airport with 100% local funds, or as negotiated by the Engineer. For the purposes of this contract, night hours shall be defined as the period between dusk and dawn when natural light, as determined by the Engineer or his representative, is insufficient to safely and effectively perform contract operations.

If the Contractor elects to perform any phase of this contract during night hours, he shall submit, in writing, to the Engineer, a full and complete plan for traffic control and construction lighting which shall be approved prior to beginning construction.

All traffic control devices shall meet the requirements for night use as set forth in the Standard Specifications and the current edition of FAA AC 150/5370-2F *Operational Safety on Airports During Construction* (09/29/2011).

TAXIWAYS AND PRIVATE PROPERTY

The Contractor shall maintain access to taxiways for all residents, businesses, and property owners throughout the life of the project.

The Contractor shall not perform work for private citizens or agencies in conjunction with this project or within the project limits of this contract.

USE OF TAXIWAYS FOR TAKEOFF AND LANDING OPERATIONS

The use of taxiways for takeoff and landing operations while work is being conducted under this contract is strongly discouraged due to the inherent safety risks associated with such operations to both the aircraft occupants and personnel on the ground.

PAVEMENT DAMAGE

It will be the responsibility of the Contractor to ensure that no damage is done to the existing pavement structure due to the Contractor's equipment. It shall be the responsibility of the Contractor to repair or replace any damaged pavement back to a satisfactory condition as determined by the Engineer. Airport pavement strengths are available and reported in maximum allowable aircraft single wheel (SW) loading. Single wheel loading strength is the standard reporting value required by FAA.

MINORITY BUSINESS ENTERPRISE AND WOMEN BUSINESS ENTERPRISE (DIVISIONS):

(10-16-07)(Rev. 12-17-13) 102-15(J) SP1 G67

Description

The purpose of this Special Provision is to carry out the North Carolina Department of Transportation's policy of ensuring nondiscrimination in the award and administration of contracts financed in whole or in part with State funds.

Definitions

Additional MBE/WBE Subcontractors - Any MBE/WBE submitted at the time of bid that will not be used to meet either the MBE or WBE goal. No submittal of a Letter of Intent is required.

Committed MBE/WBE Subcontractor - Any MBE/WBE submitted at the time of bid that is being used to meet either the MBE or WBE goal by submission of a Letter of Intent. Or any MBE or WBE used as a replacement for a previously committed MBE or WBE firm.

Contract Goals Requirement - The approved MBE and WBE participation at time of award, but not greater than the advertised contract goals for each.

Goal Confirmation Letter - Written documentation from the Department to the bidder confirming the Contractor's approved, committed MBE and WBE participation along with a listing of the committed MBE and WBE firms.

Manufacturer - A firm that operates or maintains a factory or establishment that produces on the premises, the materials or supplies obtained by the Contractor.

MBE Goal - A portion of the total contract, expressed as a percentage, that is to be performed by committed MBE subcontractor(s).

Minority Business Enterprise (MBE) - A firm certified as a Disadvantaged Minority-Owned Business Enterprise through the North Carolina Unified Certification Program.

Regular Dealer - A firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials or supplies required for the performance of the contract are bought, kept in stock, and regularly sold to the public in the usual course of business. A regular dealer engages in, as its principal business and in its own name, the purchase and sale or lease of the products in question. A regular dealer in such bulk items as steel, cement, gravel, stone, and petroleum products need not keep such products in stock, if it owns and operates distribution equipment for the products. Brokers and packagers are not regarded as manufacturers or regular dealers within the meaning of this section.

North Carolina Unified Certification Program (NCUCP) - A program that provides comprehensive services and information to applicants for MBE/WBE certification. The MBE/WBE program follows the same regulations as the federal Disadvantaged Business Enterprise (DBE) program in accordance with 49 CFR Part 26.

United States Department of Transportation (USDOT) - Federal agency responsible for issuing regulations (49 CFR Part 26) and official guidance for the DBE program.

WBE Goal - A portion of the total contract, expressed as a percentage, that is to be performed by committed WBE subcontractor(s).

Women Business Enterprise (WBE) - A firm certified as a Disadvantaged Women-Owned Business Enterprise through the North Carolina Unified Certification Program.

Forms and Websites Referenced in this Provision

Payment Tracking System - On-line system in which the Contractor enters the payments made to MBE and WBE subcontractors who have performed work on the project. https://apps.dot.state.nc.us/Vendor/PaymentTracking/

DBE-IS *Subcontractor Payment Information* - Form for reporting the payments made to all MBE/WBE firms working on the project. This form is for paper bid projects only. http://www.ncdot.org/doh/forms/files/DBE-IS.xls

RF-1 *MBE/WBE Replacement Request Form* - Form for replacing a committed MBE or WBE. http://connect.ncdot.gov/projects/construction/Construction%20Forms/DBE%20MBE%20WBE%20Replacement%20Request%20Form.pdf

SAF *Subcontract Approval Form* - Form required for approval to sublet the contract. http://connect.ncdot.gov/projects/construction/Construction%20Forms/Subcontract%20Approval%20Form%20Rev.%202012.zip

JC-1 *Joint Check Notification Form* - Form and procedures for joint check notification. The form acts as a written joint check agreement among the parties providing full and prompt disclosure of the expected use of joint checks.
http://connect.ncdot.gov/projects/construction/Construction%20Forms/Joint%20Check%20Notification%20Form.pdf

Letter of Intent - Form signed by the Contractor and the MBE/WBE subcontractor, manufacturer or regular dealer that affirms that a portion of said contract is going to be performed by the signed MBE/WBE for the amount listed at the time of bid.
http://connect.ncdot.gov/letting/LetCentral/Letter%20of%20Intent%20to%20Perform%20as%20a%20Subcontractor.pdf

Listing of MBE and WBE Subcontractors Form - Form for entering MBE/WBE subcontractors on a project that will meet this MBE and WBE goals. This form is for paper bids only.
http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/09%20MBE-WBE%20Subcontractors%20(State).doc

Subcontractor Quote Comparison Sheet - Spreadsheet for showing all subcontractor quotes in the work areas where MBEs and WBEs quoted on the project. This sheet is submitted with good faith effort packages.
http://connect.ncdot.gov/business/SmallBusiness/Documents/DBE%20Subcontractor%20Quote%20Comparison%20Example.xls

MBE and WBE Goal

The following goals for participation by Minority Business Enterprises and Women Business Enterprises are established for this contract:

(A) **Minority Business Enterprises [0] %**

(1) *If the MBE goal is more than zero,* the Contractor shall exercise all necessary and reasonable steps to ensure that MBEs participate in at least the percent of the contract as set forth above as the MBE goal.

(2) *If the MBE goal is zero,* the Contractor shall make an effort to recruit and use MBEs during the performance of the contract. Any MBE participation obtained shall be reported to the Department.

(B) **Women Business Enterprises [0] %**

(1) *If the WBE goal is more than zero,* the Contractor shall exercise all necessary and reasonable steps to ensure that WBEs participate in at least the percent of the contract as set forth above as the WBE goal.

(2) *If the WBE goal is zero*, the Contractor shall make an effort to recruit and use WBEs during the performance of the contract. Any WBE participation obtained shall be reported to the Department.

Directory of Transportation Firms (Directory)

Real-time information is available about firms doing business with the Department and firms that are certified through NCUCP in the Directory of Transportation Firms. Only firms identified in the Directory as MBE and WBE certified shall be used to meet the MBE and WBE goals respectively. The Directory can be found at the following link. https://partner.ncdot.gov/VendorDirectory/default.html

The listing of an individual firm in the directory shall not be construed as an endorsement of the firm's capability to perform certain work.

Listing of MBE/WBE Subcontractors

At the time of bid, bidders shall submit <u>all</u> MBE and WBE participation that they anticipate to use during the life of the contract. Only those identified to meet the MBE goal and the WBE goal will be considered committed, even though the listing shall include both committed MBE/WBE subcontractors and additional MBE/WBE subcontractors. Any additional MBE/WBE subcontractor participation submitted at the time of bid will be used toward overall race-neutral goals. Only those firms with current MBE and WBE certification at the time of bid opening will be acceptable for listing in the bidder's submittal of MBE and WBE participation. The Contractor shall indicate the following required information:

(A) *If either the MBE or WBE goal is more than zero,*

(1) Bidders, at the time the bid proposal is submitted, shall submit a listing of MBE/WBE participation, including the names and addresses on *Listing of MBE and WBE Subcontractors* contained elsewhere in the contract documents in order for the bid to be considered responsive. Bidders shall indicate the total dollar value of the MBE and WBE participation for the contract.

(2) If bidders have no MBE or WBE participation, they shall indicate this on the *Listing of MBE and WBE Subcontractors* by entering the word "None" or the number "0." This form shall be completed in its entirety. **<u>Blank forms will not be deemed to represent zero participation.</u>** Bids submitted that do not have MBE and WBE participation indicated on the appropriate form will not be read publicly during the opening of bids. The Department will not consider these bids for award and the proposal will be rejected.

(3) The bidder shall be responsible for ensuring that the MBE/WBE is certified at the time of bid by checking the Directory of Transportation Firms. If the firm is not certified at the time of the bid-letting, that MBE's or WBE's participation will not count towards achieving the corresponding goal.

(B) *If either the MBE or WBE goal is zero,* entries on the *Listing of MBE and WBE Subcontractors* are not required for the zero goal, however any MBE or WBE participation that is achieved during the project shall be reported in accordance with requirements contained elsewhere in the special provision.

MBE or WBE Prime Contractor

When a certified MBE or WBE firm bids on a contract that contains MBE and WBE goals, the firm is responsible for meeting the goals or making good faith efforts to meet the goals, just like any other bidder. In most cases, a MBE or WBE bidder on a contract will meet one of the goals by virtue of the work it performs on the contract with its own forces. However, all the work that is performed by the MBE or WBE bidder and any other similarly certified subcontractors will count toward the goal. The MBE or WBE bidder shall list itself along with any MBE or WBE subcontractors, if any, in order to receive credit toward the goals.

For example, on a proposed contract, the WBE goal is 10%, and the MBE goal is 8%. A WBE bidder puts in a bid where they will perform 40% of the contract work and have a WBE subcontractor which will perform another 5% of the work. Together the two WBE firms submit on the *Listing of MBE and WBE Subcontractors* a value of 45% of the contract which fulfills the WBE goal. The 8% MBE goal shall be obtained through MBE participation with MBE certified subcontractors or documented through a good faith effort. It should be noted that you cannot combine the two goals to meet an overall value. The two goals shall remain separate.

MBE/WBE prime contractors shall also follow Sections A or B listed under *Listing of MBE/WBE Subcontractors* just as a non-MBE/WBE bidder would.

Written Documentation – Letter of Intent

The bidder shall submit written documentation for each MBE/WBE that will be used to meet the MBE and WBE goals of the contract, indicating the bidder's commitment to use the MBE/WBE in the contract. This documentation shall be submitted on the Department's form titled *Letter of Intent*.

The documentation shall be received in the office of the Engineer no later than 12:00 noon of the sixth calendar day following opening of bids, unless the sixth day falls on Saturday, Sunday or an official state holiday. In that situation, it is due in the office of the Engineer no later than 12:00 noon on the next official state business day.

If the bidder fails to submit the Letter of Intent from each committed MBE and WBE to be used toward the MBE and WBE goals, or if the form is incomplete (i.e. both signatures are not present), the MBE/WBE participation will not count toward meeting the MBE/WBE goal. If the lack of this participation drops the commitment below either the MBE or WBE goal, the Contractor shall submit evidence of good faith efforts for the goal not met, completed in its entirety, to the Engineer no later than 12:00 noon of the eighth calendar day following opening of bids, unless the eighth day falls on Saturday, Sunday or an official state

holiday. In that situation, it is due in the office of the Engineer no later than 12:00 noon on the next official state business day.

Submission of Good Faith Effort

If the bidder fails to meet or exceed either the MBE or the WBE goal, the apparent lowest responsive bidder shall submit to the Department documentation of adequate good faith efforts made to reach that specific goal(s).

One complete set and (No. of Copies) copies of this information shall be received in the office of the Engineer no later than 12:00 noon of the sixth calendar day following opening of bids, unless the sixth day falls on Saturday, Sunday or an official state holiday. In that situation, it is due in the office of the Engineer no later than 12:00 noon on the next official state business day.

Note: Where the information submitted includes repetitious solicitation letters, it will be acceptable to submit a representative letter along with a distribution list of the firms that were solicited. Documentation of MBE/WBE quotations shall be a part of the good faith effort submittal. This documentation may include written subcontractor quotations, telephone log notations of verbal quotations, or other types of quotation documentation.

Consideration of Good Faith Effort for Projects with MBE/WBE Goals More Than Zero

Adequate good faith efforts mean that the bidder took all necessary and reasonable steps to achieve the goal which, by their scope, intensity, and appropriateness, could reasonably be expected to obtain sufficient MBE/WBE participation. Adequate good faith efforts also mean that the bidder actively and aggressively sought MBE/WBE participation. Mere *pro forma* efforts are not considered good faith efforts.

The Department will consider the quality, quantity, and intensity of the different kinds of efforts a bidder has made. Listed below are examples of the types of actions a bidder will take in making a good faith effort to meet the goals and are not intended to be exclusive or exhaustive, nor is it intended to be a mandatory checklist.

(A) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising, written notices, use of verifiable electronic means through the use of the NCDOT Directory of Transportation Firms) the interest of all certified MBEs/WBEs who have the capability to perform the work of the contract. The bidder must solicit this interest within at least 10 days prior to bid opening to allow the MBEs/WBEs to respond to the solicitation. Solicitation shall provide the opportunity to MBEs/WBEs within the Division and surrounding Divisions where the project is located. The bidder must determine with certainty if the MBEs/WBEs are interested by taking appropriate steps to follow up initial solicitations.

(B) Selecting portions of the work to be performed by MBEs/WBEs in order to increase the likelihood that the MBE and WBE goals will be achieved.

(1) Where appropriate, break out contract work items into economically feasible units to facilitate MBE/WBE participation, even when the prime contractor might otherwise prefer to perform these work items with its own forces.

(2) Negotiate with subcontractors to assume part of the responsibility to meet the contract MBE/WBE goals when the work to be sublet includes potential for MBE/WBE participation (2^{nd} and 3^{rd} tier subcontractors).

(C) Providing interested MBEs/WBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

(D) (1) Negotiating in good faith with interested MBEs/WBEs. It is the bidder's

responsibility to make a portion of the work available to MBE/WBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available MBE/WBE subcontractors and suppliers, so as to facilitate MBE/WBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of MBEs/WBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for MBEs/WBEs to perform the work.

(2) A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including MBE/WBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using MBEs/WBEs is not in itself sufficient reason for a bidder's failure to meet the contract MBE or WBE goals, as long as such costs are reasonable. Also, the ability or desire of a prime contractor to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Bidding contractors are not, however, required to accept higher quotes from MBEs/WBEs if the price difference is excessive or unreasonable.

(E) Not rejecting MBEs/WBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The bidder's standing within its industry, membership in specific groups, organizations, or associates and political or social affiliations (for example, union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the bidder's efforts to meet the project goal.

(F) Making efforts to assist interested MBEs/WBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or bidder.

(G) Making efforts to assist interested MBEs/WBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.

(H) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; Federal, State, and local minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of MBEs/WBEs. Contact within 7 days from the bid opening NCDOT's Business Development Manager in the Business Opportunity and Work Force Development Unit to give notification of the bidder's inability to get MBE or WBE quotes.

(I) Any other evidence that the bidder submits which shows that the bidder has made reasonable good faith efforts to meet the MBE and WBE goal.

In addition, the Department may take into account the following:

(1) Whether the bidder's documentation reflects a clear and realistic plan for achieving the MBE and WBE goals.

(2) The bidders' past performance in meeting the MBE and WBE goals.

(3) The performance of other bidders in meeting the MBE and WBE goals. For example, when the apparent successful bidder fails to meet the goals, but others meet it, you may reasonably raise the question of whether, with additional reasonable efforts the apparent successful bidder could have met the goals. If the apparent successful bidder fails to meet the MBE and WBE goals, but meets or exceeds the average MBE and WBE participation obtained by other bidders, the Department may view this, in conjunction with other factors, as evidence of the apparent successful bidder having made a good faith effort.

If the Department does not award the contract to the apparent lowest responsive bidder, the Department reserves the right to award the contract to the next lowest responsive bidder that can satisfy to the Department that the MBE and WBE goals can be met or that an adequate good faith effort has been made to meet the MBE and WBE goals.

Non-Good Faith Appeal

The Engineer will notify the contractor verbally and in writing of non-good faith.
A contractor may appeal a determination of non-good faith made by the Goal Compliance Committee. If a contractor wishes to appeal the determination made by the Committee, they shall provide written notification to the Engineer. The appeal shall be made within 2 business days of notification of the determination of non-good faith.

Counting MBE/WBE Participation Toward Meeting MBE/WBE Goals

(A) Participation

The total dollar value of the participation by a committed MBE/WBE will be counted toward the contract goal requirements. The total dollar value of participation by a committed

MBE/WBE will be based upon the value of work actually performed by the MBE/WBE and the actual payments to MBE/WBE firms by the Contractor.

(B) Joint Checks

Prior notification of joint check use shall be required when counting MBE/WBE participation for services or purchases that involves the use of a joint check. Notification shall be through submission of Form JC-1 *(Joint Check Notification Form)* and the use of joint checks shall be in accordance with the Department's Joint Check Procedures.

(C) Subcontracts (Non-Trucking)

A MBE/WBE may enter into subcontracts. Work that a MBE subcontracts to another MBE firm may be counted toward the MBE contract goal requirement. The same holds for work that a WBE subcontracts to another WBE firm. Work that a MBE subcontracts to a non-MBE firm does not count toward the MBE contract goal requirement. Again, the same holds true for the work that a WBE subcontracts to a non-WBE firm. If a MBE or WBE contractor or subcontractor subcontracts a significantly greater portion of the work of the contract than would be expected on the basis of standard industry practices, it shall be presumed that the MBE or WBE is not performing a commercially useful function. The MBE/WBE may present evidence to rebut this presumption to the Department. The Department's decision on the rebuttal of this presumption may be subject to review by the Office of Inspector General, NCDOT.

(D) Joint Venture

When a MBE or WBE performs as a participant in a joint venture, the Contractor may count toward its contract goal requirement a portion of the total value of participation with the MBE or WBE in the joint venture, that portion of the total dollar value being a distinct clearly defined portion of work that the MBE or WBE performs with its forces.

(E) Suppliers

A contractor may count toward its MBE or WBE requirement 60 percent of its expenditures for materials and supplies required to complete the contract and obtained from a MBE or WBE regular dealer and 100 percent of such expenditures from a MBE or WBE manufacturer.

(F) Manufacturers and Regular Dealers

A contractor may count toward its MBE or WBE requirement the following expenditures to MBE/WBE firms that are not manufacturers or regular dealers:

(1) The fees or commissions charged by a MBE/WBE firm for providing a *bona fide* service, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of

a DOT-assisted contract, provided the fees or commissions are determined to be reasonable and not excessive as compared with fees and commissions customarily allowed for similar services.

(2) With respect to materials or supplies purchased from a MBE/WBE, which is neither a manufacturer nor a regular dealer, count the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site (but not the cost of the materials and supplies themselves), provided the fees are determined to be reasonable and not excessive as compared with fees customarily allowed for similar services.

Commercially Useful Function

(A) MBE/WBE Utilization

The Contractor may count toward its contract goal requirement only expenditures to MBEs and WBEs that perform a commercially useful function in the work of a contract. A MBE/WBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the MBE/WBE shall also be responsible with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material and installing (where applicable) and paying for the material itself. To determine whether a MBE/WBE is performing a commercially useful function, the Department will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the contract is commensurate with the work it is actually performing and the MBE/WBE credit claimed for its performance of the work, and any other relevant factors.

(B) MBE/WBE Utilization in Trucking

The following factors will be used to determine if a MBE or WBE trucking firm is performing a commercially useful function:

(1) The MBE/WBE shall be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there shall not be a contrived arrangement for the purpose of meeting the MBE or WBE goal.

(2) The MBE/WBE shall itself own and operate at least one fully licensed, insured, and operational truck used on the contract.

(3) The MBE/WBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.

(4) The MBE may subcontract the work to another MBE firm, including an owner-operator who is certified as a MBE. The same holds true that a WBE may subcontract the work to another WBE firm, including an owner-operator who is certified as a

WBE. When this occurs, the MBE or WBE who subcontracts work receives credit for the total value of the transportation services the subcontracted MBE or WBE provides on the contract. It should be noted that every effort shall be made by MBE and WBE contractors to subcontract to the same certification (i.e., MBEs to MBEs and WBEs to WBEs), in order to fulfill the goal requirement. This, however, may not always be possible due to the limitation of firms in the area. If the MBE or WBE firm shows a good faith effort has been made to reach out to similarly certified transportation service providers and there is no interest or availability, and they can get assistance from other certified providers, the Engineer will not hold the prime liable for meeting the goal.

(5) The MBE/WBE may also subcontract the work to a non-MBE/WBE firm, including from an owner-operator. The MBE/WBE who subcontracts the work to a non-MBE/WBE is entitled to credit for the total value of transportation services provided by the non-MBE/WBE subcontractor not to exceed the value of transportation services provided by MBE/WBE-owned trucks on the contract. Additional participation by non-MBE/WBE subcontractors receives credit only for the fee or commission it receives as a result of the subcontract arrangement. The value of services performed under subcontract agreements between the MBE/WBE and the Contractor will not count towards the MBE/WBE contract requirement.

(6) A MBE/WBE may lease truck(s) from an established equipment leasing business open to the general public. The lease must indicate that the MBE/WBE has exclusive use of and control over the truck. This requirement does not preclude the leased truck from working for others during the term of the lease with the consent of the MBE/WBE, so long as the lease gives the MBE/WBE absolute priority for use of the leased truck. This type of lease may count toward the MBE/WBE's credit as long as the driver is under the MBE/WBE's payroll.

(7) Subcontracted/leased trucks shall display clearly on the dashboard the name of the MBE/WBE that they are subcontracted/leased to and their own company name if it is not identified on the truck itself. Magnetic door signs are not permitted.

MBE/WBE Replacement

When a Contractor has relied on a commitment to a MBE or WBE firm (or an approved substitute MBE or WBE firm) to meet all or part of a contract goal requirement, the contractor shall not terminate the MBE/WBE for convenience. This includes, but is not limited to, instances in which the Contractor seeks to perform the work of the terminated subcontractor with another MBE/WBE subcontractor, a non-MBE/WBE subcontractor, or with the Contractor's own forces or those of an affiliate. A MBE/WBE may only be terminated after receiving the Engineer's written approval based upon a finding of good cause for the termination.

All requests for replacement of a committed MBE/WBE firm shall be submitted to the Engineer for approval on Form RF-1 *(Replacement Request).* If the Contractor fails to

follow this procedure, the Contractor may be disqualified from further bidding for a period of up to 6 months.

The Contractor shall comply with the following for replacement of a committed MBE/WBE:

(A) Performance Related Replacement

When a committed MBE is terminated for good cause as stated above, an additional MBE that was submitted at the time of bid may be used to fulfill the MBE commitment. The same holds true if a committed WBE is terminated for good cause, an additional WBE that was submitted at the time of bid may be used to fulfill the WBE goal. A good faith effort will only be required for removing a committed MBE/WBE if there were no additional MBEs/WBEs submitted at the time of bid to cover the same amount of work as the MBE/WBE that was terminated.

If a replacement MBE/WBE is not found that can perform at least the same amount of work as the terminated MBE/WBE, the Contractor shall submit a good faith effort documenting the steps taken. Such documentation shall include, but not be limited to, the following:

(1) Copies of written notification to MBEs/WBEs that their interest is solicited in contracting the work defaulted by the previous MBE/WBE or in subcontracting other items of work in the contract.

(2) Efforts to negotiate with MBEs/WBEs for specific subbids including, at a minimum:

(a) The names, addresses, and telephone numbers of MBEs/WBEs who were contacted.
(b) A description of the information provided to MBEs/WBEs regarding the plans and specifications for portions of the work to be performed.

(3) A list of reasons why MBE/WBE quotes were not accepted.

(4) Efforts made to assist the MBEs/WBEs contacted, if needed, in obtaining bonding or insurance required by the Contractor.

(B) Decertification Replacement

(1) When a committed MBE/WBE is decertified by the Department after the SAF (*Subcontract Approval Form*) has been received by the Department, the Department will not require the Contractor to solicit replacement MBE/WBE participation equal to the remaining work to be performed by the decertified firm. The participation equal to the remaining work performed by the decertified firm will count toward the contract goal requirement.

(2) When a committed MBE/WBE is decertified prior to the Department receiving the SAF (*Subcontract Approval Form*) for the named MBE/WBE firm, the Contractor shall take all necessary and reasonable steps to replace the MBE/WBE subcontractor with another

similarly certified MBE/WBE subcontractor to perform at least the same amount of work to meet the MBE/WBE goal requirement. If a MBE/WBE firm is not found to do the same amount of work, a good faith effort must be submitted to NCDOT (see A herein for required documentation).

Changes in the Work

When the Engineer makes changes that result in the reduction or elimination of work to be performed by a committed MBE/WBE, the Contractor will not be required to seek additional participation. When the Engineer makes changes that result in additional work to be performed by a MBE/WBE based upon the Contractor's commitment, the MBE/WBE shall participate in additional work to the same extent as the MBE/WBE participated in the original contract work.

When the Engineer makes changes that result in extra work, which has more than a minimal impact on the contract amount, the Contractor shall seek additional participation by MBEs/WBEs unless otherwise approved by the Engineer.

When the Engineer makes changes that result in an alteration of plans or details of construction, and a portion or all of the work had been expected to be performed by a committed MBE/WBE, the Contractor shall seek participation by MBEs/WBEs unless otherwise approved by the Engineer.

When the Contractor requests changes in the work that result in the reduction or elimination of work that the Contractor committed to be performed by a MBE/WBE, the Contractor shall seek additional participation by MBEs/WBEs equal to the reduced MBE/WBE participation caused by the changes.

Reports and Documentation

A SAF (*Subcontract Approval Form*) shall be submitted for all work which is to be performed by a MBE/WBE subcontractor. The Department reserves the right to require copies of actual subcontract agreements involving MBE/WBE subcontractors.

When using transportation services to meet the contract commitment, the Contractor shall submit a proposed trucking plan in addition to the SAF. The plan shall be submitted prior to beginning construction on the project. The plan shall include the names of all trucking firms proposed for use, their certification type(s), the number of trucks owned by the firm, as well as the individual truck identification numbers, and the line item(s) being performed.

Within 30 calendar days of entering into an agreement with a MBE/WBE for materials, supplies or services, not otherwise documented by the SAF as specified above, the Contractor shall furnish the Engineer a copy of the agreement. The documentation shall also indicate the percentage (60% or 100%) of expenditures claimed for MBE/WBE credit.

Reporting Minority and Women Business Enterprise Participation

The Contractor shall provide the Engineer with an accounting of payments made to all MBE and WBE firms, including material suppliers and contractors at all levels (prime, subcontractor, or second tier subcontractor). This accounting shall be furnished to the Engineer for any given month by the end of the following month. Failure to submit this information accordingly may result in the following action:

(A) Withholding of money due in the next partial pay estimate; or

(B) Removal of an approved contractor from the prequalified bidders' list or the removal of other entities from the approved subcontractors list.

While each contractor (prime, subcontractor, 2nd tier subcontractor) is responsible for accurate accounting of payments to MBEs/WBEs, it shall be the prime contractor's responsibility to report all monthly and final payment information in the correct reporting manner.

Failure on the part of the Contractor to submit the required information in the time frame specified may result in the disqualification of that contractor and any affiliate companies from further bidding until the required information is submitted.

Failure on the part of any subcontractor to submit the required information in the time frame specified may result in the disqualification of that contractor and any affiliate companies from being approved for further work on future projects until the required information is submitted.

Contractors reporting transportation services provided by non-MBE/WBE lessees shall evaluate the value of services provided during the month of the reporting period only.

At any time, the Engineer can request written verification of subcontractor payments.

The Contractor shall report the accounting of payments on the Department's DBE-IS *(Subcontractor Payment Information)* with each invoice. Invoices will not be processed for payment until the DBE-IS is received.

Failure to Meet Contract Requirements

Failure to meet contract requirements in accordance with Subarticle 102-15(J) of the *2012 Standard Specifications* may be cause to disqualify the Contractor.

EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION:

(1-16-07) (Rev 11-16-10) SP1 G180

General

Schedule and conduct construction activities in a manner that will minimize soil erosion and the resulting sedimentation and turbidity of surface waters. Comply with the requirements herein regardless of whether or not a National Pollution discharge Elimination System (NPDES) permit for the work is required.

Establish a chain of responsibility for operations and subcontractors' operations to ensure that the *Erosion and Sediment Control/Stormwater Pollution Prevention Plan* is implemented and maintained over the life of the contract.

(A) *Certified Supervisor* – Provide a certified Erosion and Sediment Control/Stormwater Supervisor to manage the Contractor and subcontractor operations, insure compliance with Federal, State and Local ordinances and regulations, and manage the Quality Control Program.

(B) *Certified Foreman* – Provide a certified, trained foreman for each construction operation that increases the potential for soil erosion or the possible sedimentation and turbidity of surface waters.

(C) *Certified Installer* – Provide a certified installer to install or direct the installation for erosion or sediment/stormwater control practices.

(D) *Certified Designer* – Provide a certified designer for the design of the erosion and sediment control/stormwater component of reclamation plans and, if applicable, for the design of the project erosion and sediment control/stormwater plan.

Roles and Responsibilities

(A) *Certified Erosion and Sediment Control/Stormwater Supervisor* – The Certified Supervisor shall be Level II and responsible for ensuring the erosion and sediment control/stormwater plan is adequately implemented and maintained on the project and for conducting the quality control program. The Certified Supervisor shall be on the project within 24 hours notice from initial exposure of an erodible surface to the project's final acceptance. Perform the following duties:

(1) Manage Operations – Coordinate and schedule the work of subcontractors so that erosion and sediment control/stormwater measures are fully executed for each operation and in a timely manner over the duration of the contract.

(a) Oversee the work of subcontractors so that appropriate erosion and sediment control/stormwater preventive measures are conformed to at each stage of the work.

(b) Prepare the required National Pollutant Discharge Elimination System (NPDES) Inspection Record and submit to the Engineer.

(c) Attend all weekly or monthly construction meetings to discuss the findings of the NPDES inspection and other related issues.

(d) Implement the erosion and sediment control/stormwater site plans requested.

(e) Provide any needed erosion and sediment control/stormwater practices for the Contractor's temporary work not shown on the plans, such as, but not limited to work platforms, temporary construction, pumping operations, plant and storage yards, and cofferdams.

(f) Acquire applicable permits and comply with requirements for borrow pits, dewatering, and any temporary work conducted by the Contractor in jurisdictional areas.

(g) Conduct all erosion and sediment control/stormwater work in a timely and workmanlike manner.

(h) Fully perform and install erosion and sediment control/stormwater work prior to any suspension of the work.

(i) Coordinate with Department, Federal, State and Local Regulatory agencies on resolution of erosion and sediment control/stormwater issues due to the Contractor's operations.

(j) Ensure that proper cleanup occurs from vehicle tracking on paved surfaces or any location where sediment leaves the Right-of-Way.

(k) Have available a set of erosion and sediment control/stormwater plans that are initialed and include the installation date of Best Management Practices. These practices shall include temporary and permanent groundcover and be properly updated to reflect necessary plan and field changes for use and review by Department personnel as well as regulatory agencies.

(2) Requirements set forth under the NPDES Permit – The Department's NPDES Stormwater permit (NCS000250) outlines certain objectives and management measures pertaining to construction activities. The permit references *NCG010000, General Permit to Discharge Stormwater* under the NPDES, and states that the Department shall incorporate the applicable requirements into its delegated Erosion and Sediment Control Program for construction activities disturbing one or more acres of land. The Department further incorporates these requirements on all contracted bridge and culvert work at jurisdictional waters, regardless of size. Some of the requirements are, but are not limited to:

(a) Control project site waste to prevent contamination of surface or ground waters of the state, i.e. from equipment operation/maintenance, construction materials, concrete washout, chemicals, litter, fuels,

lubricants, coolants, hydraulic fluids, any other petroleum products, and sanitary waste.

(b) Inspect erosion and sediment control/stormwater devices and stormwater discharge outfalls at least once every 7 calendar days, twice weekly for construction related *Federal Clean Water Act, Section 303(d)* impaired streams with turbidity violations, and within 24 hours after a significant rainfall event of 0.5 inch that occurs within a 24 hour period.

(c) Maintain an onsite rain gauge or use the Department's Multi-Sensor Precipitation Estimate website to maintain a daily record of rainfall amounts and dates.

(d) Maintain erosion and sediment control/stormwater inspection records for review by Department and Regulatory personnel upon request.

(e) Implement approved reclamation plans on all borrow pits, waste sites and staging areas.

(f) Maintain a log of turbidity test results as outlined in the Department's Procedure for Monitoring Borrow Pit Discharge.

(g) Provide secondary containment for bulk storage of liquid materials.

(h) Provide training for employees concerning general erosion and sediment control/stormwater awareness, the Department's NPDES Stormwater Permit NCS000250 requirements, and the applicable requirements of the *General Permit, NCG010000.*

(i) Report violations of the NPDES permit to the Engineer immediately who will notify the Division of Water Quality Regional Office within 24 hours of becoming aware of the violation.

(3) Quality Control Program – Maintain a quality control program to control erosion, prevent sedimentation and follow provisions/conditions of permits. The quality control program shall:

(a) Follow permit requirements related to the Contractor and subcontractors' construction activities.

(b) Ensure that all operators and subcontractors on site have the proper erosion and sediment control/stormwater certification.

(c) Notify the Engineer when the required certified erosion and sediment control/stormwater personnel are not available on the job site when needed.

(d) Conduct the inspections required by the NPDES permit.

(e) Take corrective actions in the proper timeframe as required by the NPDES permit for problem areas identified during the NPDES inspections.

(f) Incorporate erosion control into the work in a timely manner and stabilize disturbed areas with mulch/seed or vegetative cover on a section-by-section basis.

(g) Use flocculants approved by state regulatory authorities where appropriate and where required for turbidity and sedimentation reduction.
(h) Ensure proper installation and maintenance of temporary erosion and sediment control devices.
(i) Remove temporary erosion or sediment control devices when they are no longer necessary as agreed upon by the Engineer.
(j) The Contractor's quality control and inspection procedures shall be subject to review by the Engineer. Maintain NPDES inspection records and make records available at all times for verification by the Engineer.

(B) *Certified Foreman* – At least one Certified Foreman shall be onsite for each type of work listed herein during the respective construction activities to control erosion, prevent sedimentation and follow permit provisions:

(1) Foreman in charge of grading activities
(2) Foreman in charge of bridge or culvert construction over jurisdictional areas
(3) Foreman in charge of utility activities

The Contractor may request to use the same person as the Level II Supervisor and Level II Foreman. This person shall be onsite whenever construction activities as described above are taking place. This request shall be approved by the Engineer prior to work beginning.

The Contractor may request to name a single Level II Foreman to oversee multiple construction activities on small bridge or culvert replacement projects. This request shall be approved by the Engineer prior to work beginning.

(C) *Certified Installers* – Provide at least one onsite, Level I Certified Installer for each of the following erosion and sediment control/stormwater crew:

(1) Seeding and Mulching
(2) Temporary Seeding
(3) Temporary Mulching
(4) Sodding
(5) Silt fence or other perimeter erosion/sediment control device installations
(6) Erosion control blanket installation
(7) Hydraulic tackifier installation
(8) Turbidity curtain installation
(9) Rock ditch check/sediment dam installation
(10) Ditch liner/matting installation
(11) Inlet protection
(12) Riprap placement
(13) Stormwater BMP installations (such as but not limited to level spreaders, retention/detention devices)

(14) Pipe installations within jurisdictional areas

If a Level I *Certified Installer* is not onsite, the Contractor may substitute a Level II Foreman for a Level I Installer, provided the Level II Foreman is not tasked to another crew requiring Level II Foreman oversight.

(D) *Certified Designer* – Include the certification number of the Level III-B Certified Designer on the erosion and sediment control/stormwater component of all reclamation plans and if applicable, the certification number of the Level III-A Certified Designer on the design of the project erosion and sediment control/stormwater plan.

Preconstruction Meeting

Furnish the names of the *Certified Erosion and Sediment Control/Stormwater Supervisor*, *Certified Foremen, Certified Installers* and *Certified Designer* and notify the Engineer of changes in certified personnel over the life of the contract within 2 days of change.

Ethical Responsibility

Any company performing work for the North Carolina Department of Transportation has the ethical responsibility to fully disclose any reprimand or dismissal of an employee resulting from improper testing or falsification of records.

Revocation or Suspension of Certification

Upon recommendation of the Engineer to the certification entity, certification for *Supervisor*, *Certified Foremen, Certified Installers* and *Certified Designer* may be revoked or suspended with the issuance of an *Immediate Corrective Action (ICA), Notice of Violation (NOV),* or C*ease and Desist Order* for erosion and sediment control/stormwater related issues.

The Engineer may recommend suspension or permanent revocation of certification due to the following:

(A) Failure to adequately perform the duties as defined within this certification provision.
(B) Issuance of an ICA, NOV, or Cease and Desist Order.
(C) Failure to fully perform environmental commitments as detailed within the permit conditions and specifications.
(D) Demonstration of erroneous documentation or reporting techniques.
(E) Cheating or copying another candidate’s work on an examination.
(F) Intentional falsification of records.
(G) Directing a subordinate under direct or indirect supervision to perform any of the above actions.
(H) Dismissal from a company for any of the above reasons.
(I) Suspension or revocation of one’s certification by another entity.

Suspension or revocation of a certification will be sent by certified mail to the certificant and the Corporate Head of the company that employs the certificant.

A certificant has the right to appeal any adverse action which results in suspension or permanent revocation of certification by responding, in writing, to the Engineer within 10 calendar days after receiving notice of the proposed adverse action.

Failure to appeal within 10 calendar days will result in the proposed adverse action becoming effective on the date specified on the certified notice. Failure to appeal within the time specified will result in a waiver of all future appeal rights regarding the adverse action taken. The certificant will not be allowed to perform duties associated with the certification during the appeal process.

The Engineer will hear the appeal and make a decision within 7 days of hearing the appeal. Decision of the Engineer will be final and will be made in writing to the certificant.

If a certification is temporarily suspended, the certificant shall pass any applicable written examination and any proficiency examination, at the conclusion of the specified suspension period, prior to having the certification reinstated.

Measurement and Payment

Certified Erosion and Sediment Control/Stormwater Supervisor, Certified Foremen, Certified Installers and *Certified Designer* will be incidental to the project for which no direct compensation will be made.

Special Provisions

MOBILIZATION

DESCRIPTION

This item consists of preparatory work and operations, including but not limited to the movement of personnel, equipment, supplies, and incidentals to each airport project site and to perform the required work and the removal and disbandment of those personnel, equipment, supplies, or incidentals that are used for the prosecution of the work.

COMPENSATION

All work covered by this section will be paid for at the contract price for "Mobilization for ….." The Contractor will be eligible to receive the contract price for each type of Mobilization once per each airport where applicable work is performed under this contract, after acceptance of the work by the Engineer.

PRODUCTION TIME

Production time allotted for the summation of all required mobilizations to an airport is limited to no more than three (3) days for each project.

BASIS OF PAYMENT

Payment for "Mobilization for……" will be per each airport and will be made available after satisfactory completion of the required work under this contract at each airport.

Payment will be made under:

"Mobilization for Hot-Applied Crack and Joint Sealing……. Ea."

"Mobilization for Full Depth Asphalt Pavement Patching…….. Ea."

"Mobilization for Flexible Repair of Concrete and Asphalt Pavement……..... Ea."

"Mobilization for Rigid Repair of Concrete Pavement…….……..……Ea."

"Mobilization for Silicone Joint and Crack Sealing…..……..... Ea."

"Mobilization for Asphalt Rejuvenation……...……... Ea."

"Mobilization for Runway Rubber Removal……... Ea."

"Mobilization for Airfield Marking……. Ea."

"Mobilization for Pavement Marking Removal…….. Ea."

"Mobilization for Polymer Composite Micro-Overlay…… Ea."

"Mobilization for Raised Pavement Markers…….....Ea."

"Mobilization for Pipe Joint Sealing Backgrouting and Soil Stabilization……..……Ea."

"Mobilization for Concrete Pavement Leveling and Undersealing…..……..... Ea."

"Mobilization for Thermoplastic Coal-Tar Emulsion……...…….....Ea."

"Mobilization for Aircraft Tie Downs……. Ea."

"Mobilization for Anchored Airfield Light Mats…….Ea."

"Mobilization for Pavement Marking & Surface Cleaning……. Ea."

"Mobilization for Shoulder, Slope, and Eroded Section Reconstruction…….....Ea."

"Mobilization for Seeding and Mulching……...……..……Ea."

"Mobilization for Coal Tar Emulsion Slurry Seal……...……..…….. Ea."

"Mobilization for General Labor Crew……...……..……...Ea."

"Mobilization for Pavement Texturing…… Ea."

HOT-APPLIED CRACK AND JOINT SEALING FOR CONCRETE AND ASPHALT PAVEMENTS

DESCRIPTION

Description:
This item shall consist of providing and installing a resilient and adhesive crack and joint sealant, hot-applied, capable of effectively sealing cracks and joints in both rigid (PCC) and flexible (bituminous) pavements, in areas as shown on the plans or as directed by the Engineer. This work includes the removal of existing, loose, or damaged sealant material where applicable, preparation of the cracks and joints, preparation of the sealant material, and the complete and proper installation of the sealant repair system. The selection of sealant material types will be based on field conditions, performance requirements, and at the discretion of the Engineer.

References:
FAA AC 150/5380-6B, Appendix B, Item M-361

MATERIALS

Type A, Crack and Joint Sealant:
The material used to seal the cracks and joints shall meet or exceed the following minimum specifications noted in Table 1 when tested for conformance with ASTM D6690, Type I Limits, formerly ASTM D1190:

TABLE 1 – Type A Material Properties

Test	ASTM D6690, Type I Limits
Cone Penetration, 77°F (25°C) (ASTM D3407)	90 max.
Flow, 140°F (60°C)	5 mm max.
Softening Point	176°F (80°C) min.
Bond, 0°F (-18°C), 50% ext.	Pass 5 cycles
Recommended Application Temperature	380°F (193°C)
Safe (Maximum) Heating Temperature	400°F (204°C)
Workability	Capable of being melted and applied through a pressure feed, indirect heated, agitated melter

TABLE 2 – Type A Material Composition

Composition	Requirement
Recycled Rubber Content (by asphaltic components)	18% min.
Recycled Rubber Gradation (% passing)	
#10	95-100%
#20	35-55%
#40	0-25%
Unit weight @ 60°F (15.5°C)	10.0 lb/gal. Max.

Notes:

1. The above specifications are those of CRAFCO product "Asphalt Rubber Plus Sealant."

2. Other products may be available which meet or exceed these criteria and such products may be used, however, proof of conformance to criteria must be submitted with your bid.

Type B, Crack and Joint Sealant:
The material used to seal the joints and cracks shall be a fiberized asphalt sealant and shall meet the following material properties and specification limits in Tables 3 and 4 and the sealant must contain 5 +/- ½ % by weight polyester fibers blended with high quality modified asphalt cement.

TABLE 3 – Type B Fiber Properties

Type	Polyester
Denier	3 to 5
Length	¼ inch (0.6mm)
Specific Gravity	1.38
Melt Temperature	478°F to 490°F (248-254°C)
Tensile Strength	78,000 to 88,000 psi (53,708 to 60,632 N/cm^2)
Elongation at Break	35-38%

TABLE 4 – Specification Limits

Property	**Recommended Spec Limits**
Recommended Application Temperature	350°F (177°C)
Safe (Maximum) Heating Temperature	400°F (204°C)
Softening Point (ASTM D36)	210°F (99°C) min.
Flexibility, 1in, 25mm 10F(-12C), 90 deg. bend, 10 sec.	Pass @ 20°F (-7°C)
Cone Penetration, 77F (ASTM D5329)	20 max.
Ductility, 77F, 5 cm/min. (ASTM D113)	10 cm min.
Asphalt Compatability (ASTM D5329)	Pass
Workability	Capable of being melted and applied through pressure feed indirect heated, agitated melter

Notes:

1. The above specifications are those of CRAFCO product "Poly-Fiber, Type 4 Sealant."

2. Other products may be available which meet or exceed these criteria and such products may be used, however, proof of conformance to criteria must be submitted with your bid.

Type C, Crack and Joint Sealant:
The material used to seal the joints and cracks shall meet or exceed the following minimum specifications noted in Table 5 when tested for conformance with ASTM D6690, Type I Limits, formerly ASTM D1190:

TABLE 5 – Type C Material Properties

Test	ASTM D6690, Type I Limits
Cone Penetration, 77°F (25°C) (ASTM D3407)	90 max.
Flow, 140°F (60°C)	5 mm max.
Softening Point	176°F (80°C) min.
Bond, 0°F (-18°C), 50% ext.	Pass 5 cycles
Asphalt Compatibility	Pass
Recommended Application Temperature	380°F (193°C)
Safe (Maximum) Heating Temperature	400°F (204°C)
Workability	Capable of being melted and applied through a pressure feed, indirect heated, agitated melter

Notes:

1. The above specifications are those of CRAFCO product "Roadsaver 211"

2. Other products may be available which meet or exceed these criteria and such products may be used, however, proof of conformance to criteria must be submitted with your bid.

Backer Rod Material:
Backer rod materials and bond breakers should be compatible with the sealant, should not adhere to the sealant, should be compressible without extruding the sealant, and should recover to maintain contact with the joint faces when the joint is open. The backer rod will be 25 percent larger in diameter than the width of the reservoir.

Herbicide/Soil Sterilant:
The herbicide/soil sterilant must kill all vegetation residing within the pavement joints and cracks to be sealed, and render the soil sterile for a period of 6 months or more. Material Safety Data Sheets for the herbicide/soil sterilant must be submitted to the Engineer prior to any application. A compatible dye shall be properly mixed with the herbicide/sterilant prior to application. Contractor must follow all applicable local, state, and federal laws for the handling and application of herbicide/soil sterilant. All herbicide/soil sterilant materials must be supplied in accordance with section 1060-13 of the Standard Specifications for Roads and Structures.

Material Acceptance:
The Contractor shall furnish a Type 7 Contractor Certification, with an attached Type 1 Certified Mill Test Report in accordance with Article 106-3 of the Standard Specifications for Roads and Structures for all sealant material shipped to the airport for use on the project. The Suppliers Boxes of sealant are to be palletized for shipment. The pallets are to be protected with a weatherproof covering. The Contractor shall be responsible for storage, clean up, and all trash disposal.

EQUIPMENT

The Contractor shall furnish all equipment and hardware necessary for the performance of the work in accordance with these specifications. All machines, tools and equipment used in the performance of work required by these specifications will be subject to the approval of the Engineer and maintained in a satisfactory working condition at all times.

Melter/Applicator:
The melter/applicator unit shall be a 100 gallon tank (min) trailer mounted self-contained double boiler device with the transmittal of heat through a heat transfer oil. It must be equipped with an onboard automatic heat-controlling device to permit the attainment of a predetermined temperature, and then maintain that temperature for as long as required. The unit shall have a means to vigorously and continuously agitate the sealant. The sealant shall be transferred from the unit to the crack by means of a direct-connect feed hose and wand. The equipment should be designed to allow the sealant to be circulated back into the unit when sealing is not being performed or equipped with a temperature controlled heated hose and wand that does not require circulation. The sealant should not be heated to a temperature in excess of that specified by the manufacturer.

Hot Compressed Air Lance:
The hot compressed air lance, constructed of suitable hardware, shall be capable of producing a concentrated air jet that is a minimum of 3000°F in temperature, and that has a minimum air jet force of 3000 fps (feet per second) of blasting velocity. It shall be provided with separate valves to fuel, burner air, and lance air. The fuel and burner air shall be mixed only at the point of combustion before leaving the burner tube. At the fuel source, a high-pressure regulator to control fuel pressure and to prevent flashback shall be used. No external flame shall be allowed to touch the pavement.

Air Compressor and Air Wand:
The air compressor and air wand shall be of commercial grade and capable of 100% continuous duty cycle. The compressor shall have an operable oil and water trap and shall deliver a steady flow of compressed air free of oil and water through the air wand

Pavement Router/Saw:
The router / saw machine or machines shall be portable, wheel mounted, gasoline or diesel powered, with rock deflectors and a safety shut-off in working order. The machine shall be capable of following both straight and random cracks and joints. The machine shall be

capable of sawing and routing both rigid and flexible pavements, and be capable of adjusting the cutting width from ½ inch to 1¾ inch with minimal spalling. The cutters/blades used for routing and sawing shall be in the shape of the required square or rectangular rout profile. The machine shall be equipped with a cutter head clutch and shall have an adjustable depth control.

Power Broom/Vacuum Truck:
Tractor mounted power broom or vacuum truck capable of removing all FOD from pavement surfaces.

Blowers:
Backpack, handheld, or wheeled blowers capable of removing FOD from pavement surfaces.

CONSTRUCTION METHODS

Time of Application:
Do not apply pavement crack and joint sealant when pavement surface temperatures are below 45°F, moisture is present on the pavement, or rain is imminent. The months of March, April, May, September, October and November in North Carolina usually provide optimum surface crack contraction and field weather conditions for crack sealing operations.

Herbicide/Soil Sterilant:
A minimum of ten (10) days and a maximum of thirty (30) days before any routing / sawing and sealing, all vegetation in the pavement cracks and joints to be sealed shall be treated with an approved herbicide/soil sterilant. To ensure all required areas have been sprayed, and to prevent overlapping, the **temporary dye** shall clearly identify all locations of herbicide/soil sterilant application. The herbicide/soil sterilant must be placed on the cracks at the rate and methods recommended by the manufacturer. All herbicide/soil sterilant must be used in accordance with section 1060-13 of the Standard Specifications for Roads and Structures.

Preparation of Joints in Rigid Pavements
All existing joint sealants and foreign material will be removed by routing / plowing. Any remaining sealant and debris will be removed by use of wire brushes or other tools as necessary. In some instances, re-sawing the joints may be required in areas where the existing joint faces cannot be thoroughly cleaned to satisfactorily promote the effectiveness and adherence of the new sealant or as directed by the Engineer. Immediately after sawing, the resulting slurry will be completely removed from the joint and adjacent area by flushing with a jet of water, and by use of other tools as necessary. The joint reservoir width to depth ratio should be as close to 1:1 as practical when re-sawing is required. The use of backer material may be required to obtain the desired ratio at the reservoir or as recommended by the sealant manufacturer.

Immediately before sealing, the joints will be thoroughly cleaned of all remaining laitance, curing compound, and other foreign material. Cleaning will be accomplished by sandblasting. Sandblasting will be accomplished in a minimum of two passes. One pass per joint face with the nozzle held at an angle directly toward the joint face and not more that 3 inches from it. Upon completion of cleaning, the joints will be blown out using an air compressor and air wand or comparable tool with compressed air free of oil and water. Only air compressors with operable oil and water traps will be used to prepare the joints for sealing. The joints will be sufficiently clean and dry prior to sealing.

Preparation of Joints in Flexible Pavements

All existing joint sealants and foreign material will be removed by routing / plowing. Any remaining sealant and debris will be removed by use of a hot compressed air lance. In some instances, re-sawing the joints may be required where the existing joint faces cannot be thoroughly cleaned to satisfactorily promote the effectiveness and adherence of the new sealant. If re-sawing the joints is required, immediately after sawing, the joint faces will be cleaned by use of a hot compressed air lance and compressed air free of oil and water. The joint reservoir width to depth ratio should be as close to 1:1 as practical when re-sawing is required. The use of backer material may be required to obtain the desired ratio at the reservoir or as recommended by the sealant manufacturer.

Immediately before sealing, the joints will be thoroughly cleaned of all remaining foreign material. Cleaning will be accomplished by use of a hot compressed air lance. The joints will be sufficiently clean and dry prior to sealing.

Preparation of Cracks in Rigid Pavements

All cracks will be cleaned of any debris or laitance by use of wire brushes or other tools as necessary. Routing / sawing the cracks is required as specified in **Table 6**. Immediately after routing / sawing, the resulting slurry will be completely removed from the crack and adjacent area by flushing with a jet of water, and by use of other tools as necessary. The crack reservoir width to depth ratio should be as close to 1:1 as practical when routing / sawing is required, with a ½ inch minimum width required

Immediately before sealing, the cracks will be thoroughly cleaned of all remaining laitance, curing compound, and other foreign material. Cleaning will be accomplished by sandblasting. Sandblasting will be accomplished in a minimum of two passes. One pass per crack face with the nozzle held at an angle directly toward the crack face and not more than 3 inches from it. Upon completion of cleaning, the cracks will be blown out using an air compressor and air wand or comparable tool with compressed air free of oil and water. The cracks will be sufficiently clean and dry prior to sealing.

Preparation of Cracks in Flexible Pavements
All cracks will be cleaned of any debris or laitance by use of a hot compressed air lance or other tools as necessary. Routing / sawing the cracks is required as specified in **Table 6**. The resulting debris will be completely removed from the crack and adjacent area by a hot compressed air lance, and by use of other tools as necessary. The crack reservoir width to depth ratio should be as close to 1:1 as practical when routing / sawing is required, with a ½ inch minimum width required

Immediately before sealing, the cracks will be thoroughly cleaned of all remaining foreign material. Cleaning will be accomplished by use of a hot compressed air lance. The cracks will be sufficiently clean and dry prior to sealing.

TABLE 6 – Crack Sealing Criteria

Crack Width	Action
Less than ¼"	Do not seal.
From ¼" to 1 ¾"	Routing / Sawing shall remove at least ⅛ from each sidewall. The profile of the rout / saw cut shall be square or rectangular, and shall have a minimum required width and depth of ½ inch. The crack reservoir width to depth ratio should be close to 1:1 Only route if cracks are reasonably straight and are capable of being routed without excessively damaging the existing pavement.
Greater than 1 ¾"	Shall be repaired as directed by the Engineer

***Note: The Engineer must approve any exceptions to these criteria. ***

Installation of Sealant:
Cracks and joints will be sealed as soon after completion of the pavement preparation as feasible and preferably before the pavement is opened to traffic, including construction equipment. In addition, cracks and joints will be inspected for proper width, depth, alignment, and preparation, and will be approved by the Engineer before sealing is allowed. Any backing material required to obtain the desired width to depth ratio in joints shall be properly installed such that it will be both non-reactive and non-adhesive to the pavement or sealant material. Sealant shall be applied in the properly prepared cracks and joints at the manufacturer's recommended application temperature. The sealant will not be heated to more than 20˚F (-11˚C) below the safe heating temperature. The sealant will be applied uniformly solid from bottom to top by using the pressure screed shoe to completely fill the reservoir without formation of entrapped air or voids. Joints and cracks shall be filled flush with the surface, and then a squeegee or other acceptable tool shall immediately strike off any excess material on the surface. Overbanding shall not exceed two (2) inches beyond the crack and joint edges, and the surface of the installed sealant material will be ¼ inch below the existing pavement surface. For further instructions, see the "Pavement Crack and Joint Sealing Procedure."

Protection and Cleanup:
All pavement surfaces and all work areas shall be completely clean. Traffic shall not be permitted on the pavement in the areas of the treated cracks and joints during the curing period or before cleaning has occurred. The Contractor shall supply all temporary traffic control devices to protect the sealant and local traffic, as required and approved by the Engineer. Any damage to uncured sealant shall be repaired at the Contractor's expense. The Contractor shall be responsible for clean-up and removal from the work area all debris, waste, residual repair materials, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **one (1) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

The amount of the sealant material to be paid for will be the actual number of pounds of material that has satisfactorily been used to seal pavement cracks in accordance with these specifications and designated locations as shown in this contract or provided by the Engineer. Any material that has been spilled, used in excessive overbanding, wasted, misapplied, or unsatisfactorily used in any way will be deducted in determining quantities for payment. The Engineer will determine the quantity, if any, to be deducted. The Engineer's decision on the quantity to be deducted will be final and binding.

BASIS OF PAYMENT

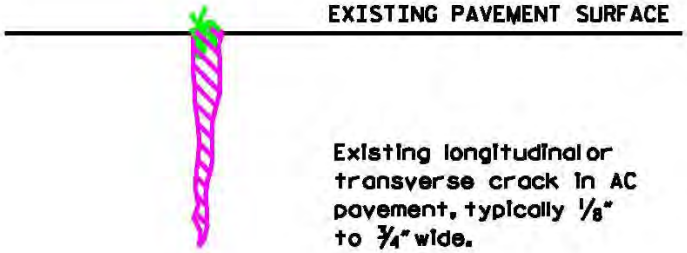
The quantity of sealant material, measured as above, will be paid for at the contract unit price per pound. The above price and payment will be full compensation for all work required to seal the pavement cracks including but not limited to furnishing, hauling, loading, and unloading, and storage of all needed materials; application of herbicide, routing, cleaning and preparation of cracks to be sealed; application of an approved soil sterilant, application of the approved sealant material in the prepared cracks, clean-up, and any incidentals necessary to satisfactorily complete the work.

Payment will be made under:

"Asphalt Crack and Joint Sealing……Pounds"

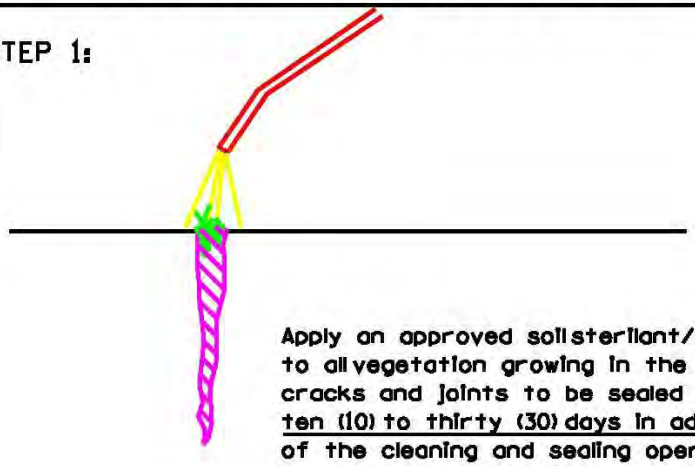
"Concrete Crack and Joint Sealing……..Pounds"

PAVEMENT CRACK AND JOINT SEALING PROCEDURE



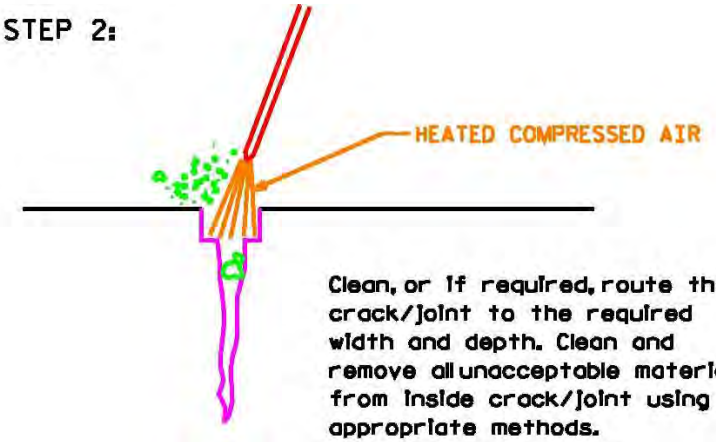
Existing longitudinal or transverse crack in AC pavement, typically 1/8" to 3/4" wide.

STEP 1:



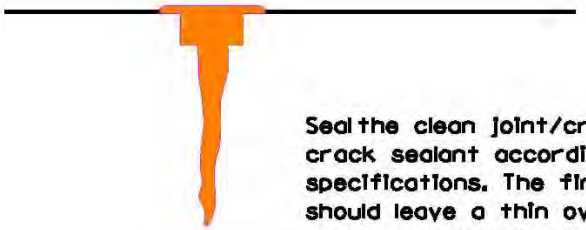
Apply an approved soil sterilant/herbicide to all vegetation growing in the cracks and joints to be sealed ten (10) to thirty (30) days in advance of the cleaning and sealing operation.

STEP 2:



Clean, or if required, route the crack/joint to the required width and depth. Clean and remove all unacceptable material from inside crack/joint using appropriate methods. There should not be the presence of any moisture, dust, and loose incompressible material.

STEP 3:



Seal the clean joint/crack with crack sealant according to specifications. The final seal should leave a thin overband completely covering both edges of the joint/crack.

7/1/03 NOT TO SCALE D:\dgn\standard\cincrack.dgn

FULL DEPTH ASPHALT PAVEMENT PATCHING

DESCRIPTION

This item shall consist of repairing the existing flexible pavement in designated areas chosen by the Engineer with full depth asphalt patching. This work shall consist of removing the existing material below the existing finished grade, compacting the subgrade, and placing and compacting bituminous material in the excavated area.

MATERIAL

The type of plant mix material must be in accordance with the pavement detail contained in this contract, except where the Engineer permits the substitution of another type of approved plant mix. The asphalt concrete base course shall be the Superpave base course mix, B 25.0B, and the asphalt concrete surface course shall be Superpave S-9.5B mix.

EQUIPMENT

The Contractor shall provide all equipment necessary to remove and dispose of existing pavement materials, compact subgrade, transport, place, and compact new asphalt concrete according to the following specifications.

WEATHER LIMITATIONS

The air temperature forty-eight (48) continuous hours prior to paving must be above 32°F. All paving operations shall be in accordance with Article 610-4 of the Standard Specifications for Roads and Structures. The Contractor shall not begin pavement removal if rain is imminent.

CONSTRUCTION METHODS

The Contractor shall repair the existing pavement in designated areas with full depth asphalt patching as directed by the Engineer. This patching shall include, but is not limited to, the cutting of the existing pavement to a neat vertical joint and uniform line; the removal and disposal of pavement, base, and subgrade material to a depth as shown on the plans or as determined by the Engineer below the existing finished grade; the compaction of the subgrade; the coating of the area to be repaired with a tack coat; and the replacement of the removed material with asphalt plant mix. The existing pavement shall be removed in accordance with Section 250 of the Standard Specifications.

All asphalt patching shall be constructed in accordance with Section 600 of the Standard Specifications. Asphalt concrete base course, Superpave B 25.0B, shall be placed in lifts not less than 3 inches compacted and not to exceed 5.5 inches compacted. Asphalt concrete surface course, Superpave S-9.5B, shall be placed in lifts not less than 1.5 inches compacted and not to exceed 2 inches compacted. Compaction equipment suitable for compacting patches as small as 3.5-feet by 6-feet shall be utilized on each lift. Compaction pattern to achieve proper compaction shall be approved by the Engineer.

All joints and other patch surfaces shall be checked using a 10-foot non-mobile straightedge and the variation of the surface from the straightedge shall not exceed 1/4 inch between any two contact points on the runway and shall not exceed 1/2 inch between any two contact points on taxiways and aprons. The 10-foot straightedge is furnished by the Contractor and must be used by both the Contractor and the DOT inspector to assure that the surface at joints and all other pavement patch surfaces meet this requirement. The patching operation shall not begin until this 10-foot straightedge is on hand at the patching site. Skin patches will not be accepted.

The Contractor shall schedule his operations so that all areas where pavement has been removed will be repaired on the same day of the pavement removal.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **one (1) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHODS OF MEASUREMENT

The quantity of full depth asphalt patching to be paid for will be the actual number of tons of asphalt plant mix, complete in place, which has been used to make complete and accepted repairs, except for those repairs that have been made necessary by the Contractor's negligence. The asphalt plant mixed material will be measured by being weighed in trucks on certified platform scales or other certified weighing devices.

BASIS OF PAYMENT

Payment for the item "Full Depth Asphalt Patching" shall be compensation for all work covered by this provision, including but not limited to excavation and compaction of repair areas; removal and disposal of the existing pavement and base material; furnishing and applying tack coat; and furnishing, placing, and compacting bituminous material.

Payment will be made under:

"Full Depth Asphalt Pavement Patching …….....Tons"

FLEXIBLE REPAIR OF CONCRETE AND ASPHALT PAVEMENT

DESCRIPTION

This item shall consist of repairing large cracks, joints, spalls, and small potholes using a hot-applied, flexible, concrete/asphalt repair material in accordance with these specifications for the areas shown on the plans or as directed by the Engineer.

MATERIALS

TABLE 1 – Material Properties

Binder Properties	Test Method	Requirement
Bond	ASTM D 6690	Pass, 3 cycles @ -20°C, 50%
Penetration	ASTM D 5329	1 mm min @ -18°C, 200 g, 60 sec 9 mm max @ 25°C, 150 g, 5 sec
Ductility	ASTM D113	40 cm min @ 25°C
Flexibility	ASTM D5329	Pass @ -12°C
Flow	ASTM D5329	3 mm max @ 60° @ 5 hours
Resilience	ASTM D5329	40% min @ 25°C
Softening Point	ASTM D36	82°C min
Elongation		500% min
Wheel tracking@ 122°F	BS598	4.8mm/h
Safe Heating Temperature		230°C (440°F)
Recommended Pouring Temperature		185°C to 199°C (365°F-390°F)

The specifications in Table 1 are those of both Fibrecrete-B and Fibrecrete-G. Fibrecrete-B is a black hot-applied mastic asphalt binder with 36% bitumen content, polymers mixed with graded fillers, recycled steel fibers, aggregate, and recycled tire rubber. Fibrecrete-G is a grey hot-applied synthetic polymer modified resin binder.

Other products may be available which meet or exceed these specifications.

Sufficient material to perform the entire crack or spall repair application shall be in proper storage at the site prior to any field preparation, so that there shall be no delay in procuring the material for each days application.

Material Acceptance:
All of the concrete/asphalt repair materials shall be delivered unopened in their original containers bearing the manufacturer's label, specifying date of manufacture, batch number, trade name or brand, and quantity. The Contractor shall furnish a Material Safety Data Sheet (MSDS), and a Type 7 Contractor Certification with an attached Type 1 Certified Mill Test Report in accordance with Article 106-3 of the Standard Specifications for Roads and Structures, for all concrete/asphalt repair material shipped to the airport for use on the project.

EQUIPMENT

The Contractor shall provide all equipment necessary to remove, clean, and prepare the failing concrete/asphalt, place the concrete/asphalt repair material according to the manufacturer's installation requirements at all locations identified in the plans or as directed by the Engineer. The Contractor shall also provide the necessary equipment for removing all debris on the airfield generated from this work.

CONSTRUCTION METHODS

Weather Limitations:
Do not apply the concrete/asphalt repair material when pavement surface temperature is below 40°F, moisture is present on the surface of the pavement, or rain is imminent.

Surface Preparation:
The joint/crack, spall or pot hole will be saw-cut/milled or jack hammered to the specified width and depth at the Engineers discretion. The joint/crack, spall or pot hole surfaces will be cleaned and dried with a hot air lance capable of producing air temperatures in excess of 2500°F and directional velocities exceeding 2500 fps. The top edges of the repair will be masked to prevent unsightly overspill. All recessed areas and vertical walls will be treated with a primer agent to promote adhesion and prevent moister intrusion (for concrete applications only).

Installation:
The concrete/asphalt repair material will be heated in a thermostatically controlled mixer, having a horizontal agitator that ensures complete mixing. Once the material has reached approximately 300°F, the molten concrete/asphalt repair material will be introduced into the prepared repair area, sealing the bottom of the repair from water intrusion. If the depth of the repair exceeds 1 inch, the remainder of the repair process will consist of layering coarse hot angular aggregate (cleaned and dried) at a rate of 25%- 35% by volume with the molten Fibrecrete until within ¾" of the top of the repair. The final ¾" of the repair will be a Fibrecrete material for optimum flexibility of the repair. Once this top layer has been leveled with a hot iron, a high PSV (polished stone value) topping aggregate will be applied to the top of the repair to ensure proper skid resistance. The concrete/asphalt repair material shall be ready for traffic within 1 hour.

Protection and Cleanup:
The Contractor shall protect the concrete/asphalt repair until ready for traffic by placing guarding or warning devices as necessary. In the event any traffic crosses the uncured concrete/asphalt repair, the Contractor shall take corrective action to the satisfaction of the Engineer. The Contractor shall be responsible for clean-up and removal from the work area all debris, waste, residual repair materials, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **two (2) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

The amount of the concrete/asphalt repair material to be paid for will be the actual number of pounds of material that has satisfactorily been used to repair concrete/asphalt pavement distresses in accordance with these specifications and at designated locations as shown in this contract or provided by the Engineer. Any material that has been spilled, used in excessive overlap, wasted, misapplied, or unsatisfactorily used in any way will be deducted in determining quantities for payment. The Engineer will determine the quantity, if any, to be deducted. The Engineer's decision on the quantity to be deducted will be final and binding.

BASIS OF PAYMENT

Upon final inspection and after the Engineer's final acceptance of work, the quantity of concrete/asphalt repair material, will be paid for at the contract unit price per pound. The above price and payment will be full compensation for all work required to repair the pavement distresses including but not limited to furnishing, hauling, loading, and unloading, and storage of all needed materials; application of, cleaning and preparation of distresses to be repaired; application of the approved concrete/asphalt repair material in the prepared distresses, clean-up, and any incidentals necessary to satisfactorily complete the work.

Payment will be made under:

"Concrete/Asphalt Repair – Fibercrete B……..…...Pounds"

"Concrete/Asphalt Repair – Fibercrete G…….Pounds"

RIGID REPAIR OF CONCRETE PAVEMENT

1) DESCRIPTION

1.1 Description:

This item consists of repairing pavement distresses (e.g., cracks, spalls, corner breaks, etc.) in rigid (Portland Cement Concrete) pavements, as well as patching of small areas (less than 5 square feet) of PCC pavements. This work consists of: saw cutting, chipping, and removing the existing unsound PCC pavement; cleaning and preparing the area for the repair materials. This work also includes placing, vibrating, and finishing the repair material to reconstruct the PCC pavements, in accordance with this specification.

1.2 References:

FAA AC 150/5380-6B, Appendix B, M-564

2) MATERIALS

The repair method and material will be of the type specified below for the appropriate application, outlined in "Table 1 – Repair Material Usage Matrix," as directed by the Engineer.

Table 1. Repair Material Usage Matrix

PAVEMENT DISTRESS	**TYPE 1** (Conventional)	**TYPE 2A** (Pre-packaged w/ Aggregate)	**TYPE 2B** (Pre-packaged w/o Aggregate)	**TYPE 3** (Rapid Setting, Early Strength)
CORNER BREAKS	Permanent	Permanent	n/a	Permanent
DURABILITY "D" CRACKING	Permanent	Temporary/ Emergency	Temporary/ Emergency	Temporary/ Emergency
SCALING, MAP CRACKING AND CRAZING	Permanent	n/a	n/a	n/a
JOINT SPALLING	n/a	Permanent	Permanent	Permanent
CORNER SPALLING	n/a	Permanent	Permanent	Permanent
PATCHING, SMALL (less than 5 square feet)	n/a	Permanent	Permanent	Permanent
PATCHING, LARGE AND UTILITY CUTS	Permanent	n/a	n/a	Temporary/ Emergency
SHATTERED SLAB / INTERSECTING CRACKS	Permanent	n/a	n/a	n/a
BLOWUPS	Permanent	n/a	n/a	n/a

A. Type 1 – Conventional Concrete Mixture:
The conventional concrete mixture will conform to FAA specification P-501 for materials. This repair method is considered a permanent, long term repair as it is typically used for large repair areas requiring 3 cubic yards or more of mix supplied by a local concrete mixing plant.

B. Type 2A – Pre-packaged Cementitious Mixture with Aggregate:
The pre-packaged, one-component, cementitious mixture will have a minimum compressive strength of 5,000 psi in 7 days when tested in accordance with ASTM C 39. Bond strength will be 2,000 psi in 7 days when tested in accordance with ASTM C 882. The aggregate will conform to the requirements of ASTM C 33. This repair method may be used for either permanent or temporary/emergency repairs dependent on the distress type, as noted in Table 1. Preparation of materials (mixing with potable water, blending, etc) will be per manufacturer's requirements for the product.

C. Type 2B – Pre-packaged Cementitious Mixture without Aggregate:
The pre-packaged, one-component, cementitious mixture will have a minimum compressive strength of 5,000 psi in 7 days when tested in accordance with ASTM C 39. Bond strength will be 2,000 psi in 7 days when tested in accordance with ASTM C 882. If the repair size requires the addition of coarse aggregate, the aggregate to be added maximum size will be 3/8-inch and will conform to the requirements of ASTM C 33. The aggregate will be blended into the pre-packaged mixture per the manufacturer's requirements. This repair method may be used for either permanent or temporary/emergency repairs dependent on the distress type, as noted in Table 1. Preparation of materials (mixing with potable water, blending, etc) will be per manufacturer's requirements for the product.

D. Type 3 – Rapid Setting and Early Strength Gaining Cementitious Mixture:
The rapid setting and early strength gaining cementitious mixture will have a minimum compressive strength of 2,000 psi in 2 hours and 5,000 psi in 1 day when tested in accordance with ASTM C 109. Bond strength will be 2,000 psi in 7 days when tested in accordance with ASTM C 882. This repair method may be used for either permanent or temporary/emergency repairs dependent on the distress type, as noted in Table 1. Preparation of materials (mixing with potable water, blending, etc) will be per manufacturer's requirements for the product.

2.2 Nonabsorbent Board:
The nonabsorbent board will be used as a joint form for the joint reservoir to be protected. The nonabsorbent board will be a standard 1/2-inch asphalt impregnated fiberboard. For joint widths greater than 1/2-inch, the width of the nonabsorbent board will be adjusted to fit the larger joint width.

2.3 Curing Compound:
The curing compound will be a white pigmented impervious membrane conforming to the requirements of ASTM C 309. The curing compound will be of such character that the film will harden within 30 minutes after application.

3) CONSTRUCTION METHODS

3.1 Time of Application:
Do not apply the concrete/asphalt repair material when pavement surface temperature is below 40°F, moisture is present on the surface of the pavement, or rain is imminent. The ambient temperature and concrete surface temperature will be within the range specified by the manufacturer's requirements for that product at the time of application.

3.2 Repair of Distresses in PCC Pavements:

A. Corner Breaks / Shattered Slabs / Blowups:

These are considered structural failures and require full-depth repairs. The procedures for repairing these types of distresses are as follows:

(1) Make full-depth saw cuts at constructed joints. The FAA recommends that full-depth cuts be made at a distance of at least 2 feet beyond the limits of the break. Make the saw cuts so the repair area is rectangular. For corner cracks, cut the repair area square.

(2) Use appropriate-sized impact equipment (e.g., jackhammer) to remove material within the limits of the saw cuts. When using a hoe-ram or removing the concrete by lifting, make a second saw cut inside the perimeter cuts to provide expansion. Remove by hand any loose materials that remain. During the repair, try to minimize any disturbance to the subgrade soils or base materials.

(3) Restore subgrade or subbase materials to the base elevation of the panel being repaired.

(4) Use epoxy coated tie-bars consisting of #4 deformed bars (#5 bars for pavements more than 12 inches thick) in the faces of the parent panel. Install by drilling into the face and using an epoxy bonding agent. Use equidistant spacing of the bars, but do not install them more than 24 inches apart. When spacing bars, do not allow their ends to overlap with those of other tie-bars or dowels.

(5) Use epoxy coated dowel bars, of the type and size of the existing dowel bars, in the joint that parallels the direction of traffic. On aprons and areas where traffic may be oblique to joints, install dowels in both joint faces. Dowels are installed by drilling and epoxying. Dowel bars will spaced at least one bar spacing away from faces parallel to the dowel bar. Space dowel bar ends at least one bar spacing apart at corners of intersecting joints. Oil exposed dowel bar ends prior to backfilling with concrete.

(6) Install nonabsorbent board within the limits of the joint seal reservoirs along the adjacent concrete panels. When repairing multiple panels, restore the joint seal reservoirs with the nonabsorbent filler board.

(7) Fill the repair area with concrete, being sure to consolidate the concrete along the limits of repair. Exercise caution when working adjacent to existing concrete faces, particularly during consolidation, and watch for segregation of the concrete. Finish the surface to match existing surface when practical.

(8) After the concrete cures, remove the nonabsorbent board by sawing. Reinstall joint seal material per silicone joint sealant specification within this contract.

B. Durability "D" Cracking:

This type of distress usually requires repairing the complete slab since "D" cracking will normally reappear adjacent to the repaired areas. Temporary/emergency repairs can be made using the technique noted in paragraph 3.2.a (Corner Breaks/Shattered Slabs/Blowups). Another temporary/emergency repair, which is not a preferred method but is a rapid repair, is the partial depth repair by milling 2-3 inches in depth by 3-4 feet in length and width and filling the patch area with a high quality HMA.

C. Scaling, Map Cracking, and Crazing:

If the distress is severe and produces FOD, the repair method is to remove and replace the area. Permanent repairs can be made using the technique noted in paragraph 3.2.a (Corner Breaks/Shattered Slabs/Blowups).

D. Joint Spalling and Corner Spalling:

The procedure for the repair of spalls is as follows:

(1) Make a vertical cut with a concrete saw 2 inches in depth and approximately 2 inches outside of the spalled area. Saw cuts will be straight lines forming rectangular areas.
(2) Remove all unsound concrete until sound, intact material has been reached (into at least 1/2-inch of visually sound concrete). Break out the unsound concrete with air hammers or pneumatic drills and blow out the area with oil-free compressed air.
(3) Clean the area to be repaired with high-pressure water. Allow patch area to dry completely if required by the patch material specification.
(4) Treat the surface (all sides and bottom, except any joint face) with a neat cement grout mixture to ensure a good bond between the existing and new concrete. It is important to maintain the joint through the full depth of the spall repair and prevent a bond between the patch and the adjacent slab, thereby eliminating point-to-point loading. Apply the grout immediately before placing the patch mixture and spread with a stiff-bristle broom or brush to a depth of 1/16 inches. The use of liquid bonding agents will be acceptable if recommended by the manufacturer's requirements.
(5) Place the nonabsorbent board in the joint groove and vibrate or tamp the new mixture into the old surface.
(6) After edging the patch, finish it to a texture matching the adjacent area. After a proper cure period, remove the nonabsorbent board by sawing. Reinstall joint seal material per silicone joint sealant specification within this contract.
(7) When there are adjacent spall repair areas within a slab, the minimum distance between repair areas is 1-1/2 feet. Therefore, when repairs areas are less than 1-1/2 feet apart, combine the repair areas into one repair. Similarly, when the repair areas are greater than 1-1/2 feet apart, maintain separate repair areas.

E. Patching, Small (less than 5 square feet):
Patching repairs can be made using the technique noted in paragraph 3.2.d (Joint Spalling and Corner Spalling). For full-depth repairs, follow technique noted in paragraph 3.2.f (Patching, Large or Utility Cut).

F. Patching, Large or Utility Cut:
The procedure for patching a large or utility cut areas of PCC pavement is as follows:

(1) Make a full-depth vertical cut with a concrete saw at the limits of the area to be patched (approximately 6 inches outside of each end of the broken area).
(2) Break out the concrete with pneumatic tools, and remove concrete down to the subbase/subgrade material.
(3) Add subbase material, if necessary, and compact.
(4) In reinforced pavement construction, use joint techniques to tie the new concrete to the old reinforced material. Dowel any replacement joints, and build them to joint specifications. Follow procedures in paragraph 3.2.a (4) or 3.2a. (5) as appropriate.
(5) Dampen the subgrade and the edges of existing PCC pavement. Place conventional concrete on the area to be patched. Finish the concrete so the surface texture approximates that of the existing pavement.
(6) Immediately after completing finishing operations, properly cure the surface with curing compound.
(7) After a proper cure period, fill the open joints with joint sealant per silicone joint sealant specification within this contract.

4) WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **one (1) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

5) METHOD OF MEASUREMENT

The repair will be measured by the **cubic yard** for large areas and by the **square foot** for small areas for the material in place, completed, and accepted.

6) BASIS OF PAYMENT

Payment for repairs will be made at the contract unit price bid per the method of measurement. This price will be full compensation for furnishing all materials, for all preparation, delivering, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

" Type 1 Rigid Repair of Concrete …….Cubic Yard"

" Type 2A Rigid Repair of Concrete…….……..Square Feet"

" Type 2B Rigid Repair of Concrete……...Square Feet"

" Type 3 Rigid Repair of Concrete…….…… Square Feet"

TESTING REQUIREMENTS

ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

ASTM C 109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars(Using 2-in. or [50-mm] Cube Specimens)

ASTM C 882 Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear

MATERIAL REQUIREMENTS

ASTM C 33 Standard Specification for Concrete Aggregates

ASTM C 309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

SILICONE JOINT AND CRACK SEALING FOR CONCRETE AND ASPHALT PAVEMENTS

DESCRIPTION

Description:
This item shall consist of removing existing joint materials, preparation of existing and new joints, preparation of cracks, and installation of backing rod and self-leveling silicone sealant in the joints and cracks of both flexible (bituminous) and rigid (PCC) pavements. For flexible pavements, the use of a silicone sealant is restricted to edge joints between flexible and rigid pavements only. Silicone will not be used to seal flexible pavement to flexible pavement joints. Contractor will perform work in areas as shown on the plans or as directed by the Engineer.

References:
FAA AC 150/5380-6B, Appendix B, M-362

MATERIALS

Herbicide/Soil Sterilant:
The herbicide/soil sterilant must kill all vegetation residing within the pavement joints and cracks to be sealed, and render the soil sterile for a period of 6 months or more. Material Safety Data Sheets for the herbicide/soil sterilant must be readily available by the Contractor onsite at all times, and a copy submitted to the Engineer prior to any application. A compatible dye shall be properly mixed with the herbicide/sterilant prior to application. Contractor must follow all applicable local, state, and federal laws for the handling and application of herbicide/soil sterilant. All herbicide/soil sterilant materials must be supplied in accordance with section 1060-13 of the Standard Specifications for Roads and Structures.

Backer Rod Material:
Backer rod material shall be compatible with the sealant, non-reactive and non-adhesive with the pavement or the sealant, compressible without extruding the sealant, and should recover to maintain contact with the joint and crack faces when the joints and cracks are open. The backer rod will be 25 percent larger in diameter than the width of the reservoir. The backer rod will conform to the requirements of ASTM D 5249.

Sealant Material:
The silicone sealant will be a one-part, self-leveling, nonacid producing material formulation capable of being applied with a pressure applicator and curing on exposure to air. The silicone sealant will be a low modulus type, as stated by the manufacturer, and meet the requirements of ASTM D 5893 as shown in Table 1. Material Safety Data Sheets for the silicone sealant must be readily available by the Contractor onsite at all times, and a copy submitted to the Engineer prior to any application.

TABLE 1 – Silicone Material Properties

Physical Requirements	**ASTM D 5893 Requirements**
Cure Evaluation	Pass at 21 days
Extrusion Rate (ASTM C 1183)	Type S, 50 ml/min. minimum
Tack Free Time (ASTM C 679)	5 hr. maximum
Hardness (ASTM C 661)	
-29°C (-20°F), Type A2	25 max.
23°C (73°F), Type 00	30 min.
Rubber Properties in Tension	
Ultimate Elongation	600% minimum
Stress at 150% Elongation	310 K pa (45 psi) max.
Resilience	75% minimum

Material Acceptance:
The Contractor shall furnish a Type 7 Contractor Certification, with an attached Type 1 Certified Mill Test Report in accordance with Article 106-3 of the Standard Specifications for Roads and Structures for silicone sealant material shipped to the airport for use on the project. Materials are to be delivered to the project site in manufacturer's original unopened containers. Typical containers in which silicone sealant material is supplied include caulking tubes, 5 gallon sealed pails, and 55 gallon sealed drums. Each container shall be marked clearly with the name and address of the manufacturer, trade name of the sealant, classification of the sealant (for purposes of this specification, self-leveling), manufacturer's batch or lot number, and an expiration date or pot life. All materials are to be stored in a protected area with a weatherproof covering upon delivery to the project site. The Contractor shall be responsible for storage, clean up, and all trash disposal.

EQUIPMENT

The Contractor shall provide all equipment necessary to remove any existing failing sealant systems and debris, clean, and prepare the concrete / asphalt joints and cracks, and place the new backer rod and sealant material according to the manufacturer's installation requirements and as directed by the Engineer. The Contractor shall also provide the necessary equipment for removing all debris on the airfield generated from this work.

Air Compressor and Air Wand:
The air compressor and air wand shall be of commercial grade and capable of 100% continuous duty cycle. The compressor shall have an operable oil and water trap and shall deliver a steady flow of compressed air free of oil and water through the air wand.

Pavement Router/Saw:
The router / saw machine or machines shall be portable, wheel mounted, gasoline or diesel powered, with rock deflectors and a safety shut-off in working order. The machine shall be capable of following both straight and random cracks and joints. The machine shall be capable of sawing and routing both rigid and flexible pavements, and be capable of adjusting the cutting width from 3/8 inch to 1 ½ inch with minimal spalling. The cutters/blades used for routing and sawing shall be in the shape of the required square or rectangular rout profile. The machine shall be equipped with a cutter head clutch and shall have an adjustable depth control.

Power Broom/Vacuum Truck:
Tractor mounted power broom or vacuum truck capable of removing all FOD from pavement surfaces.

Blowers:
Backpack, handheld, or wheeled blowers capable of removing FOD from pavement surfaces.

Backer Rod Installer:
Mechanical rolling/sliding backer rod insertion tool capable of continuously installing backer rod at the required depth.

Sealant Dispenser / Extruder:
Sealant dispenser / extruder shall have extruding rate capabilities appropriately matched for the project/quantity requirements.

CONSTRUCTION METHODS

Time of Application:
Do not apply pavement crack and joint sealant when pavement surface temperatures are below 45°F, moisture is present on the pavement, or rain is imminent. The months of March, April, May, September, October and November in North Carolina usually provide optimum surface crack contraction and field weather conditions for crack sealing operations.

Herbicide/Soil Sterilant Application:
A minimum of ten (10) days and a maximum of thirty (30) days before any routing / sawing and sealing, all vegetation in the pavement cracks and joints to be sealed shall be treated with an approved herbicide/soil sterilant. To ensure all required areas have been sprayed, and to prevent overlapping, the **temporary dye** shall clearly identify all locations of herbicide/soil sterilant application. The herbicide/soil sterilant must be placed on the cracks at the rate and methods recommended by the manufacturer. All herbicide/soil sterilant must be used in accordance with section 1060-13 of the Standard Specifications for Roads and Structures.

Joint Design:
Unless otherwise directed by the Engineer and required by the manufacturer, the Contractor shall follow the general design guidelines set forth in Table 2 and Detail 1 for joint construction.

Preparation of Joints and Cracks in Rigid Pavements
All existing joint sealants, foreign material and debris will be removed by routing / plowing. Any remaining sealant and debris will be removed by use of wire brushes or other tools as necessary. Re-sawing joint / crack faces will be required to satisfactorily promote the effectiveness and adherence of the new sealant. Immediately after sawing, the resulting slurry will be completely removed from the joint and adjacent area by flushing with a jet of water, and by use of other tools as necessary. The joint / crack reservoir width to depth ratio should be as close to 2:1 as practical. The use of backer material is required to obtain the desired ratio at the reservoir or as recommended by the sealant manufacturer.

Immediately before sealing, the joints / cracks will be thoroughly cleaned of all remaining laitance, curing compound, and other foreign material. Cleaning will be accomplished by sandblasting. Sandblasting will be accomplished in a minimum of two passes. One pass per joint face with the nozzle held at an angle directly toward the joint face and not more than 3 inches from it. Upon completion of cleaning, the joints / cracks will be blown out using an air compressor and air wand or comparable tool with compressed air free of oil and water. Only air compressors with operable oil and water traps will be used to prepare the joints for sealing. The joints will be sufficiently clean and dry prior to sealing.

Preparation of Joints in Flexible Pavements
All existing joint sealants and foreign material will be removed by routing / plowing. Any remaining sealant and debris will be removed by use of a hot compressed air lance. Re-sawing the joint faces will be required to satisfactorily promote the effectiveness and adherence of the new sealant. Immediately after sawing, the joint faces will be cleaned by use of a hot compressed air lance and compressed air free of oil and water. The joint reservoir width to depth ratio should be as close to 2:1 as practical when re-sawing. The use of backer material is required to obtain the desired ratio at the reservoir or as recommended by the sealant manufacturer.

Immediately before sealing, the joints will be thoroughly cleaned of all remaining foreign material. Cleaning will be accomplished by use of a hot compressed air lance. The joints will be sufficiently clean and dry prior to sealing.

Installation of Sealant:
Cracks and joints will be sealed as soon after completion of the pavement preparation as feasible and preferably before the pavement is opened to traffic, including construction equipment. In addition, cracks and joints will be inspected for proper width, depth, alignment, and preparation, and will be approved by the Engineer before sealing is allowed.

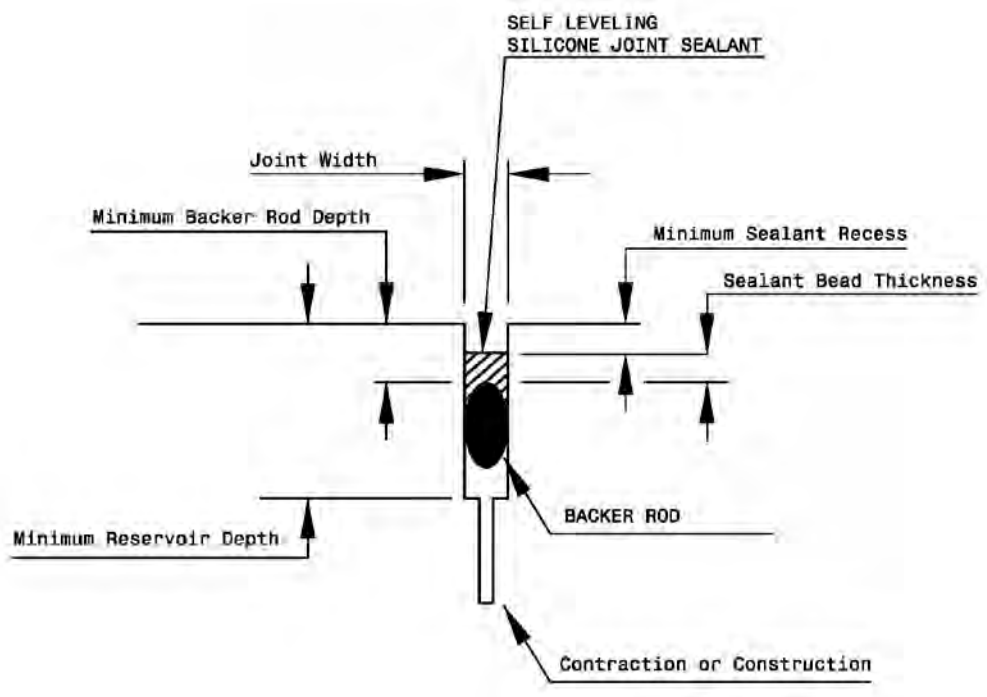
The backer rod material or bond breaker shall be installed per sealant manufacturer and Engineer requirements in the bottom of the joint /crack to be filled to control the depth of the sealant, to achieve the desired shape factor, and to support the sealant against indentation and sag.

The silicone sealant will then be applied uniformly solid from bottom to top and will be filled without formation of entrapped air or voids per sealant manufacturer and Engineer requirements. A direct connecting pressure type extruding device with nozzles shaped for insertion into the joint reservoir will be provided. Masking tape or other precautionary measures shall be in place to prevent any sealant from spilling outside the intended reservoir.

TABLE 2 – Sealing Design, General Guidelines

Joint Width (in)	Minimum Sealant Recess (in)	Backer Rod Diameter (in)	Sealant Bead Thickness (in)	Minimum Reservoir Depth (in)	Minimum Backer Rod Depth (in)	Self-Leveling Silicone Usage (ft/gal)
3/8	1/4	1/2	1/4	1 and 1/4	1/2	172
1/2	5/16	5/8	1/4	1 and 1/2	5/8	130
5/8	5/16	3/4	5/16	1 and 3/4	11/16	82
3/4	3/8	7/8	3/8	1 and 7/8	3/4	58
7/8	3/8	1	7/16	2	13/16	41
1	3/8	1 and 1/4	1/2	2 and 3/8	7/8	31
1 and 1/8	1/2	1 and 1/2	1/2	2 and 5/8	1	27
1 and 1/4	1/2	1 and 1/2	1/2	2 and 7/8	1	22
1 and 3/8	1/2	1 and 3/4	1/2	3 and 1/8	1	20
1 and 1/2	1/2	2	1/2	3 and 3/8	1	19

DETAIL 1 - Joint Detail, General Guidelines



Protection and Cleanup:
All pavement surfaces and all work areas shall be completely clean. Traffic shall not be permitted on the pavement in the areas of the treated cracks and joints during the curing period or before cleaning has occurred. The Contractor shall supply all temporary traffic control devices to protect the sealant and local traffic, as required and approved by the Engineer. Any damage to uncured sealant shall be repaired at the Contractor's expense. The Contractor shall be responsible for clean-up and removal from the work area all debris, waste, residual repair materials, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **two (2) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

The sealant material will be measured by the linear foot of sealant in place, completed, and accepted.

BASIS OF PAYMENT

Upon final inspection and after the Engineer's final acceptance of work, payment for sealing material will be made at the contract unit price bid per linear foot. This price will be full compensation for furnishing all materials, for all preparation, delivering, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

"Silicone Joint and Crack Sealing, 3/8" – 5/8"……..…...Linear Feet"
"Silicone Joint and Crack Sealing, 3/4" – 1 and 1/2"……..Linear Feet"

ASPHALT REJUVENATION

1) DESCRIPTION

1.1 Description:

This item governs the application of an asphalt pavement rejuvenation product applied to a previously placed hot-mix asphalt (HMA) surface in accordance with these specifications, as shown on the plans, or as directed by the Engineer. The purpose of this product is rejuvenation of the upper 3/8 inch of oxidized or otherwise aged asphalt binder without causing an unacceptable reduction in the friction characteristics (skid resistance) of the pavement section. Additionally, the rejuvenation product should not introduce unacceptable pavement distresses such as raveling, high temperature deformation (rutting), and loss of strength. The rejuvenation product should not contribute to accelerated deterioration of the pavement.

1.2 References:

FAA AC 150/5370-10F, ITEM P-632

2) MATERIAL

2.1 Rejuvenation Product:

A. The rejuvenation product must be capable of achieving the minimum changes in the asphalt binder properties shown in Tables 1 or 2 after proper application and field exposure.

B. The binder extracted per ASTM D 2172, Method A and recovered per ASTM D 1856 or D 5404 from samples of the upper 3/8 inch of the surface of the treated pavement must exhibit the percent decrease in absolute viscosity or complex viscosity and corresponding phase angle increase listed in Table 1 or 2, when compared to the values from adjacent untreated samples from the same pavement in the prescribed timeframe.

C. The bid submittal must include, from previous projects, independent laboratory test results accredited by an American Association of State Highway Transportation Officials (AASHTO) Materials Reference Laboratory (AMRL). The test results should verify the ability of the proposed rejuvenation product to achieve the minimum changes in asphalt binder properties shown in Table 1 or 2.

TABLE 1 - Pavement Three (3) Years or Less in Age

Item #	Property of Recovered Binder*	Requirement	Test Method
1	Absolute Viscosity 60°C, P	≥ 25% Decrease *	ASTM D 2171
2a	Complex Modulus 60°C, G*	≥ 25% Decrease *	AASHTO T 315
2b	Viscosity 60°C, η = G* / ώ Pa·s	≥ 25% Decrease *	AASHTO T 315
2c	Phase Angle 60°C, δ, °	Report	AASHTO T 315

TABLE 2 - Pavement More than Three (3) Years in Age

Item #	Property of Recovered Binder*	Requirement	Test Method
1	Absolute Viscosity 60°C, P	≥ 40% Decrease *	ASTM D 2171
2a	Complex Modulus 60°C, G*	≥ 40% Decrease *	AASHTO T 315
2b	Viscosity 60°C, η = G* / ώ Pa·s	≥ 40% Decrease *	AASHTO T 315
2c	Phase Angle 60°C, δ, °	Report	AASHTO T 315

* Procedures: Sample collection for application and acceptance as noted in this specification. Sample weights and measure by ASTM D 3549; Extraction by: ASTM D 2172, Method A using toluene (conditioning to remove moisture will not be accomplished); Recovery by: ASTM D (Abson) or ASTM D 5404 (Roto-Vap); and binder extraction, recovery and testing within 48 hours of obtaining pavement cores or equivalent surface area samples

2.2 Rejuvenation Documentation/Certification:

A. Performance. The bid submittal must include documentation of previous use and test data conclusively demonstrating that the rejuvenation product has been used successfully for a period of two or more years by other user agencies; and that the asphalt rejuvenation product has been proven to perform in a manner equivalent to this specification, through field testing by/for using agencies as to the required change in the recovered asphalt binder properties. Testing data must be submitted indicating such product performance from at least two projects representative of two different HMA mix designs, each being tested for a minimum of two years to insure reasonable longevity of the treatment, as well as product consistency. The performance documentation must be presented from a geographically similar climatic region of the United States as that for this project, e.g., wet-warm, wet-cool, dry-warm, and drycool, and contain data specified in 2.1.C.

B. Friction Characteristics. The bidder must provide evidence of past performance that the material, a minimum of 48 hours after application, does not cause a decrease in pavement frictional characteristics [skid resistance] below the maintenance planning requirements specified in AC 150/5320-12C, *Measurement, Construction, and Maintenance of Skid-resistant Airport Pavement Surfaces*, Table 3-2, when tested at the speed of 40 mph with approved continuous friction measuring equipment [CFME].

C. Health, Safety, and Environment. The bidder must provide a complete material safety data sheet (MSDS) and the manufacturer's certification that the rejuvenation product is in compliance with the Code of Federal Regulation Title 40 – Protection of Environment. The manufacturer's certification shall address compliance for Air Programs, Part 59, National Volatile Organic Compound Emission Standards for Consumer and Commercial Products [for the airport location] and Water Programs, Part 116, Designation of Hazardous Substances. The MSDS, Section II, shall include the chemical abstracts service (CAS) registry numbers for all applicable hazardous ingredients in the rejuvenation product.

3) APPLICATION RATE

3.1 Test Sections:

Prior to full application, the Contractor must place a series of test sections (minimum one square yard) at application rates as judged necessary by the manufacturer to establish the appropriate project rejuvenation product application rates for the specific product. As a minimum, a test section is required for each different HMA mix design identified in the project. Additional test sections may be required due to highly variable traffic areas, e.g., taxiway pavement wheel paths versus taxiway edge areas or specific areas identified by the Engineer. The Contractor must select test sections to obtain pavement cores or saw cut 'slabs' (equivalent surface area samples) in accordance with 6.3. The pavement cores or equivalent surface area samples must be taken 48 hours after application of the rejuvenation test sections and tested in accordance with Table 1 or 2, Item #1 and Item #2a, paragraph 2.1 for the purpose of determining a recommendation for the rejuvenation product application rates. The Contractor is responsible for all sampling and testing associated with the test sections.

3.2 Approval:

The Contractor and the Engineer shall examine the test sections 24 hours after treatment to determine if the entire rejuvenation product has penetrated into the surface. Application rates that have not allowed full penetration into the pavement surface after 24 hours must not be permitted to be used for full production. The application rates for full production must be determined by the Contractor and approved by the Engineer based on the Contractor's recommendation and observation of test sections and test section data from 3.1.

4) CONSTRUCTION

4.1 Worker Safety:

The rejuvenation product must be handled with caution. The Contractor must obtain a Material Safety Data Sheet (MSDS) for the rejuvenation product and require workmen to follow the manufacturer's recommended safety precautions.

4.2 Weather Limitations:

The rejuvenation product must be applied only when the existing surface is dry and the weather forecast is in accordance with the manufacturer's recommendations for application and curing. The rejuvenation product must not be applied during inclement weather or when rain or freezing temperatures are anticipated within 24 hours before or after application. If weather conditions interfere with application and/or curing, the Engineer may at his discretion suspend the job or require remedial action as deemed necessary.

4.3 Equipment:

The Contractor must furnish all equipment and hardware necessary for the performance of the work. The rejuvenation product should be delivered in dedicated tankers and/or containers with agitating equipment and filters, per manufacturer's recommendations. The distributor must be designed and equipped in accordance with the manufacturer's recommendations, but include as a minimum, the following characteristics:

A. Adequate heating capability for rapid heating of the rejuvenator to the proper application temperature.

B. A positive displacement pump capable of pumping low viscosity material and providing a preselected constant pressure to deliver the specified rates of application.

C. A full circulation spray bar and applicator that maintain proper nozzles, which provide the specified rate of application.

D. A hooded spray bar and applicator that maintain proper nozzle height.

E. A positive shut-off for the spray bar and a hand spray (with hose) equipped with a positive shut-off at the spray gun.

F. A thermometer installed in the distributor tank to measure the temperature of the rejuvenation product at the time of the application.

G. A speedometer calibrated to a minimum of tenths of miles per hour.

H. A chart listing the capacity of the tank (in gallons) for each one (1) inch of depth. A chart showing speed/pressure application rates must also be included.

4.4 Cleaning and Preparing Existing Surface:

A. Prior to placing the rejuvenation product, the surface of the pavement must be clean and free of all vegetation, rubber deposits, oil/fuel spills, debris, dust, dirt, or other loose foreign matter to the satisfaction of the Engineer.

B. Cracks that are ¼ inch wide or greater must be routed and cleaned prior to application of the rejuvenation product in accordance with the instructions of the selected joint sealer. The cracks must be sealed with a hot-pour joint sealant compatible with the rejuvenation product as approved by the engineer subsequent to rejuvenation acceptance in accordance with the paragraph titled – REJUVENATION ACCEPTANCE.

4.5 Application of Rejuvenation Product:

A. Following preparation and subsequent inspection of the surface and consideration for skid resistance, the rejuvenation product shall be uniformly applied over the surface to be treated at the approved rate with an allowable variation from the approved rate of application of plus or minus 5 percent, in accordance with ASTM D 2995.

B. Materials shall be applied at the temperature recommended by the manufacturer.

C. Other rejuvenation product application procedures include:

- Calibration Test – contractor must furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor or other application equipment. Calibration must be made with approved job material and prior to applying the rejuvenation product to the prepared surface. Calibration of the bituminous distributor and the specialized bituminous spray applicator must be in accordance with ASTM D 2995.

- Excess Rejuvenation Product Removal – Manufactured sand, as approved by the engineer, must be provided by the contractor and must be spread in sufficient quantity to effectively blot up any excess rejuvenation product remaining on the treated pavement surface after 24 hours.

- Ponding and Puddling of Rejuvenation Product – If low spots and depressions in the pavement surface cause ponding or puddling of the rejuvenation product, the pavement surface must be broomed with a broom drag. Brooming should continue until the pavement surface is free of any pools of excess material. Ponding and/or puddling must not cause excess pavement softening and/or additional distress. The engineer must inspect and approve areas after 'brooming.'

- Excess Runoff of Rejuvenation Product – The application rate should be reduced, and the engineer notified, if the surface grade of the pavement surface causes excessive runoff of the rejuvenation product. Additional rejuvenation product, if necessary, may be subsequently applied after the first application of material has penetrated into the pavement to achieve the required properties of the treated binder

- Insufficient Rejuvenation Product – When it is determined by the engineer that the actual application rate of the rejuvenation product is more than 5 percent below the approved application rate, subsequent applications of materials must be made to bring the actual application rate up to the approved rate; additional rejuvenation product must penetrate into the pavement surface within 24 hours after application. Multiple applications may be required at the discretion of the engineer, requiring additional pavement sampling and rejuvenation testing to assure compliance with Table 1 or 2 of 2.1.

4.6 Cure Time Remedial Option – Application of Sand:

A. The contractor must apply sand to the surface of the treated asphalt pavement(s) if the rejuvenation product does not meet the cure time requirement and/or the frictional characteristics (skid resistance) have been reduced to a level not acceptable to the engineer. An unacceptable level of frictional characteristics (skid resistance) is defined in paragraph 6.6.

B. The manufactured sand must be dry, hard, durable, free from clay, salt and foreign matter and well graded (100 percent passing #8 sieve and less than 10 percent passing #200 sieve). The sand must be uniformly applied at a rate of 3.0 lb/yd^2 ± 0.5 lb/yd^2, rolled (as recommended by the Contractor and accepted by the Engineer) into the treated surface and any surplus removed with a power broom, or as directed by the Engineer. The Contractor is responsible for all materials, equipment, and costs associated with the application of sand.

C. All manufactured sand or approved substitute used during the treatment must be removed as soon as practical after treatment of a pavement and prior to opening any airfield runway, taxiway, etc. This should be accomplished by a combination of hand and mechanical sweeping. All turnouts must be cleaned of any sand to the satisfaction of the engineer. Pavement sweeping will be included in the price bid per square yard for asphalt rejuvenation product.

D. If, after sand is swept and in the opinion of the Engineer, a hazardous condition exists on the pavement, the contractor must apply additional sand and sweep same immediately following reapplication. No additional compensation will be allowed for reapplication and removal of sand.

5) QUALITY CONTROL

5.1 Manufacturer Representation:

The contractor must have a manufacturer's authorized representative on the job site at the beginning of the work and during all rejuvenation product application. The manufacturer's representative must have knowledge of the material, procedures, and equipment described in the specification and will be responsible for determining the application rates and must oversee the preparation and application of the rejuvenation product. Documentation of the manufacturer representative's experience and knowledge for applying the rejuvenation product must be furnished to the engineer a minimum of 10 work days prior to placement of the test sections. The cost of the manufacturer's representative will be included in the bid price.

5.2 Quality Control Plan:

The contractor must submit a quality control plan to the engineer a minimum of 10 days prior to applying test sections in accordance with paragraph 3.1. The quality control plan must address all items that affect the quality of the rejuvenation application including, but not limited to:

A. Qualifications of personnel.

B. Schedule for the project.

C. Procedure to monitor the weather/temperature limitations.

D. Inspection requirements including rejuvenation product, test sections, storage of rejuvenation product, preparation of the pavement surface, and equipment calibration.

E. Provisions for obtaining, packaging and shipping acceptance samples and repair of the pavement.

F. Provisions for sample testing, testing laboratory name, location, accreditation, contact person, all contact information, testing requested, and report on information.

5.3 Warranty:

The Contractor must provide a manufacturer's/applicator warranty that the treated pavement will retain the lower binder properties of Table 1 or 2, for a period of two (2) years from the date of treatment. For compliance with the warranty, the Engineer may obtain cores and perform tests in accordance with REJUVENATION ACCEPTANCE. The Contractor must further warrant that from the date the rejuvenation product was applied, the material will not flake, peel, chip, spall, nor otherwise contribute to or accelerate the aging of the pavement. The contractor must reapply the rejuvenation product, as necessary, or provide remedial actions at no cost to the owner, and/or refund all payments at the owner's discretion. The Engineer must designate and record an area of no less than 10 square yards of untreated and 10 square yards of treated pavement as the control sections for warranty testing. In the event a pay reduction, or no payment, is enforced, the warranty is rescinded.

6) REJUVENATION ACCEPTANCE

6.1 Product Sampling:

The Engineer will take samples of the rejuvenation product proposed for use upon delivery of each shipment in accordance with ASTM D 140 and store in accordance with MSDS, Section VII for a period of at least six months after payment in accordance with paragraph 8.1. Testing, as necessary, will be accomplished by the Engineer to verify information provided by the MSDS information.

6.2 Freight and Weigh Bills:

The Contractor must furnish the Engineer receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the rejuvenation product used in the construction covered by the contract. The Contractor shall not remove rejuvenation product from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer.

6.3 Field Sampling Procedures. Sampling of the pavement sections to be treated must be performed before and after the pavement has been treated with the rejuvenation product. The Contractor will be responsible for obtaining all pavement core samples or equivalent surface area samples as approved by the engineer for testing. At the discretion and approval of the Engineer, the before samples collected and tested for application may suffice for before samples for acceptance.

A. At each sampling location, three (3) cores or equivalent surface area samples must be taken before the rejuvenation product is placed [**untreated**] and three (3) cores or equivalent surface area samples after treatment of the pavement [**treated**]. The treated pavement samples must be taken close to the untreated samples, at a minimum within the same paving lane and within one foot of each other. All pavement cores taken by the contractor must be six (6) inches in diameter. The Contractor must repair any sample holes resulting from the removal of asphalt concrete pavement cores or equivalent surface area samples (with suitable materials and methods as approved by the Engineer) at no cost to the owner.

B. The **treated** pavement cores or equivalent surface area samples must be taken 30-45 days after application of the rejuvenation product.

C. Both **untreated** and **treated** pavement cores or equivalent surface area samples must be performed for each 30,000 square yards or fractional part of pavement section per pavement plan or as required by the Engineer. Material acceptance in accordance with paragraph 2.1, Table 1 or Table 2, will be based on the test results for each 30,000 square yards or fractional part of treated pavement section per pavement plan or as required by the engineer. Locations for **untreated** samples should be determined by the engineer on a random basis in accordance with the procedures contained in ASTM D 3665 provided requirements of paragraph 6.3.A. can be satisfied for both untreated and treated samples.

D. Pavement core samples or equivalent surface areas samples must be placed in labeled sealable plastic bags immediately after taking, cleaning and removing sampling water (blotting). The sealed samples must then be placed in labeled plastic core canisters. For equivalent surface area samples, an equivalent processing for the sample is required as approved by the engineer. The specimens must be shipped to the designated laboratory within 24 hours of collection.

6.4 Rejuvenation Testing Responsibility:

All acceptance testing necessary to determine conformance with this specification must be performed by the engineer, or accredited independent test agency, to verify that the rejuvenation product achieves the minimum decrease in the asphalt binder properties as measured from binder in the top 3/8 ± 1/32 inch of the samples.

6.5 Rejuvenation Testing. Tests must be conducted to extract the bituminous binder from the top 3/8 ± 1/32 inch of the cores/slabs precisely cut from the field specimens.

A. Binder extraction must be by ASTM D 2172, Method A (centrifuge) with toluene, and recovered according to ASTM D 1856 (Abson Method) or ASTM D 5404 (Roto-Vap Method).

- Viscosity of the bituminous material must be measured in accordance with ASTM D 2171. The percent decrease in the binder properties must be computed as follows:
  100 [(absolute viscosity, P, of untreated sample) – (absolute viscosity, P, of treated sample)] / (absolute viscosity, P, of untreated samples)

- The complex modulus, G*, kPa, must be measured in accordance with AASHTO T 315 C, at 60°C (140°F) 10 rad/sec or other recorded frequency. The percent decrease in the binder properties must be computed as follows:
  100 [(complex modulus, G*, kPa of untreated sample) – (complex modulus, G*, kPa, of treated sample)] / (complex modulus, G*, kPa, of untreated samples)
  The complex viscosity, η*, at 60°C (140°F) must be calculated and reported from the complex modulus, G* and angular frequency, ώ (radians/sec).

B. Test results for absolute viscosity, complex modulus (and viscosity), and phase angle must be reported. The maximum percent reduction calculated for absolute viscosity or complex modulus must be considered in BASIS OF PAYMENT.

C. In the event of binders recovered from aged pavements and/or pavements using polymer modified binders (before treatment) exhibiting absolute viscosities ≥ 200,000 P (data becomes suspect, viscosity exceeds test capabilities) the viscosity reduction compliance requirement should be determined based on the complex modulus, G*, kPa.

6.6 Skid Resistance. Special attention must be afforded to skid resistance based on the use of the pavement surfaces.

A. For Runway and High Speed Taxiway Exit Surfaces. The pavement surface areas treated with rejuvenation product must be tested for skid resistance a minimum of forty-eight (48) hours after application of the rejuvenation product. The results of the friction evaluation must be equal or greater than the Maintenance Planning levels provided in Table 3-2, "Friction Level Classification for Runway Pavement Surfaces," in AC 150/5320-12C, *Measurement, Construction, and Maintenance of Skid-resistant Airport Pavement Surfaces*, when tested at speeds of 40 and 60 mph with approved continuous friction measuring equipment [CFME].

B. For Taxiway and Apron Surfaces. The skid resistance for taxiway and apron surfaces must be inspected by the contractor and engineer a minimum of forty-eight (48) hours after application of the rejuvenation product. In the event either the Contractor or the Engineer has concern on the skid resistance of these surfaces, the Contractor must exercise 4.6. Cure Time Remedial Option – Application of Sand to the satisfaction of the Engineer Otherwise, the provisions of 6.6.A may be directed by the engineer.

7) METHOD OF MEASUREMENT

7.1 Asphalt Crack Preparation and Seal. Asphalt crack preparation and sealing will be paid for under the crack sealing specification included in the contract.

7.2 Asphalt Rejuvenation. The quantity of rejuvenation product to be paid for will be the number of square yards performed in accordance with the plans and specifications and accepted by the engineer. The Contractor must furnish the Engineer with the certified weigh bills when materials are received for the rejuvenation product used under this contract. The Contractor must not remove material from the tank car or storage tank until initial amounts and temperature measurements have been verified.

8) BASIS OF PAYMENT

8.1 Payment. Payment for accepted rejuvenation product will be made at the contract unit price per square yard for bituminous rejuvenation adjusted according to 8.1.A. Crack preparation and sealing will be performed and paid for under the crack sealing specification within this contract.

A. Basis of Adjusted Payment. The payment for accepted rejuvenation product must be calculated in accordance with Table #3.

TABLE 3 - Rejuvenation Pay Reduction

Binder Rejuvenation at Acceptance; % Reduction in Absolute Viscosity or Complex Modulus		**% Payment**
Pavement **More Than** 3 Years in Age	Pavement **Less Than** 3 Years in Age	
≥ 40	≥ 25	**100**
30.0 - 39.9	20.0 - 24.9	**75**
Less than 30.0	Less than 20.0	**No payment**

B. Final Payment. Final payment will not be made until rejuvenation success has been confirmed by acceptance testing, which does not occur until 30-45 days after application. Final payment will be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

"Asphalt Rejuvenation ……..Square Yard"

TESTING REQUIREMENTS

ASTM D 140	Standard Practice for Sampling Bituminous Materials.
ASTM D 1856	Standard Test Method for Recovery of Asphalt from Solution by Abson Method.
ASTM D 2171	Standard Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer.
ASTM D 2172	Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.
ASTM D 2995	Standard Practice for Estimating Application Rate of Bituminous Distributors.
ASTM D 3549	Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
ASTM D 3665	Standard Practice for Random Sampling of Construction Materials.
ASTM D 5340	Standard Test Method for Airport Pavement Condition Index Surveys.
ASTM D 5404	Standard Practice for Recovery of Asphalt from Solution Using the Rotary Evaporator.
AASHTO T 315	Standard Method of Test for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR).

RUNWAY RUBBER REMOVAL

DESCRIPTION

Description:
This item shall consist of furnishing all labor, material, and equipment necessary for the removal of rubber from areas designated on the plans or as directed by the Engineer.

References:
- UFGS-32 01 11.52 (August 2008)
- FAA AC 150/5320-12C

MATERIALS

Water:
Water to be used by the Contractor for the cleaning shall be potable and free from soluble salt. The Contractor is responsible for obtaining the water.

Chemicals:
Chemicals used for rubber removal shall be non-toxic, non-hazardous, non-flammable, and non-corrosive. Chemicals shall be compatible for use on airports, and shall not adversely affect pavement surfaces, markings, electrical systems, or the surrounding environment.

EQUIPMENT

Mechanical rubber removal equipment includes waterblasting, shotblasting, sandblasting, or other approved nonchemical systems. Equipment used on pavement surfaces to remove rubber accumulations shall be controlled to minimize disturbance. Basic hand tools and the following major types of mechanical equipment will be considered acceptable for this specification.

UHP Waterblasting Equipment:
Provide mobile ultra-high pressure waterblasting equipment (up to 50,000 psi) capable of producing a pressurized stream of water that will effectively remove rubber from the pavement surface. Equipment shall be capable of removing rubber from the pavement without damaging the pavement surface or joint sealant. Equipment shall be self-recovering and recovered debris shall be disposed of properly in accordance with EPA regulations. If high pressure water is delivered from a spray bar, the nozzles shall be spaced to provide total coverage of the area being treated. The nozzle shall have adjustable pressure regulators or relief valves and gauges measuring actual line pressure. Regulate water pressure so that all rubber accumulations are substantially removed during execution of the work. The equipment shall be supported on pneumatic tires.

Shotblasting Equipment:
Provide mobile self-propelled shotblasting equipment capable of producing an adjustable depth of rubber removal and of propelling abrasive particles at high velocities on the rubber for effective removal without significantly damaging the pavement or joint sealant. Each unit shall be self-cleaning and self-contained. Provide equipment able to confine the abrasive, any dust that is produced, and removed rubber; and capable of recycling the abrasive for reuse.

Sandblasting Equipment:
Provide mobile sandblasting equipment capable of producing a pressurized stream of sand and air that will effectively remove rubber from the pavement surface without filling voids with debris in asphalt pavements or removing joint sealants in portland cement concrete pavements. Include with the equipment an air compressor, hoses, and nozzles of adequate size and capacity for removing all rubber. Equip the compressor with traps that will maintain the compressed air free of oil and water, and capable of furnishing a flow rate of at least 150 cubic feet/minute of air at a pressure of at least 90 psi at each nozzle.

Chemical Rubber Removal Equipment:
Chemical equipment shall be capable of application and removal of chemicals from the pavement surface and shall leave only non-toxic biodegradable residue.

WEATHER LIMITATIONS

Pavement surface shall be free of snow, ice or slush. Surface temperature shall be at least 40 degrees F and rising at the beginning of operations. Cease operation if rain is imminent. Cease waterblasting where surface water accumulation alters the effectiveness of material removal.

CONSTRUCTION METHODS

Test Section:
Prior to the start of work, Contractor shall demonstrate the ability to remove rubber at a touchdown area of the runway selected by the Engineer; at least one site per runway will be chosen. Use approved procedures and equipment needed to achieve the required degree of rubber removal. The test section will be inspected and approved by the Engineer before any further removal work will be allowed. The surface texture of the cleaned demonstration area will be compared to that of uncontaminated traffic areas to determine satisfactory completion of the removal operation. After approval of the Contractor's operations, the cleaned area will become the standard for rubber removal and final surface texture for the remainder of work.

Degree of Cleaning:
Rubber removal shall be defined as the removal of at least 85 percent of the rubber build up and/or Mu values have been restored to within 10 percent of those on an uncontaminated portion of the center portion of the runway.

Cleaning Methods:
The pavement surface may be of portland cement or asphalt mixtures. Only use chemical methods which are compatible with pavement materials, the environment and working personnel. Exercise close control of water pressure and blasting time/duration to prevent disintegration damage to portland cement or asphalt pavements. Any damage caused by the Contractor's operations shall be corrected at the Contractor's expense and in a manner approved by the Engineer. Exercise extremely good control for porous friction courses. Rubber removal shall be as complete as possible without damage to the pavement surface.

CLEANUP AND WASTE DISPOSAL

Keep the worksite clean of debris and waste from rubber removal operations. Cleanup operations shall be continuous. Debris and waste materials shall be accumulated and disposed at approved sites.

COMPLIANCE

In order to determine compliance with the degree of cleaning, a clear grid containing 100 equal squares, each approximately 1-inch square, may be placed on the areas where rubber removal operations have been conducted at the discretion of the Engineer. The degree of rubber removal required as outlined in the "Degree of Cleaning" section above should equal the number of squares within the grid that contain no visible contaminants. For example, if 85% of rubber removal is required, 85 squares should show that contaminants have almost been completely removed, but 15 squares can contain heavier contaminant remnants.

METHOD OF MEASUREMENT

The quantity of rubber removal to be paid for shall be the number of square feet of existing rubber removed from existing pavements in accordance with these specifications and accepted by the Engineer.

BASIS OF PAYMENT

Upon final inspection and after the Engineer's final acceptance of work, the quantity of rubber removal will be paid for at the contract unit price per square foot. This contract price shall be full compensation for all disposal work and for furnishing all material, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

"Runway Rubber Removal – UHP Waterblasting"……... Square Feet"
"Runway Rubber Removal - Shotblasting"……..……... Square Feet"
"Runway Rubber Removal - Sandblasting"……..…….. Square Feet"
"Runway Rubber Removal - Chemical"…….. Square Feet"

AIRFIELD MARKING

DESCRIPTION

Description:
This item shall consist of the preparation and marking of airfield pavement surfaces, using the required materials, in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer.

References:
FAA AC 150/5370-10G, Item P-620

MATERIALS

Material Acceptance:
The Contractor shall furnish a "Type 7 Contractor Certification", with an attached "Type 1 Certified Mill Test Report" in accordance with Article 106-3 of the Standard Specifications for Roads and Structures for all marking material shipped to the airport for use on the project. Material needing certification shall include waterborne paint with microbicide, reflective media, and preformed thermoplastic markings with beads. The reports can be used for material acceptance or the Engineer may perform independent verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers for inspection by the Engineer. Material shall not be loaded into the equipment until inspected by the Engineer.

Waterborne Paint:
Waterborne paint shall meet the requirements of Federal Specifications TT-P-1952E Type II or Type III, as specified by the Engineer. Paint shall be furnished in white (37925), yellow (33655), red (31136), black (37038), and blue (35180) in accordance with Federal Standard No 595.

Microbicide:
All Waterborne paint shall contain a microbicide additive that provides microbial efficacy for a period of no less than three years. The microbicide shall be blended homogeneously with the paint under high speed dispersion during production by the manufacturer. The final homogenous blend of microbicide treated paint shall conform to the same viscosity stability standards as specified in TT-P-1952E.

Dow (formally Rohm and Haas) Rocima 63 microbicide shall be added at a rate of 10 pounds per 100 gallons of paint.

Other products may be available which meet or exceed these specifications.

Reflective Media:
Glass beads shall meet the requirements for TT-B-1325D. Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Federal Specification. TT-B-1325D, Type I, gradation A. Initial retro-reflectometer readings shall yield at least 300 mcd/m²/lux on white markings at installation, and at least 175 mcd/m²/lux on yellow markings at installation.

Federal Specification. TT-B-1325D, Type III. Initial retro-reflectometer readings shall yield at least 600 mcd/m²/lux on white markings, and at least 300 mcd/m²/lux on yellow markings at installation.

Federal Specification. TT-B-1325D, Type IV, gradation A. Initial retro-reflectometer readings shall yield at least 400 mcd/m²/lux on white markings and at least 225 mdc/m²/lux on yellow markings at installation.

Preformed Thermoplastic Markings with Beads:
Preformed Thermoplastic Markings must be composed of ester modified resins in conjunction with aggregates, pigments, and binders that have been factory produced as a finished product. The markings must be a resilient thermoplastic product with uniformly distributed glass beads throughout the entire cross-sectional area. The markings must be resistant to the detrimental effects of aviation fuels, motor fuels and lubricants, hydraulic fluids, de-icers, anti-icers, protective coatings, exposure to sunlight, water, salt, adverse weather conditions, animal droppings, etc. Lines, legends, and symbols must be capable of being affixed to bituminous and/or Portland cement concrete pavements by the use of a large radiant heater. Preformed Thermoplastic Markings shall be furnished in white (37925), yellow (33655), red (31136), black (37038), and blue (35180) and as required in accordance with Federal Standard No 595. The marking material shall have an integral color throughout the thickness of the marking material.

The preformed thermoplastic markings must be capable of conforming to pavement contours, breaks, and faults through the action of airport traffic at normal pavement temperatures. The markings must be capable of fully conforming to grooved pavements, including pavement grooving per FAA AC 150/5320-12C, current version. The markings shall have resealing characteristics, such that it is capable of fusing with itself and previously applied thermoplastics when heated with a heat source per manufacturer's recommendation.

Multicolored markings must consist of interconnected individual pieces of preformed thermoplastic pavement marking material, which through a variety of colors and patterns, make up the desired design. The individual pieces in each large marking segment (typically more than 20 ft. long) must be factory assembled with a compatible material and interconnected so that in the field it is not necessary to assemble the individual pieces within a marking segment. Obtaining multicolored effect by overlaying materials of different colors is not acceptable due to resulting inconsistent marking thickness and inconsistent application temperature in the marking/substrate interface.

The marking material must set up rapidly, permitting the access route to be re-opened to traffic a maximum of 15 minutes after application. The markings must be able to be applied in temperatures down to 35ºF without any special storage, preheating, or treatment of the material before application.

The material must contain a minimum of thirty percent (30%) intermixed graded glass beads by weight. The intermixed beads shall conform to Federal Specification. TT-B-1325D, Type III or Type IV.

The material must have factory applied coated surface beads in addition to the intermixed beads at a rate of 1 lb. (± 10%) per 10 sq. ft. The evenly distributed factory applied coated surface beads shall have a minimum of 90% true spheres, minimum refractive index of 1.50, and meet the following gradation.

Size Gradation		Retained, %	Passing, %
US Mesh	µm		
12	1700	0 - 2%	98 - 100%
14	1400	0 - 3.5%	96.5 - 100%
16	1180	2 - 25%	75 - 98%
18	1000	28 - 63%	37 - 72%
20	850	63 - 72%	28 - 37%
30	600	67 - 77%	23 - 33%
50	300	89 - 95%	5 - 11%
80	200	97 - 100%	0 - 3%

The top surface of the material (same side as the factory applied surface beads) shall have regularly spaced indents. These "heating indicator" indents shall act as a visual cue during application that the material has reached a molten state so satisfactory adhesion and proper bead embedment has been achieved and a post-application visual cue that the installation procedures have been followed.

Pigments, as a Percent by weight shall be as follows:

A. White: Titanium Dioxide, ASTM D 476, type II shall be 10 percent minimum.

B. Yellow and Colors: Titanium Dioxide, ASTM D 476, type II shall be 1 percent minimum. Organic yellow, other colors, and tinting as required to meet color standard.

Daylight Directional Reflectance shall be as follows:

A. White: The daylight directional reflectance of the white paint shall not be less than 75 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN, Method 6121.

B. Yellow: The daylight directional reflectance of the yellow paint shall not be less than 45 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN. The x and y values shall be consistent with the Federal Hegman yellow color standard chart for traffic yellow standard 33538, or shall be consistent with the tolerance listed below:

x .462	x .470	x .479	x .501
y .438	y .455	y .428	y .452

The surface, with properly applied and embedded surface beads, must provide a minimum resistance value of 45 BPN when tested according to ASTM E303.

The material must be supplied at a nominal thickness of 65 mils (1.7 mm).

The material, when applied in accordance with manufacturer's guidelines, must demonstrate a uniform level of nighttime retroreflection when tested in accordance to ASTM E1710.

A protective film around the box must be applied in order to protect the material from rain or premature aging.

The manufacturer must be ISO 9001:2008 certified for design, development and manufacturing, and provide proof of current certification. The scope of the certification shall include manufacture of reflective markings. The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.

EQUIPMENT

Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless-type marking machine suitable for application of traffic paint. The marking machinery shall be capable of applying lines in width from four (4) inches to three (3) feet in a single pass. It shall produce an even and uniform film thickness at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. Four Material Guns are required for 3 foot wide marking.

Marking equipment shall employ functional windscreens and shrouds, **to be used at all times** to shroud the paint guns and bead dispensers from damaging winds.

CONSTRUCTION METHODS

Weather Limitations:
The painting shall be performed only when the surface is dry and when the surface temperature is at least 45°F and rising and the pavement surface temperature is at least 5°F above the dew point. Markings shall not be applied when the pavement temperature is greater than 120°F. Markings shall not be applied when wind speeds exceed 10 knots.

Preparation of the Surface:
Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material that would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by sweeping and blowing or by other methods as required to remove all dirt, laitance, and loose materials without damage to the pavement surface. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the Engineer. Paint shall not be applied to Portland cement concrete pavement until the areas to be painted are clean of curing material. Sandblasting or high-pressure water shall be used to remove curing materials.

If pavement surface is exceptionally contaminated, the Engineer may invoke an additional Airfield Marking and Pavement Surface Cleaning line item in order to sufficiently prepare the surface for paint application.

Layout and Tolerance of Markings:
The proposed markings shall be laid out in advance of the paint application. All markings shall be in accordance with the plans as provided by the Engineer and FAA AC 150/5340-1L. Marking materials shall not be applied until the layout and condition of the surface has been approved by the Engineer. The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet and marking dimensions and spacings shall be within the following tolerances:

Dimension and Spacing	Tolerance
36 inches or less	± 1/2 inch
greater than 36 inches to 6 feet	± 1 inch
greater than 6 feet to 60 feet	± 2 inches
greater than 60 feet	± 3 inches

Application of Waterborne Paint Markings and Beads:
Paint shall be properly applied at the locations and to the dimensions and spacing shown on the plans or as directed by the Engineer. The paint shall be mixed in accordance with the manufacturer's instructions and the requirements of this contract, and applied to the pavement with a marking machine at the rate(s) shown in Table 1. The addition of thinner will not be permitted. A period **three (3) days** shall elapse between placement of a new bituminous surface course or seal coat and application of half-rate prime coat paint. A period of **thirty (30)** days shall elapse between placement of half-rate prime coat paint on a new bituminous surface or seal coat and application of a full-rate final paint.

TABLE 1. APPLICATION RATES FOR PAINT AND GLASS BEADS

Paint Type	**Paint Square feet per gallon, ft^2/gal.**	**Glass Beads, Type I, Gradation A Pounds per gallon of paint—lb./gal.**	**Glass Beads, Type III Pounds per gallon of paint—lb./gal.**	**Glass Beads, Type IV, Gradation A Pounds per gallon of paint—lb./gal.**
Waterborne Type II	**115 ft^2/gal. maximum**	**7 lb./gal. minimum**	**10 lb./gal. minimum**	**--**
Waterborne Type III	**90 ft^2/gal. maximum**	**--**	**--**	**8 lb./gal. minimum**

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate(s) shown in Table 1. Glass beads shall not be applied to black paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Regular monitoring of glass bead embedment shall be performed by the Contractor.

All emptied material containers shall be returned to the paint storage area for checking by the Engineer. The containers shall not be removed from the airport or destroyed until authorized by the Engineer.

Application of Preformed Thermoplastic Markings:
Preformed thermoplastic markings shall be properly applied at the locations and to the dimensions and spacing shown on the plans or as directed by the Engineer. To ensure minimum single-pass application time and optimum bond in the marking/substrate interface, the materials must be applied using a variable speed self-propelled mobile heater with an effective heating width of no less than 16 feet (4.88 m) and a free span between supporting wheels of no less than 18 feet (5.49 m). The heater must emit thermal radiation to the marking material in such a manner that the difference in temperature of 2 inch (5.08 cm) wide linear segments in the direction of heater travel must be within 5 percent of the overall average temperature of the heated thermoplastic material as it exits the heater. The material must be able to be applied at ambient and pavement temperatures down to 35ºF (2°C) without any preheating of the pavement to a specific temperature. The material must be able to be applied without the use of a thermometer. The pavement shall be clean, dry, and free of debris. A non-VOC sealer with a maximum applied viscosity of 250 centi-Poise (ASTM D 2393) must be applied to the pavement shortly before the markings are applied. The supplier must enclose application instructions with each box/package.

Protection and Cleanup:
The Contractor shall protect all markings until dry and properly cured by placing guarding or warning devices as necessary. In the event any traffic crosses the wet or uncured markings, the Contractor shall correct any resulting tracks and damage made by the traffic. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose or unadhered reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

Corrective:
All work that fails to meet the specifications, permissible tolerances and appearance requirements, or is marred or damaged by traffic or from other causes, shall be corrected at the Contractor's expense. All misted areas, drip and spattered paint shall be removed to the satisfaction of the Engineer. In all instances, when it is necessary to remove paint, it shall be done by means satisfactory to the Engineer, which will not damage the underlying surface of the pavement.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **one (1) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

The quantity of airfield markings to be paid for shall be the number of square feet of paint performed in accordance with the specifications and accepted by the Engineer.

BASIS OF PAYMENT

Payment for Airfield Marking shall be made at the contract items bid price per square foot for each material type. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools and incidentals necessary to complete this contract item.

Payment will be made under:

"Airfield Marking (Type II Paint, Quarter-Rate, No Beads)……....Square Feet"

"Airfield Marking (Type II Paint, Half-Rate, No Beads)…….Square Feet"

"Airfield Marking (Type II Paint, Full-Rate, Type I Beads)……....Square Feet"

"Airfield Marking (Type II Paint, Full-Rate, Type III Beads)…….Square Feet"

"Airfield Marking (Type III Paint, Full-Rate, Type IV Beads)……Square Feet"

"Airfield Marking (Preformed Thermoplastic, Type III Beads)……...Square Feet"

"Airfield Marking (Preformed Thermoplastic, Type IV Beads)……...Square Feet"

"Airfield Marking (Surface Painted Hold Position Signs)……..……..…Square Feet"

PAVEMENT MARKING REMOVAL

DESCRIPTION

This item shall consist of removing existing pavement markings from paved areas designated on the drawings or required by the Engineer. The Contractor shall schedule and coordinate the removal operations with the Engineer prior to the start of any work and removal operations shall not commence until adequate provisions have been made to complete the installation of replacement markings. The degree of pavement marking removal will be determined by the Engineer.

MATERIALS

Water:
Water to be used by the Contractor for the cleaning of the pavement markings shall be potable and free from soluble salt. The Contractor is responsible for obtaining the water.

Chemicals:
The use of chemicals for removal of pavement markings will not be permitted.

EQUIPMENT

Mechanical pavement marking removal equipment includes waterblasting, grinding, shotblasting, or other approved systems. Equipment used on pavement surfaces to remove pavement markings shall be controlled to minimize disturbance. Basic hand tools and the following major type of mechanical equipment will be considered acceptable for this specification.

UHP Waterblasting Equipment:
Provide mobile ultra-high pressure waterblasting equipment (up to 50,000 psi) capable of producing a pressurized stream of water that will effectively remove markings from the pavement surface. Equipment shall be capable of removing markings from the pavement without damaging the pavement surface or joint sealant. Equipment shall be self-recovering and recovered debris shall be disposed of properly in accordance with EPA regulations. If high pressure water is delivered from a spray bar, the nozzles shall be spaced to provide total coverage of the area being treated. The nozzle shall have adjustable pressure regulators or relief valves and gauges measuring actual line pressure. Regulate water pressure so that markings are substantially removed during execution of the work. The equipment shall be supported on pneumatic tires.

Grinding Equipment:
Provide mobile grinding equipment capable of effectively removing markings from the pavement surface without significantly damaging the pavement or joint sealant. Mobile grinding equipment shall have variable depth control, and use multiple heads working in tandem to thoroughly and uniformly remove required markings from the pavement surface. Provide the equipment necessary to control dust and the accumulation of debris resulting from the removal process. The removal equipment shall provide dust control and the capture of the removed material shall be done utilizing a separate vacuum equipped vehicle or other approved system.

Shotblasting Equipment:
Provide mobile self-propelled shotblasting equipment capable of producing an adjustable depth of pavement marking removal and of propelling abrasive particles at high velocities on the marking for effective removal without significantly damaging the pavement or joint sealant. Each unit shall be self-cleaning and self-contained. Provide equipment able to confine the abrasive, any dust that is produced, and removed marking material; and capable of recycling the abrasive for reuse.

WEATHER LIMITATIONS

Except as approved by the Engineer, do not perform work when the atmospheric temperature is below 40°F or when the pavement is covered with snow or ice.

CONSTRUCTION METHODS

Test Section:
Prior to the start of work, remove pavement markings on designated test area(s) not less than 50 square feet in size. Use approved procedures and equipment needed to achieve the required degree of marking removal. The test section will be inspected and approved by the Engineer before any further removal work will be allowed. After approval of the Contractor's operations, the area removed of pavement markings will become the standard for pavement marking removal for the remainder of work.

Degree of Removal:
Remove a minimum of 95% of all existing pavement markings that do not comply with the new marking layout, or as directed by the Engineer.

Removal Methods:
Pavement marking shall be removed from indicated areas by methods acceptable to the Engineer that cause negligible damage to existing pavements, surface texture, joint sealants, or other airfield appurtenances as determined by the Engineer. It is understood that the marking removal process will leave some scarring. It will be incumbent upon the contractor to mitigate the degree of damage and scarring to the pavement, and to also leave the pavement surface in a condition that will not mislead or misdirect traffic. If excessive damage results from the marking removal operation, the Contractor shall repair, at his expense, said damage to the pavement, surface texture, sealant or appurtenances caused by the removal work by methods acceptable to the Engineer. Excessive damage is defined as removing more than 1/8 inch of the pavement surface relative to the existing adjacent pavement surface or the disturbance of the aggregate in the pavement within the marking removal area to the point of creating a FOD hazard from raveling. Grooved runway surfaces shall maintain their functionality, i.e., water shall be able to run off the surface without puddling.

Obliterating pavement markings by masking with paint, bituminous material, surface treatments or other cover material will not be an acceptable removal method. Any removal method that causes objectionable dust, contaminated water runoff, or other such hazard or nuisance shall be controlled by means approved by the Engineer that eliminate such causes of objection or its use will not be allowed.

Removal of Deposits:
Sand, water, residue, and other waste material that may be deposited on the pavement as a result of removal operations shall be removed as the work progresses. Obtain the approval of residue removal and disposal method from the Engineer prior to beginning work. Accumulations of residue or other waste materials which might interfere with drainage or might constitute a hazard to aircraft or aircraft operations will not be permitted.

COMPLIANCE

In order to determine compliance with the degree of removal, a clear grid containing 100 equal squares, each approximately 1-inch square, may be placed on the areas of pavement where paint removal operations have been conducted at the discretion of the Engineer. The degree of paint removal required as outlined in the "Degree of Removal" section above should equal the number of squares within the grid that contain no undisturbed paint. For example, if 95% paint removal is required, 95 squares should show that paint has been almost completely removed from the pavement, but 5 squares can contain heavier paint remnants.

METHOD OF MEASUREMENT

The quantity of pavement marking removal to be paid for shall be the number of square feet of designated pavement markings removed in accordance with these specifications, complete, and accepted by the Engineer.

BASIS OF PAYMENT

For removal of existing non-conforming, non-compatible, or temporary pavement markings, payment shall be made at the contract unit price per square foot. This contract price shall be full compensation for all disposal work and for furnishing all material, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

"Pavement Marking Removal – UHP Waterblasting"……..... Square Feet"
"Pavement Marking Removal – Grinding……. Square Feet"
"Pavement Marking Removal – Shotblasting……... Square Feet"

POLYMER COMPOSITE MICRO-OVERLAY FOR FUEL RESISTANT WEARING SURFACES

DESCRIPTION

Description:
This item shall consist of at least one application of a polymer concrete emulsion seal coat, with mineral aggregate, applied on an existing, previously prepared bituminous surface, in accordance with the specifications for the apron area shown on the plans or as designated by the Engineer. The material is intended for use as a fuel-resistant asphalt pavement sealer on an apron surface. Note that for fuel resistance, the manufacturer recommends two applications.

References:
FAA Engineering Brief Number 62

MATERIALS:

The materials described here are specific to the E-Krete™ TOL 3000 PCMO, and are designed to establish a minimum level for quality and quality control; however, we do not intend these requirements to exclude other materials. Other products may be available which meet or exceed these specifications. For all products, Material Safety Data Sheets (MSDS) must be made available upon request, and certification sheets that do not reveal proprietary information shall be made available to the Engineer verifying the composition of each separate material employed in the PCMO. For TOL 3000, this requires certificate of analyses (COA) for the polymer emulsion, aggregate, and cement/aggregate dry blend verifying that the materials meet the requirements, as outlined in Sections 2.1 thru 2.5. The COAs should be traceable to the batch/lot of materials received from the supplier of polymer emulsion and cement/aggregate mix. Batch/lot identification must be clearly marked on all packaging and traceable to a specific COA for that particular batch. Upon request, all COAs and batch/lot identifications must be made available to the Engineer, and must include all required information listed in Sections 2.1 thru 2.5, including allowable tolerances.

1. **Aggregate:**
   The aggregate will be either a natural or manufactured angular aggregate composed of clean, hard, durable, uncoated particles, free from lumps of clay and all organic matter. The aggregate must meet the criteria outlined in ASTM C33 and follow the gradation shown in Table 1, when tested in accordance with ASTM C144.

TABLE 1 – Gradation of Aggregates

TABLE 1. GRADATION OF AGGREGATES Sieve Size, US	Percentage By Weight, Passing Sieves	Allowable Tolerance, Percent
No. 8	95 - 100	± 2
No. 16	70 - 100	± 2
No. 30	40 - 75	± 2
No. 50	10 - 35	± 2
No. 100	2 - 15	± 1
No. 200	0 - 5	± 1

2. **Polymer Emulsion:**
   The polymer emulsion is of proprietary design, according to the requirements of E-Krete™ TOL 3000. However, the solids content must be between 46.5 and 47.5 percent by weight of total liquid, and viscosity latex between 5 and 55 centipoises when measured at 25°C (77°F). Water content must not exceed 52% by weight of total latex liquid. Polymer emulsion is typically supplied in 5-gallon buckets. The allowable tolerance for the amount of polymer emulsion in each bucket is 5 ± 0.08 gallons or 44.1 ± 0.7 lbs. (20.0 ± 0.32 kg).

3. **Cement:**
   Cement for E-Krete™ must conform to the specifications of ASTM C150 for Type I Portland Cement.

4. **Water:**
   The water used in mixing must be potable and free from harmful soluble salts. The temperature of the water added during mixing must be at least 10°C (50°F) and not above 32°C (90°F). The pH of the water added during mixing must conform to the requirements of the E-Krete™ manufacturer.

5. **Cement/Aggregate Dry Blend:**
   The cement/aggregate dry blend used for TOL 3000 must conform to the specifications outlined in ASTM C387 for a Type M mortar. Cement content must be 33 ± 1.0 percent by weight of total dry mix and aggregate content must be 67 ± 1.0 percent by weight of total dry mix. The cement/aggregate dry blend comes prepackaged in 60 lb. (27.2 kg) bags. Weight tolerance is 60 ± 0.5 lbs. (27.2 ± 0.25kg) for each bag.

COMPOSITION AND APPLICATION

1. **Composition:**
   The TOL 3000 PCMO consists of a polymer emulsion, water, cement, and aggregate in proportions that fall within the ranges shown in Table 2. A "kit" of TOL 3000 refers to 75 gallons of polymer emulsion, 55 sixty-pound bags of cement/aggregate dry blend, and 10 gallons of water. A kit of TOL 3000 yields approximately 4500 feet of coverage (500 yards).

2. **Job Mix Formula:**
   The contractor must submit the recommended formulation of water, emulsion, and cement/aggregate dry blend and application rate proposed for use to the Engineer at least 5 days prior to the start of operations. The mix design must fall within the range shown in Table 2. The contractor must not produce any seal coat for payment until the Engineer has approved a job mix formula. The formulation must pass the fuel-resistance test in Appendix A.

   The job mix formula for each mixture will remain in effect until modified in writing by the Engineer. Improper formulations of TOL 3000 PCMO will produce coatings that crack prematurely or do not adhere properly to the pavement surface. The manufacturer recommends a minimum of 5 days for job mix approval.

TABLE 2 - Job Mix Formula

Product Type	Polymer Emulsion, gallons (percent by weight of total mix)	Cement/Aggregate Dry Blend, weight in pounds (percent by weight of total mix) [Number of bags of dry mix]	Water, gallons (percent by weight of total mix)*	Application Rate**, weight in pounds/square yard
TOL 3000	75 ± 0.5 (16.0% ± 0.1)	3300 ± 55 (81.9% ± .1.36) [55]	10 ± .25 (2.1% ± 0.05)	0.90± 0.1

* This may be increased to no more than 15 gallons total to account for evaporative water loss if applied on a hot, windy day (see Item 5.1).

**This is an average application rate for many pavement types; the actual application rate may be outside this suggested range, depending on the surface properties of the pavement to be sealed.

3. **Application Rate:**
   The PCMO seal coat must be applied in one or two coats, depending on the application. The application rate and number of applications will match those shown on the project plans. The application rate submitted with the job mix formula shall be verified during placement of the test section; the rate must fall within the limits shown in Table 2. In areas the Engineer thinks may be subjected to fuel spillage, a double coat of TOL 3000 may be placed at the same application rate as listed in Table 2.

TEST SECTION

Prior to full production, the contractor will prepare a quantity of mixture in the proportions shown in the approved mix design. The amount of mixture must be sufficient to place a test section a minimum of 250 square yards at the rate specified in the job mix formula. Although the Engineer will designate the area to be tested, it must be on a representative section of the pavement to be seal coated. The Engineer will determine the actual application rate during placement of the test section, depending on the condition of the pavement surface. From this test section the Engineer will verify the adequacy of the mix design and determine the application rate. The contractor must use the same equipment and method of operations on the test section as will be used on the actual area of application. If the test section should prove to be unsatisfactory, the necessary adjustments to the mix composition, application rate, placement operations, and equipment will be made. Additional test sections shall be placed and evaluated, if required. Full production will not begin without the Engineer's approval. Acceptable test sections shall be paid for in accordance with Section 3.

CONSTRUCTION METHODS

1. **Weather:**
   TOL 3000 must not be applied when the surface is wet or when humidity or impending weather conditions will not allow proper curing. The contractor must only apply the PCMO when the atmospheric or pavement temperature is 55°F and rising and expected to remain above 55°F for 24 hours, unless otherwise directed by the Engineer. Pavement temperatures should not exceed 120°F to limit water loss by evaporation. Ideal conditions for placement are 60° to 90°F and humidity levels between 50 and 60 percent.

2. Equipment and Tools:

The contractor must furnish all equipment, tools, and machinery necessary for the performance of the work.

A. Mixers. For batch mixing, the mix tank must have a mechanically powered, full-sweep mixer with sufficient power to move and homogeneously mix the entire contents of the tank. For continuous mixing, the machine shall be capable of accurately delivering a predetermined proportion of cement/aggregate dry blend, water, and polymer emulsion, and of discharging the thoroughly mixed product on a continuous basis. The mixing unit shall be capable of thoroughly blending all ingredients together and discharging the material to the spreader box without segregation.

B. Spreading Equipment. The TOL 3000 application unit consists of proprietary equipment designed to apply the coating at a precise thickness. The unit has a series of rubber and stainless spring steel blades. The rubber blades have a specific durometer hardness that allows the material to pass underneath without completely wiping the material off the surface of the pavement. The stainless steel blades are notched and separated so that an uneven base will not affect the micro-overlay. A brush feathers the material as it is overlapped on subsequent passes to reduce buildup from overlap. The operator must keep the unit clean, and not allow any TOL 3000 buildup.

C. Calibration. The Contractor will furnish all equipment, materials, and labor necessary to calibrate the equipment. The calibration will assure that the unit will produce and apply a mix that conforms to the job mix design and deliver the application rate specified in Table 2. The Contractor will make calibrations with the approved job materials prior to applying the seal coat to the pavement and will use this calibration on the test section (see Item 4). The Contractor will furnish a copy of the calibration test results to the Engineer.

3. Preparation of Pavement Surface:

The Contractor must remove bituminous pavement surfaces softened by petroleum derivatives or that have failed due to any other cause to the full depth of the damage and replace these surfaces with new bituminous concrete similar to that of the existing pavement. Areas of the pavement surface to be treated must be in a firm consolidated condition, and sufficiently cured so there is no concentration of oils on the surface.

A period of a minimum of **90** days must elapse between the placement of a bituminous surface course and the application of the seal coat.

4. **Cleaning Existing Surface:**
   Prior to placing TOL 3000, the Contractor must ensure the pavement is clean and free from dust, dirt, or other loose foreign matter, grease, oil, or any type of objectionable surface film. Contractor shall clean the existing surface with a vacuum sweeper or a combination of wire brushes and a power blower. The manufacturer recommends the vacuum sweeping method.
   A. Where vegetation exists in cracks, the Contractor must remove the clean cracks to depth of two inches where practical, and then treat them with a concentrated solution of an herbicide approved by the Engineer. Cracks shall then be prepared utilizing the crack sealing specification within this contract. The Contractor must also cure brush areas that have been subjected to fuel or oil spillage to remove any dirt accumulations.

5. **Curing:**
   The Contractor must permit the mixture to cure for a minimum of **24** hours after the final application before opening the area to traffic. The area must be sufficiently cured to drive over without damage to the seal coat, and any damage to the uncured mixture due to early traffic will be the responsibility of the Contractor to repair. TOL 3000 contains Portland cement, and although an initial set occurs within a few hours that provides enough strength to accept traffic, ultimate strength requires 28 days of cure time

6. **Handling:**
   The Contractor must continuously agitate the mixture from the initial mixing until its application on the pavement surface. The Contractor must maintain the distributor or applicator, pumps, and all tools in satisfactory working condition.

QUALITY CONTROL

1. **Contractor's Certification:**
   The Contractor must furnish the manufacturer's certification that each consignment of materials shipped to the project meets the requirements of Item 2 for polymer emulsion, aggregate, cement, and cement/aggregate blend. The Contractor must deliver the certification to the Engineer prior to the beginning of work, but must not interpret the manufacturer's certification for the emulsion as a basis for final acceptance. Any certification received shall be subject to verification by an independent laboratory for materials received for project use as required by the Engineer. The Contractor shall also furnish a certification demonstrating a minimum of three years of experience in the application of a PCMO.

2. **Field Mixing:**
   The Contractor must monitor each batch of material prepared for placement, and keep written records of the number of bags of dry mix, amount of polymer emulsion and water used for each batch. In addition, the Contractor must keep records of air temperature, pavement temperature (as measured by an infrared sensing device), wind velocity (speed and direction), and humidity. The Engineer will have access to these records upon request. For each airport feature receiving PCMO, the Engineer will keep a record of which batch was used in a particular location as well as the amount of coverage expressed in square feet per "kit".

3. **Inspection:**
   The Contractor must have an independent technical consultant on the job site at the beginning of operations. The consultant must have knowledge of the materials, procedures, and equipment described in this specification and will assist the Contractor in the proper mixing of the component materials and application of the TOL 3000. The consultant must have a minimum of 3 years experience in the use of PCMO. The consultant must provide documentation of this experience to the Engineer prior to the start of operations. The Contractor must include the cost of the technical consultant in the bid price.

4. **Sampling:**
   The Engineer will take a random sample of two bags of the dry mix and two gallons of polymer emulsion daily, and place the samples in a glass or plastic container. The Engineer must seal the sample bags of dry mix inside a plastic bag or 5-gallon bucket to prevent humidity from damaging the Portland cement in the dry mix. All sample containers must be sealed against contamination and stored for a period of one year, at room temperature in a place not subject to freezing temperatures. The Engineer may conduct a sampling of a random batch without the Contractor's prior knowledge.

5. **Project Records:**
   The Engineer shall maintain written records of the number of bags of dry mix, amount of polymer emulsion, and water for each batch. In addition, records of air temperature, pavement temperature as measured by an infrared sensing device), wind velocity (speed and direction), and humidity shall be maintained. For each airport feature receiving PCMO, a record of which batch was used in a particular location shall be kept. Records of the amount of coverage expressed in square feet per "kit" shall be maintained.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **five (5) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or Contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

The Contractor will NOT be responsible for damage due to normal wear and tear, Acts of God as defined in Article 101-3 of the Standard Specifications for Roads and Structures, or use in excess of the design parameters.

METHOD OF MEASUREMENT

Any material that has been spilled, used in excessive overbanding, wasted, misapplied, or unsatisfactorily used in any way will be deducted in determining quantities for payment. The Engineer will determine the quantity, if any, to be deducted. The Engineer's decision on the quantity to be deducted will be final and binding.

1. The dry mix (cement/aggregate blend) shall be measured by the ton (kg).
2. The polymer emulsion shall be measured by the gallon (liter).
3. Water shall be measured by the gallon (liter).

BASIS OF PAYMENT

Payment will be made to the Contractor at the contract unit price per square yard for the PCMO and per linear foot for the PCMO Crack filler. This contract price shall fully compensate the Contractor for furnishing all materials; and for all labor, equipment, tools, cleanup, and incidentals necessary to complete the item.

Payment will be made under:

"PCMO Crack-Filler…….....Linear Foot"
"PCMO……...…….. Square Yard"

TESTING REQUIREMENTS

1. Dry Mix:
   a. ASTM C387, “Standard Specification for Packaged, Dry Combined Materials for Mortar and Concrete”
   b. ASTM C33, “Standard Specification for Concrete Aggregates”
   c. ASTM C144, “Standard Specification for Aggregate for Masonry Mortar”
   d. ASTM C150, “Standard Specification for Portland Cement”

2. PCMO Blend: See Appendix A.

RAISED PAVEMENT MARKERS

DESCRIPTION

Description:
This item shall consist of furnishing, installing, maintaining and removing permanent raised pavement markers in accordance with this contract.

References:
In addition to the specific requirements herein modified, section 1250 of the Standard Specifications for Roads and Structures is by reference incorporated into this specification.

MATERIALS

Refer to Division 10 of the Standard Specifications for Roads and Structures:

Item	Section
Permanent Raised Pavement Markers	1086-2

CONSTRUCTION METHODS

Install **permanent** raised pavement markers using a hot bitumen adhesive in accordance with Article 1081-7 of the Standard Specifications for Roads and Structures.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **six (6) month warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

Permanent Raised Pavement Markers will be measured as the actual number markers that have been satisfactorily placed and accepted by the Engineer.

BASIS OF PAYMENT

Payment will be made under:

"Permanent Raised Pavement Markers……Each"

PIPE JOINT SEALING, PIPELINE BACKGROUTING AND SOIL STABILIZATION WITH MOISTURE-ACTIVATED POLYURETHANE FOAM

DESCRIPTION

This item shall consist of sealing pipe joints, backgrouting pipe and stabilizing loose, weak soils using moisture-activated hydrophilic and/or hydrophobic polyurethane foam in accordance with these specifications at locations shown on the plans or as directed by the Engineer. This work shall include forming containment dams to seal joints, drilling injection holes through pipe walls, backgrouting pipes, and stabilizing loose and/or weak soils as specified herein.

CONTRACTOR PRE-QUALIFICATION REQUIREMENTS

The Contractor and field supervisor assigned to this project shall have a minimum of five (5) years of experience in performing pipe joint sealing, backgrouting pipelines and stabilizing soils using moisture-activated hydrophobic polyurethane foam, and a minimum of ten (10) projects over the past two (2) years on which the Contractor and field supervisor assigned to this project have successfully performed this type of work. Prior to beginning work, the Contractor shall submit certification to the Engineer that the Contractor meets the minimum required experience. The certification shall include a listing of previous clients with contact names and phone numbers.

MATERIALS

Flexible Polyurethane Foam for Pipe Joint Sealing:
The medium used for pipe joint sealing shall be a moisture-activated, hydrophilic polyurethane injection resin that carries an ANSI/NSF 61 Certification approving it for use in potable water applications and meets the following physical properties:

TABLE 1 – Material Properties

Tensile Strength, ASTM D-3574	**Shrinkage, ASTM D-1042/ D-756**
450 psi	less than 2%
Tensile Elongation, ASTM D-3574	**Tear Resistance, ASTM D-3574**
350%	21 lbs/inch
Viscosity @ 73°F - liquid	**Solids Content @ 73°F - liquid**
250-350 centipoise	88%

The joint filler material that is saturated with the polyurethane material specified above, and placed in the joint, shall be an oil-free jute oakum.

Sufficient material to perform the entire pipe sealing operation shall be in proper storage at the site prior to any field preparation, so that there shall be no delay in procuring the material for each day's application.

Moisture-Activated Polyurethane Foam for Backgrouting Pipeline and Soil Stabilization:
The medium used for pipe joint sealing shall be a moisture-activated, hydrophobic polyurethane injection resin that carries an ANSI/NSF 61 Certification approving it for use in potable water applications and meets the following physical properties:

TABLE 1 – Material Properties

Tensile Strength, ASTM D-3574	**Shrinkage, ASTM D-1042/ D-756**
41 psi	None
Tensile Elongation, ASTM D-3574	**Compressive Strength, ASTM C-39 (with fine sand)**
3.4%	970 psi
Viscosity @ 73°F - liquid	**Solids Content @ 73°F - liquid**
110-130 centipoise	100%

This material shall be mixed with a catalyst that reacts as follows:

Cream Time (test) Kat to 920 Mix Ration	Set Time (test) Kat to 920 Mix Quantities	Full Cure (test) Initial Reaction Time	Set Time	Expansion
10%	13 oz. to 1 gal.	12 sec.	30 sec	29x
7.50%	10 oz. to 1 gal.	12 sec.	47 sec	28.5x
5%	7 oz. to 1 gal.	20 sec.	70 sec	26.5x
3.50%	5 oz. to 1 gal.	30 sec.	80 sec	23.5x
1%	1.5oz. to 1 gal.	90 sec.	5 min. 30 sec.	13.5x

Sufficient material to perform the entire backgrouting or soil stabilization operation shall be in proper storage at the site prior to any field preparation, so that there shall be no delay in procuring the material for each day's application.

Material Acceptance:
The Contractor shall furnish a Type 7 Contractor Certification, with an attached Type 1 Certified Mill Test Report in accordance with Article 106-3 of the Standard Specifications for Roads and Structures for all foam material shipped to the airport for use on the project. The reports can be used for material acceptance or the Engineer may perform independent verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers for inspection by the Engineer. Material shall not be loaded into the equipment until inspected by the Engineer.

EQUIPMENT

The Contractor shall furnish all equipment and hardware necessary for the performance of the work in accordance with these specifications. All machines, tools and equipment used in the performance of work required by these specifications will be subject to the approval of the Engineer and maintained in a safe and satisfactory working condition at all times.

Drills:
Pneumatic drill/driver and an electric drill which shall be capable of drilling holes up to 1" in diameter or driving ½" diameter steel probes.

Pumping Unit:
Portable pumping unit capable of injecting the polyurethane formulation behind pipe or into subsurface soils through steel probes. This pumping unit will be capable of controlling the delivery of polyurethane and have a maximum output capable of injecting material up to 3300 psi behind the pipe or into the subsurface soils as required.

CCTV:
The Camera, Monitor, and other components shall be color, and capable of fully inspecting non-pressurized airfield drainage systems. Inspection equipment shall have accurate footage counter that will display and record the distance from a set start point. The camera shall be of remotely operated pan and tilt type capable of performing a 360-degree inspection of the drainage system.

CONSTRUCTION METHODS

Weather Limitations:
Work under this contract item shall not be performed when ambient temperature is below 32°F.

CCTV Inspection:
Perform the inspection in accordance with Pipeline Assessment Certification Program (PACP.) CCTV Inspection and assessment shall be performed in the presence of the Engineer.

Preparation:
The Contractor shall determine size of pipe joints, areas to be backgrouted or depth of soils that may require treatment. All areas to be treated shall be approved by the Engineer. For joint sealing, the Contractor's personnel shall be properly trained to perform the work in accordance with OSHA confined entry requirements. All joints shall be wetted down with water prior to insertion of joint material. For backgrouting pipes, a series of 3/8" holes shall be drilled through the pipe wall at each joint to be treated, in a circumferential spacing approved by the Engineer. Ports shall be placed in drilled holes to facilitate backgrouting. For soil stabilization, ½" diameter steel pipes shall be driven in a grid pattern or at a spacing and a depth as approved by the Engineer.

Installation:

Joint Sealing
Joint sealing shall be performed by inserting jute oakum that has been saturated in the hydrophilic polyurethane resin and activated with water into the pipe joint and allowed to cure, sealing the joint completely. The Contractor shall perform the joint sealing in accordance with OSHA confined space entry using properly calibrated air quality meters and harnesses as required.

Backgrouting Pipe
Backgrouting pipe shall be performed by pumping the moisture-activated hydrophobic polyurethane resin in through the grout ports, filling voids as material flows out adjacent ports. Material shall be properly mixed with the catalyst to react based on the site conditions and approval of the Engineer.

Soil Stabilization
Soil stabilization shall be performed by pumping the moisture-activated hydrophobic polyurethane resin through the steel pipes and into the underlying soils. Material shall be pumped down to elevations and in quantities as directed by the Engineer.

Protection and Cleanup:
The Contractor shall be responsible for storage, clean-up, and removal from the work area all debris, waste, residual repair materials, and by-products generated by the preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose

of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **five (5) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or Contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

The polyurethane material for joint sealing shall be paid for by the joint completed (per each), which will include furnishing and installing joint material.

The polyurethane material for backgrouting and soil stabilization shall be paid for by the gallon. Both the Contractor and the Engineer shall agree on the number of gallons pumped utilizing a daily grout log.

BASIS OF PAYMENT

The quantity of material to be paid for shall be the quantity actually used, based on the contract unit price shown on the bid form. Only those items shown on the bid sheet shall be paid for directly. All other labor, tool, equipment, and incidentals necessary for the completion of the project shall be considered incidental to the contract bid items.

Payment will be made under:

"Joint Sealing (36" to 48" diameter) ……..……Each"
"Joint Sealing (54" to 72" diameter)…….....Each"
"Joint Sealing (> 72" diameter)…….....Each"
"Backgrouting……...Gallons"
"Soil Stabilization…….Gallons"
"CCTV Inspection……..Day"

CONCRETE PAVEMENT LEVELING AND UNDERSEALING WITH HIGH DENSITY POLYURETHANE FOAM

DESCRIPTION

This item shall consist of raising, leveling, and undersealing concrete pavement slabs using a High Density Polyurethane Foam (HDPF) in accordance with these specifications at locations shown on the plans or as directed by the Engineer. This work shall include drilling injection holes, placing of HDPF material, densifying the underlying soil, and testing and surveying to control the pavement leveling operation.

CONTRACTOR PRE-QUALIFICATION REQUIREMENTS

The contractor and field supervisor assigned to this contract item shall have a minimum of five (5) years of experience in the performance of "Concrete Pavement Leveling and Undersealing with HDPF" and a minimum of ten (10) projects over the past three (3) on which the contractor and field supervisor assigned to this project have successfully performed this type of work. Prior to beginning work, the contractor shall submit certification to the engineer that the contractor meets the minimum required experience. The certification shall include a listing of previous clients with contact names and phone numbers.

MATERIALS

High Density Polyurethane Foam:
The medium used for concrete leveling and undersealing shall be a blown, closed cell, hydrophobic polyurethane foam system, and meet the material specifications in Table 1. The polyurethane foam system will have a free rise density of 3.0 – 4.2 lb/ft, with a minimum compressive strength of 40 psi. The expansion of the polyurethane foam under pressure will increase the foam density above the original free rise density value. The compressive strength will be a function of the density of the tested material; therefore it is understood that the foam produced during the lifting process will normally have a higher compressive strength than foam produced without restriction (free rise).

TABLE 1 – Material Properties

Density lbs/ft ， ASTM 1622	Compressive Strength ， ASTM 1621
3.0	40 psi
3.5	50 psi
4.0	60 psi
6.0	110 psi

Sufficient material to perform the entire pavement leveling operation shall be in proper storage at the site prior to any field preparation, so that there shall be no delay in procuring the material for each day's application.

Material Acceptance:
The Contractor shall furnish a Type 7 Contractor Certification, with an attached Type 1 Certified Mill Test Report in accordance with Article 106-3 of the Standard Specifications for Roads and Structures for all foam material shipped to the airport for use on the project. The reports can be used for material acceptance or the Engineer may perform independent verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers for inspection by the Engineer. Material shall not be loaded into the equipment until inspected by the Engineer.

EQUIPMENT

The Contractor shall furnish all equipment and hardware necessary for the performance of the work in accordance with these specifications. All machines, tools and equipment used in the performance of work required by these specifications will be subject to the approval of the Engineer and maintained in a safe and satisfactory working condition at all times.

Drills:
Pneumatic drill and an electric drill which shall be capable of drilling holes up to ¾" in diameter.

Pumping Unit:
Truck or trailer mounted pumping unit capable of injecting the high density polyurethane formulation below the slab into the subsurface soils. This pumping unit will be capable of controlling the rate of rise of the concrete slabs and densifying the subsurface soils.

Laser Level:
Laser leveling survey equipment and dial indicators capable of ensuring the concrete slab is raised at the proper rate and to the required elevation.

CONSTRUCTION METHODS

Weather Limitations:
Work under this contract item shall not be performed when pavement surface and ambient temperature is below 40°F, moisture is present on the surface of the pavement, or rain is imminent.

Preparation:
The Contractor shall prepare concrete to be leveled by profiling existing pavement and determining where the pavement needs to be raised. Void filling shall be in areas as indicated and as directed by the engineer. A series of ⅝" holes shall be drilled into the pavement 3 - 8 foot O.C. with exact location and spacing to be determined in the field.

Installation:
The expanding polyurethane foam system shall be injected under the slab. A laser level will be used to monitor and verify elevations. The amount of rise shall be controlled by regulating the rate of HDPF injected. Final elevations shall be within 1/4" of the elevations proposed by profile, to the extent permitted by the structure, existing construction and site conditions. Elevations can also be verified by flooding the area to confirm that the pavement has been realigned properly. Injection holes shall be sealed with non-expansive cementitious grout once leveling is complete. The HDPF shall reach 90% of the full compressive strength in 15 minutes after injection.

The Contractor shall be responsible for any pavement blowouts, excessive lifting, cracking, uneven pavement, and any other unintentional consequence which is the result of the raising of the pavement, and shall repair or fix the damaged area to the satisfaction of the Engineer, without additional cost.

Protection and Cleanup:
Do not allow traffic on the repaired concrete slabs for at least one (1) hour after initial set. The Contractor shall protect the repair until ready for traffic by placing guarding or warning devices as necessary. The Contractor shall be responsible for storage, clean-up and removal from the work area all debris, waste, residual repair materials, and by-products generated by the preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **five (5) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

The polyurethane material shall be paid for by the pound, which will include furnishing and injecting material.

Triple Verification of Actual Pounds pumped will be accomplished as follows.

1. A conversion from pump counters to pounds will be provided with a manufacturer's certification of the accurate conversion factor.
2. Load cell(s) with printer(s) to verify weights before and after pumping with time date stamp, start weight, and end weight.
3. A visual measurement conversion on the actual totes/barrels of pounds per inches pumped.

BASIS OF PAYMENT

The quantity of material to be paid for shall be the quantity actually used, based on the contract unit price shown on the bid form. Only those items shown on the bid sheet shall be paid for directly. All other labor, tool, equipment, and incidentals necessary for the completion of the project shall be considered incidental to the contract bid items.

Payment will be made under:

"HDPF Concrete Pavement Leveling ……..……Pounds"

THERMOPLASTIC COAL-TAR EMULSION CRACK-FILLER

1) DESCRIPTION

1.1 Description:

This item shall consist of an application of a thermoplastic coal-tar emulsion crack-filler, applied to concrete or asphalt pavement cracks in accordance with these specifications for the areas shown on the plans or as designated by the engineer. This application is intended to provide fuel and water resistance to the existing pavement cracks.

1.2 References:

FAA Engineering Brief 35A

2) MATERIALS

2.1 Aggregate:

The aggregate shall be clean washed silica sand and conform to the gradation of Table 1. Samples of aggregates shall be submitted by the Contractor at least 14 days prior to the start of production. During production, the sampling points and intervals will be designated by the Engineer. The samples will be the basis of approval from the standpoint of the quality requirements of this section.

TABLE 1. GRADATION OF AGGREGATES

Sieve Size	Percentage By Weight Passing Sieves
No. 4	100
No. 8	95 - 100
No. 16 (1.18mm)	80 – 95
No. 30 (0.60mm)	60 – 80
No. 50 (0.30mm)	35 – 50
No. 100 (0.15mm)	1 - 15

2.2 Bituminous Materials:

The emulsion material shall be a thermoplastic emulsion made up of plastic resins and coal-tar conforming to the requirements of ASTM D 3320. The emulsion shall be manufactured as a complete product which can be tested at the manufacturing plant. The water content of the emulsion shall not exceed 48% +/- 1% when tested in accordance with ASTM D 244 section 3. A dried film of emulsion, shall contain a minimum of 89% of a combination of plastic resin and coal-tar with the remaining percentage being inorganic filler. The dried emulsion shall have a softening point greater than 212 degrees F (100 C) when tested in accordance with ASTM D36. A film of the dried emulsion material, eight (8) mills thick, shall stretch to five (5) times it original length at 70 Degrees F (21 C) without breaking and recover 35% of this length in one minute.

2.3 Water:

The water used in mixing shall be potable and free from harmful soluble salts. The temperature of the water added during mixing shall be at least 50 degrees F (10 degrees C). The ph of the water added during mixing shall conform to the requirements of the emulsion manufacturer.

3) COMPOSITION AND APPLICATION

Crack Filler shall be thermoplastic coal-tar emulsion and aggregate as described below. Thermoplastic coal-tar emulsion must meet the performance requirements outlined in Section 2.2 (Bituminous Materials).

A. Cracks wider than ¼-inch shall be filled with a mixture of 6-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

B. Cracks wider than 1-inch shall be filled with a mixture of 10-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

C. Cracks wider than 2-inch shall be filled with a mixture of 20-lbs of crushed granite per 1-gallon of thermoplastic coal-tar emulsion.

5) CONSTRUCTION METHODS

5.1 Weather Limitations:

This crack-filler shall not be applied when the humidity or impending weather conditions will not allow proper drying or when the atmospheric or pavement temperature is below 50 degrees F (10 degrees C), unless otherwise directed by the Engineer.

5.2 Barricades:

The contractor shall provide, place and remove barricades on other temporary control markers to indicate areas to be protected from traffic and/or parking during the progress of the work and in accordance with the coordinated and approved work schedule.

5.3 Equipment and Tools:

The mixing equipment shall be a mobile mixing plant and have a capacity to contain at least 400 gallons. It shall have an agitator which will mix the emulsion and aggregate to a uniform consistency. Other tools and equipment such as power brooms, hand brooms, air compressors, squeegees, etc. shall be provided as required.

5.4 Preparation of Cracks:

Cracks containing vegetation shall be treated with a herbicide and blown free of deleterious materials using heated compressed air. Cracks wider than 1/4 inch shall be cleaned and blown free of debris.

5.5 Crack Filling:

Crack-filler (thermoplastic coal-tar emulsion binder with aggregate) shall be applied, as an overband, four to six inches wide over cracks in the existing pavement and squeegeed to prevent excess material build-up. Repeat process after curing as necessary.

5.6 Curing:

The mixture shall be permitted to dry for a minimum of 24 hours after the application, before opening to traffic or painting, and shall be sufficiently cured to drive over without damage to the crack-filler. Any damage to the uncured mixture will be the responsibility of the contractor to repair.

After the proper curing period, cracks should be inspected to make sure no crack-filler material has recessed less than ¼". Cracks that have recessed more than ¼" need to be refilled in accordance to Section 3 (Composition and Application).

5.7 Contractor's Certification:

The Contractor shall furnish the manufacturer's certification that each consignment of thermoplastic coal-tar emulsion shipped to the project meets the requirements of Section 2.2 (Bituminous Materials). The Contractor shall submit a certification that the material proposed has been in field use for a minimum of 2 years. The Contractor shall furnish a certification demonstrating their experience in the application of a thermoplastic coal-tar

emulsion crack-filler for a minimum of two years.

6) WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **one (1) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

7) MEASUREMENT AND PAYMENT

7.1 Measurement:

The thermoplastic coal-tar emulsion crack-filler will be measured by the Linear Foot of thermoplastic coal-tar emulsion crack-filler used. Any material that has been spilled, used in excessive overbanding, wasted, misapplied, or unsatisfactorily used in any way will be deducted in determining quantities for payment. The Engineer will determine the quantity, if any, to be deducted. The Engineer's decision on the quantity to be deducted will be final and binding.

7.2 Basis of Payment:

Payment shall be made at the contract unit price per gallon for the thermoplastic coal-tar emulsion crack-filler. This price shall fully compensate the Contractor for furnishing all materials and for all labor, equipment tools and incidentals necessary to complete the thermoplastic coal-tar emulsion crack-fill, including mix design and data sheets stipulated in these specifications.

Payment will be made under:

"Thermoplastic Coal-Tar Emulsion Crack-Filler ……..……Linear Foot"

THERMOPLASTIC COAL-TAR EMULSION SEALCOAT WITH AGGREGATE

1) DESCRIPTION

1.1 Description:

This item shall consist of an application of a thermoplastic coal-tar emulsion sealcoat, applied on a concrete or asphalt pavement in accordance with these specifications for the areas shown on the plans or as designated by the engineer. This application is intended to provide a weather barrier with fuel and water resistance.

1.2 References:

A. FAA Engineering Brief 35A

2) MATERIALS

2.1 Aggregate:

The aggregate shall be clean washed silica sand and conform to the gradation of Table 1. Samples of aggregates shall be submitted by the Contractor at least 14 days prior to the start of production. During production, the sampling points and intervals will be designated by the Engineer. The samples will be the basis of approval from the standpoint of the quality requirements of this section.

TABLE 1. GRADATION OF AGGREGATES

Sieve Size	Percentage By Weight Passing Sieves
No. 4	100
No. 8	95 - 100
No. 16 (1.18mm)	80 – 95
No. 30 (0.60mm)	60 – 80
No. 50 (0.30mm)	35 – 50
No. 100 (0.15mm)	1 - 15

2.2 Bituminous Materials:

The emulsion material shall be a thermoplastic emulsion made up of plastic resins and coal-tar conforming to the requirements of ASTM D 3320. The emulsion shall be manufactured as a complete product which can be tested at the manufacturing plant. The water content of the emulsion shall not exceed 48% +/- 1% when tested in accordance with ASTM D 244 Section 3. A dried film of emulsion shall contain a minimum of 89% of a combination of plastic resin and coal-tar with the remaining percentage being inorganic filler. The dried emulsion shall have a softening point greater than 212 degrees F (100 C) when tested in accordance with ASTM D36. A film of the dried emulsion material, eight (8) mills thick, shall stretch to five (5) times it original length at 70 Degrees F (21 C) without breaking and recover 35% of this length in one minute.

2.3 Water:

The water used in mixing shall be potable and free from harmful soluble salts. The temperature of the water added during mixing shall be at least 50 degrees F (10 degrees C). The ph of the water added during mixing shall conform to the requirements of the emulsion manufacturer.

3) COMPOSITION AND APPLICATION

3.1 Composition:

The thermoplastic coal-tar emulsion shall be mixed with the aggregate at six (6) pounds of sand per gallon of undiluted emulsion.

3.2 Application:

The thermoplastic coal-tar emulsion sealcoat with aggregate shall be installed at an application rate between .10 and .15 gallons of mix per square yard.

4) TEST SECTION

Prior to full production, the Contractor shall prepare a quantity of mixture sufficient to place a test section of approximately 16 feet wide by 100 feet long at the application rate specified in Section 3.2 (Application). The area to be tested will be designated by the Engineer and will be located on the existing pavement.

The test section should be used to verify the adequacy of the mixture and to determine the exact application rate. The same equipment and method of operations shall be used on the test section as will be used on the remained of the work. If the test section should prove to be unsatisfactory, the necessary adjustments to the mix composition, application rate, placement operations and equipment shall be made. Additional test sections shall be placed and evaluated if required.

5) CONSTRUCTION METHODS

5.1 Weather Limitations:

This sealcoat shall not be applied when the humidity or impending weather conditions will not allow proper drying or when the atmospheric or pavement temperature is below 50 degrees F (10 degrees C), unless otherwise directed by the Engineer.

5.2 Barricades:

The contractor shall provide, place and remove barricades on other temporary control markers to indicate areas to be protected from traffic and/or parking during the progress of the work and in accordance with the coordinated and approved work schedule.

5.3 Equipment and Tools:

The mixing equipment shall be a mobile mixing plant and have a capacity to contain at least 400 gallons. It shall have an agitator which will mix the emulsion and aggregate to a uniform consistency. The mixer should have a non-shearing pump with a variable rate of flow for spraying the mixture on the pavement. Other tools and equipment such as power brooms, hand brooms, air compressors, squeegees, etc. shall be provided as required.

5.4 Preparation of Pavement Surface:

A. New asphalt and concrete shall be allowed to cure for thirty days prior to the application of the emulsion.

B. Where there are sections of the pavement exhibiting a soft base; the pavement shall be removed, and if the base is contaminated, it shall be replaced. The area will be filled with a paving mix comparable to the existing pavement.

C. Areas of the pavement exhibiting the effects of fuel spills shall be treated by scraping off excess oil, heating with a torch, brushing loosened material away, and primed with a solvent type polymeric primer. In areas where the fuel has weakened the integrity of the pavement, the pavement will be removed and replaced with a paving mix comparable to the existing pavement.

D. The surface shall be cleaned of dust, dirt or other loose foreign matter. All thermoplastic traffic markings shall be removed by grinding, blasting etc.

E. Cracks containing vegetation shall be treated with a herbicide blown free of deleterious materials using compressed air. Cracks wider than 1/4 inch shall be cleaned and blown free of debris.

5.5 Crack Filling and Sealing:

Crack Filler shall be thermoplastic coal-tar emulsion and aggregate as described below. Thermoplastic coal-tar emulsion must meet the performance requirements outlined in Section 2.2 (Bituminous Materials).

A. Cracks wider than ¼-inch shall be filled with a mixture of 6-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

B. Cracks wider than 1-inch shall be filled with a mixture of 10-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

C. Cracks wider than 2-inch shall be filled with a mixture of 20-lbs of crushed granite per 1-gallon of thermoplastic coal-tar emulsion.

D. Crack sealant (thermoplastic coal-tar emulsion binder with aggregate) shall be applied, as an overband, four to six inches wide over cracks in the existing pavement.

5.6 Application of Tack Coat:

Following preparation of the pavement, a tack coat of thermoplastic coal-tar emulsion diluted with 50% water, shall be applied at a minimum rate of 0.05 gallons per square yard, prior to dilution to the entire area to receive the sealcoat application.

5.7 Application of Thermoplastic Coal Tar Emulsion Sealcoat:

The thermoplastic coal-tar emulsion sealcoat (mixed according to 3.2) shall be sprayed or squeegeed onto the pavement surface, in one coat, at an application rate of .10 to .15 gallons of mix per square yard to the entire area to receive sealcoat application.

5.8 Curing:

The mixture shall be permitted to dry for a minimum of 24 hours after the application, before opening to traffic or painting, and shall be sufficiently cured to drive over without damage to the sealcoat. Any damage to the uncured mixture will be the responsibility of the contractor to repair.

5.9 Handling:

The mixture shall be continuously agitated from the time it had been mixed until its application on the pavement surface. The distributor or applicator, pumps and all tools shall be maintained in satisfactory working condition. Spray bar nozzles, pumps, or other equipment can be cleaned with coal tar toluene or xylene.

5.10 Contractor's Certification:

The Contractor shall furnish the manufacturer's certification that each consignment of thermoplastic coal-tar emulsion shipped to the project meets the requirements of Section 2.2 (Bituminous Materials). The Contractor shall submit a certification that the material proposed has been in field use for a minimum of 2 years. The Contractor shall furnish a certification demonstrating their experience in the application of a thermoplastic coal-tar emulsion sealcoat with aggregate for a minimum of two years.

6) WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **two (2) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

7) MEASUREMENT AND PAYMENT

7.1 Measurement:

The thermoplastic coal-tar emulsion sealcoat, tack coat, repairs, and preparations shall be measured by the square yard of the area indicated on the contract drawings or designated by the engineer. Crack sealing will be measured by the Gallon as applied.

7.2 Basis of Payment:

Payment shall be made at the contract unit price per square yard for the Thermoplastic Coal-Tar Emulsion Sealcoat with Aggregate. This price shall fully compensate the Contractor for furnishing all materials and for all labor, equipment tools and incidentals necessary to complete the Thermoplastic Coal - Tar Emulsion Sealcoat, including mix design and data sheets stipulated in these specifications. Payment for crack sealing shall be made according to the contract item "Thermoplastic Coal – Tar Emulsion Crack Fill."

Payment will be made under:

"Thermoplastic Coal-Tar Emulsion Sealcoat with Aggregate ……Square Yard"

THERMOPLASTIC COAL-TAR EMULSION SEALCOAT WITHOUT AGGREGATE

1) DESCRIPTION

1.1 Description:

This item shall consist of a one coat application of a thermoplastic coal-tar emulsion sealcoat without aggregate, applied on a concrete or asphalt pavement in accordance with these specifications for the areas shown on the plans or as designated by the engineer. This application is intended to provide a weather barrier with fuel and water resistance.

1.2 References:

A. FAA Engineering Brief 35A

2) MATERIALS

2.1 Bituminous Materials:

The emulsion material shall be a thermoplastic emulsion made up of plastic resins and coal-tar conforming to the requirements of ASTM D 3320. The emulsion shall be manufactured as a complete product which can be tested at the manufacturing plant. The water content of the emulsion shall not exceed 48% +/- 1% when tested in accordance with ASTM D 244 Section 3. A dried film of emulsion shall contain a minimum of 89% of a combination of plastic resin and coal tar with the remaining percentage being inorganic filler. The dried emulsion shall have a softening point greater than 212 degrees F (100 C) when tested in accordance with ASTM D36. A film of the dried emulsion material, eight (8) mills thick, shall stretch to five (5) times it original length at 70 Degrees F (21 C) without breaking and recover 35% of this length in one minute.

2.2 Water:

The water used in mixing shall be potable and free from harmful soluble salts. The temperature of the water added during mixing shall be at least 50 degrees F (10 degrees C). The ph of the water added during mixing shall conform to the requirements of the emulsion manufacturer.

3) COMPOSITION AND APPLICATION

3.1 Composition

The thermoplastic coal-tar emulsion sealcoat without aggregate shall be mixed at a rate of 70% thermoplastic coal tar emulsion and 30% water.

3.2 Application:

The thermoplastic coal-tar emulsion sealcoat without aggregate shall be installed at an application rate of .10 gallons of mix per square yard.

4) TEST SECTION

Prior to full production, the Contractor shall prepare a quantity of mixture sufficient to place a test section of approximately 16 feet wide by 100 feet long at the application rate specified in Section 3.2 (Application). The area to be tested will be designated by the Engineer and will be located on the existing pavement.

The test section should be used to verify the adequacy of the mixture and to determine the exact application rate. The same equipment and method of operations shall be used on the test section as will be used on the remained of the work. If the test section should prove to be unsatisfactory, the necessary adjustments to the mix composition, application rate, placement operations and equipment shall be made. Additional test sections shall be placed and evaluated if required.

5) CONSTRUCTION METHODS

5.1 Weather Limitations:

This sealcoat shall not be applied when the humidity or impending weather conditions will not allow proper drying or when the atmospheric or pavement temperature is below 50 degrees F (10 degrees C), unless otherwise directed by the Engineer.

5.2 Barricades:

The contractor shall provide, place and remove barricades on other temporary control markers to indicate areas to be protected from traffic and/or parking during the progress of the work and in accordance with the coordinated and approved work schedule.

5.3 Equipment and Tools:

The mixing equipment shall be a mobile mixing plant and have a capacity to contain at least 400 gallons. It shall have an agitator which will mix the emulsion and aggregate to a uniform consistency. The mixer should have a non-shearing pump with a variable rate of flow for spraying the mixture on the pavement. Other tools and equipment such as power brooms, hand brooms, air compressors, squeegees, etc. shall be provided as required.

5.4 Preparation of Pavement Surface:

A. New asphalt and concrete shall be allowed to cure for thirty days prior to the application of the emulsion.

B. Where there are sections of the pavement exhibiting a soft base; the pavement shall be removed, and if the base is contaminated, it shall be replaced. The area will be filled with a paving mix comparable to the existing pavement.

C. Areas of the pavement exhibiting the effects of fuel spills shall be treated by scraping off excess oil, heating with a torch, brushing loosened material away, and primed with a solvent type polymeric primer. In areas where the fuel has weakened the integrity of the pavement, the pavement will be removed and replaced with a paving mix comparable to the existing pavement.

D. The surface shall be cleaned of dust, dirt or other loose foreign matter. All thermoplastic traffic markings shall be removed by grinding, blasting etc.

E. Cracks containing vegetation shall be treated with a herbicide blown free of deleterious materials using compressed air. Cracks wider than 1/4 inch shall be cleaned and blown free of debris.

5.5 Crack Filling and Sealing:

Crack Filler shall be thermoplastic coal-tar emulsion and aggregate as described below. Thermoplastic coal-tar emulsion must meet the performance requirements outlined in Section 2.2 (Bituminous Materials).

A. Cracks wider than ¼-inch shall be filled with a mixture of 6-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

B. Cracks wider than 1-inch shall be filled with a mixture of 10-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

C. Cracks wider than 2-inch shall be filled with a mixture of 20-lbs of crushed granite per 1-gallon of thermoplastic coal-tar emulsion.

D. Crack sealant (thermoplastic coal-tar emulsion binder with aggregate) shall be applied, as an overband, four to six inches wide over cracks in the existing pavement.

5.6 Application of Thermoplastic Coal Tar Emulsion Sealcoat

The thermoplastic coal-tar emulsion sealcoat mixed according to Section 3.1 (Composition) shall be sprayed or squeegeed onto the pavement surface, in one coat, at an application rate of .10 gallons of mix per square yard to the entire area to receive sealcoat application.

5.7 Curing

The mixture shall be permitted to dry for a minimum of 24 hours after the application, before opening to traffic or painting, and shall be sufficiently cured to drive over without damage to the sealcoat. Any damage to the uncured mixture will be the responsibility of the contractor to repair.

5.8 Handling

The mixture shall be continuously agitated from the time it had been mixed until its application on the pavement surface. The distributor or applicator, pumps and all tools shall be maintained in satisfactory working condition. Spray bar nozzles, pumps, or other equipment can be cleaned with coal tar toluene or xylene.

5.10 Contractor's Certification

The Contractor shall furnish the manufacturer's certification that each consignment of thermoplastic coal-tar emulsion shipped to the project meets the requirements of Section 2.2 (Bituminous Materials). The Contractor shall submit a certification that the material proposed has been in field use for a minimum of 2 years. The Contractor shall furnish a certification demonstrating their experience in the application of a thermoplastic coal-tar emulsion sealcoat without aggregate for a minimum of two years.

6) WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **two (2) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

7) MEASUREMENT AND PAYMENT

7.1 Measurement

The thermoplastic coal-tar emulsion sealcoat, tack coat, repairs, and preparations shall be measured by the square yard of the area indicated on the contract drawings or designated by the engineer. Crack sealing will be measured according to the contract item "Thermoplastic Coal – Tar Emulsion Crack Fill."

7.2 Basis of Payment

Payment shall be made at the contract unit price per square yard for the thermoplastic coal-tar emulsion sealcoat without aggregate. This price shall fully compensate the Contractor for furnishing all materials and for all labor, equipment tools and incidentals necessary to complete the thermoplastic coal tar emulsion sealcoat, including mix design and data sheets stipulated in these specifications. Payment for crack sealing shall be made according to the contract item "Thermoplastic Coal – Tar Emulsion Crack Fill."

Payment will be made under:

"Thermoplastic Coal-Tar Emulsion Sealcoat Without Aggregate ……Square Yard"

THERMOPLASTIC COAL-TAR EMULSION SLURRY SEAL – TYPE A, COURSE

1) DESCRIPTION

This item shall consist of an application of a thermoplastic coal-tar emulsion slurry seal, with mineral aggregate, applied on an existing, previously prepared asphalt or concrete surface, in accordance with these specifications. This specification outlines the installation of a Type A Thermoplastic Coal-Tar Emulsion Slurry Seal.

2) MATERIALS

2.1 Aggregate:

The aggregate shall consist of sound, durable crushed igneous type stone (crushed basalt, granite, trap rock, etc.) with a hardness greater than 5 on the MOH hardness scale and shall show no more wear than 25 percent when tested in accordance with ASTM C 131. The aggregate shall be free from coatings of clay, organic matter, and other deleterious materials and shall meet the gradation in Table 1 when tested in accordance with ASTM C 136.

Samples of aggregates shall be submitted by the Contractor at least 14 days prior to the start of production. During production, the sampling points and intervals will be designated by the Engineer. The samples will be the basis of approval from the standpoint of the quality requirements of this section.

TABLE 1. GRADATION OF AGGREGATES

Sieve Size	Percentage By Weight Passing Sieves TYPE A
No. 4	100
No. 8	80 - 90
No. 16	55 – 70
No. 30	35 – 60
No. 50	25 – 45
No. 100	15 - 25
No. 200	5-20

2.2 Bituminous Materials:

The emulsion material shall be a thermoplastic emulsion made up of plastic resin and emulsified coal-tar pitch conforming to the requirements of ASTM D 3320. The thermoplastic coal-tar emulsion shall be manufactured as a complete product which can be tested at the manufacturing plant. The water content of the emulsion shall not exceed 48 percent +/- 1 percent when tested in accordance with ASTM D 244, section 3. A dried film of combination of plastic resin and coal-tar with the remaining percentage being inorganic filler. The dried emulsion shall have a softening point greater than 212 degrees F (100 degrees C) when tested in accordance with ASTM D 36. A film of the dried emulsion material, 8 mils thick, shall stretch to 5 times its original length at 70 degrees F (21 degrees C) without breaking, and recover 35 percent of this length in one minute.

3) COMPOSITION AND APPLICATION

3.1 Composition:

The aggregate shall be mixed homogeneously with the thermoplastic coal tar emulsion at the rate of 21-23 pounds of aggregate per gallon of emulsion.

3.2 Job Mix Formula:

Based on the data herein this specification, the Contractor shall submit the proportions of water, emulsion, and aggregate proposed for use to the Engineer for approval prior to the start of operations. A copy of the mix design and test data required by this specification shall be submitted to the Engineer for approval along with the above information. No thermoplastic coal-tar slurry seal shall be produced for payment until a job mix formula has been approved in writing by the Engineer.

3.3 Application:

The thermoplastic coal-tar emulsion slurry seal shall be applied in one coat at a minimum application rate of 8 pounds per square yard of uncured slurry for Type A. The application rate submitted with the job mix formula shall be verified and/or adjusted during placement of the test section. The submitted application rate provided for in Section 3.2 (Job Mix Formula) will be selected from Section 3.1 (Composition) and translated to the equivalent rate measured by gallons of slurry seal per square yard.

4) TEST SECTION

Prior to full production, the Contractor shall prepare a quantity of mixture sufficient to place a test section of approximately 16 feet wide by 100 feet long at the application rate specified in Section 3.3 (Application). The area to be tested will be designated by the Engineer and will be located on the existing pavement.

The test section should be used to verify the adequacy of the mixture and to determine the exact application rate. The same equipment and method of operations shall be used on the test section as will be used on the remained of the work. If the test section should prove to be unsatisfactory, the necessary adjustments to the mix composition, application rate, placement operations and equipment shall be made. Additional test sections shall be placed and evaluated if required.

5) CONSTRUCTION METHODS

5.1 Weather Limitations:

The slurry seal shall be applied only when the surface is dry and the air temperature is above 50 degrees F (10 degrees C). It should not be applied when the humidity or impending weather conditions will not allow proper curing.

5.2 Equipment and Tools:

Descriptive information on the mixing and application equipment proposed for use shall be submitted to the Engineer not less than 10 days before work starts. All methods employed in performing the work and all equipment, tools, and machinery used for handling materials and executing any part of the work shall be subject to the approval of the Engineer before the work is started.

A. Slurry Machine. The slurry machine shall be a truck-mounted mobile mixing plant with a towed-type spreader box. It shall have a water tank and water pump capable of delivering a constant volume of water.

The slurry machine shall have an agitated storage tank for the thermoplastic emulsion and a non-shearing peristaltic pump with variable rate of flow for the delivery of this material. The slurry machine shall have a hopper for holding aggregate, supplying this material to the mixing chamber by a conveyor belt. The rate of aggregate delivery shall be volumetrically controlled by an adjustable gate opening. The speed of the conveyor shall be mechanically dependent upon the speed of the peristaltic pump.

The slurry machine shall be a continuous-flow mixing unit capable of delivering predetermined quantities of thermoplastic emulsion, aggregate, and if necessary water, to the mixing chamber and discharging the thoroughly mixed slurry on a continuous basis. The slurry machine shall deliver the materials to the mixing chamber in a constant proportion in a manner not dependent on power plant or vehicle speed. The machine shall be equipped with a water spraybar capable of fogging the pavement surface with up to 0.05 gallons of water per square yard.

B. Batch-Mixing Machine. The batch-mixing machine shall be a truck-mounted 500 to 1000 gallon tank containing suitably driven mixing blades to combine predetermined quantities of thermoplastic emulsion, aggregate, and, if necessary, water into a homogeneous slurry. It shall be equipped with a water tank and pump capable of delivering a constant volume of water to a spraybar. The spraybar shall be capable of fogging the pavement surface with up to 0.05 gallons of water per square yard.

C. Spreading Equipment. Attached to the mixing machine shall be a mechanical-type squeegee distributor, equipped with flexible material in contact with the surface to prevent loss of slurry from the distributor. It shall be maintained to prevent loss of slurry on varying grades and adjusted to assure uniform spread. There shall be a lateral control device and a flexible strike-off capable of being adjusted to lay the slurry at the specified rate of application. The spreader box shall have an adjustable width. The box shall be kept clean; dried slurry build-up on the box shall not be permitted.

D. Auxiliary Equipment. Other tools or equipment such as power brooms, power blowers, air compressors, hand brooms hand squeegees, etc., shall be provided as required.

5.3 Preparation of Pavement:

A. Prior to placing the slurry seal, unsatisfactory areas shall be repaired and the surface shall be cleaned of dust, dirt or other loose foreign matter. Any standard cleaning method will be acceptable except that water flushing will not be permitted in areas where considerable cracks are present in the pavement surface. Remove vegetation growing in cracks with compressed air (hot air lance).

B. Any painted stripes on surface to be treated, shall be removed before applying slurry seal.

C. Small oil spots are to be treated by scraping off excess oil, heating with a torch, brushing loosened material away and primed with a solution containing one part water and one part thermoplastic coal-tar emulsion.

D. When large oil or grease soiled areas are present, the area shall be cleaned of the contaminants by chemical or mechanical abrasion.

E. All oil spot areas shall be prime sealed with thermoplastic coal-tar emulsion diluted with 50 percent water applied to the areas at the rate of 0.10 gallons per square yard.

F. A minimum period of 30 days shall elapse between the placement of a bituminous surface course and the application of the slurry seal.

5.4 Crack Filling and Sealing:

Crack Filler shall be thermoplastic coal-tar emulsion and aggregate as described below. Thermoplastic coal-tar emulsion must meet the performance requirements outlined in Section 2.2 (Bituminous Materials).

A. Cracks wider than ¼-inch shall be filled with a mixture of 6-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

B. Cracks wider than 1-inch shall be filled with a mixture of 10-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

C. Cracks wider than 2-inch shall be filled with a mixture of 20-lbs of crushed granite per 1-gallon of thermoplastic coal-tar emulsion.

D. Crack sealant (thermoplastic coal-tar emulsion binder with aggregate) shall be applied, as an overband, four to six inches wide over cracks in the existing pavement.

5.5 Application of Tack Coat:

Following preparation of the pavement, a tack coat of thermoplastic-coal tar emulsion diluted with 50 percent water shall be applied to the pavement at the rate of 0.05 gallons per square yard.

5.6 Application of Slurry Seal:

The Surface shall be pre-wet by fogging ahead of the spreader box. Water used in pre-wetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the spreader box. The mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. A sufficient amount of mixture shall be carried in the spreader box at all times so that even distribution is obtained. No clumped or unmixed aggregate shall be permitted. No segregation of the emulsion and aggregate fines from the coarse aggregate will be permitted. If the coarse aggregate settles to the bottom of the slurry, the applied slurry will be removed from the pavement surface.

Upon completion of the work, the slurry shall have no pin holes, bare spots or cracks through which liquids or foreign matter could penetrate to the underlying pavement. No excessive buildup, uncovered aggregate, or unsightly appearance shall be permitted on longitudinal or transverse joints. The finished surface shall present a uniform texture.

In areas where the spreader box cannot be used, the slurry shall be applied by means of a hand squeegee.

5.7 Curing:

The slurry shall be permitted to dry a minimum of 24 hours before opening to traffic and shall be sufficiently cured to drive over without damage to the slurry seal.

5.8 Contractor’s Certification:

The Contractor shall furnish the manufacturer's certification that each consignment of thermoplastic coal-tar emulsion shipped to the project meets the requirements of Section 2.2 (Bituminous Materials). The Contractor shall submit a certification that the material proposed has been in field use for a minimum of 2 years. The Contractor shall furnish a certification demonstrating their experience in the application of a thermoplastic coal-tar emulsion slurry seal for a minimum of two years.

6) WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **five (5) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

7) MEASUREMENT AND PAYMENT

7.1 Measurement:

The Thermoplastic Coal-Tar Emulsion Slurry Seal-Type A, tack coat, repairs, and preparations shall be measured by the square yard of the area indicated on the contract drawings or designated by the engineer. Crack sealing will be measured according to the contract item "Thermoplastic Coal – Tar Emulsion Crack Fill."

7.2 Basis of Payment:

Payment shall be made at the contract unit price per square yard for the Thermoplastic Coal-Tar Emulsion Slurry Seal-Type A. This price shall fully compensate the Contractor for furnishing all materials and for all labor, equipment tools and incidentals necessary to complete the thermoplastic coal-tar emulsion sealcoat, including mix design and data sheets stipulated in these specifications. Payment for crack sealing shall be made according to the contract item "Thermoplastic Coal – Tar Emulsion Crack Fill."

Payment will be made under:

"Thermoplastic Coal-Tar Emulsion Slurry Seal-Type A ……Square Yard"

THERMOPLASTIC COAL-TAR EMULSION SLURRY SEAL – TYPE B, MEDIUM

1) DESCRIPTION

This item shall consist of an application of a thermoplastic coal-tar emulsion slurry seal, with mineral aggregate, applied on an existing, previously prepared asphalt or concrete surface, in accordance with these specifications. This specification outlines the installation of a Type B Thermoplastic Coal-Tar Emulsion Slurry Seal.

2) MATERIALS

2.1 Aggregate:

The aggregate shall consist of sound, durable crushed igneous type stone (crushed basalt, granite, trap rock, etc.) with a hardness greater than 5 on the MOH hardness scale and shall show no more wear than 25 percent when tested in accordance with ASTM C 131. The aggregate shall be free from coatings of clay, organic matter, and other deleterious materials and shall meet the gradation in Table 1 when tested in accordance with ASTM C 136.

Samples of aggregates shall be submitted by the Contractor at least 14 days prior to the start of production. During production, the sampling points and intervals will be designated by the Engineer. The samples will be the basis of approval from the standpoint of the quality requirements of this section..

TABLE 1. GRADATION OF AGGREGATES

Sieve Size	Percentage By Weight Passing Sieves TYPE B
No. 4	100
No. 8	95 - 100
No. 16 (1.18mm)	80 – 90
No. 30 (0.60mm)	40 – 60
No. 50 (0.30mm)	25 – 40
No. 100 (0.15mm)	10 - 20

2.2 Bituminous Materials:

The emulsion material shall be a thermoplastic emulsion made up of plastic resin and emulsified coal-tar pitch conforming to the requirements of ASTM D 3320. The thermoplastic coal-tar emulsion shall be manufactured as a complete product which can be tested at the manufacturing plant. The water content of the emulsion shall not exceed 48 percent +/- 1 percent when tested in accordance with ASTM D 244, section 3. A dried film of combination of plastic resin and coal-tar with the remaining percentage being inorganic filler. The dried emulsion shall have a softening point greater than 212 degrees F (100 degrees C) when tested in accordance with ASTM D 36. A film of the dried emulsion material, 8 mils thick, shall stretch to 5 times its original length at 70 degrees F (21 degrees C) without breaking, and recover 35 percent of this length in one minute.

3) COMPOSITION AND APPLICATION

3.1 Composition:

The aggregate shall be mixed homogeneously with the thermoplastic coal tar emulsion at the rate of 19-21 pounds of aggregate per gallon of emulsion.

3.2 Job Mix Formula:

Based on the data herein this specification, the Contractor shall submit the proportions of water, emulsion, and aggregate proposed for use to the Engineer for approval prior to the start of operations. A copy of the mix design and test data required by this specification shall be submitted to the Engineer for approval along with the above information. No thermoplastic coal tar slurry seal shall be produced for payment until a job mix formula has been approved in writing by the Engineer.

3.3 Application:

The thermoplastic emulsion slurry seal shall be applied in one coat at a minimum application rate of 7 pounds per square yard of uncured slurry for Type B. The application rate submitted with the job mix formula shall be verified and/or adjusted during placement of the test section. The submitted application rate provided for in Section 3.2 (Job Mix Formula) will be selected from Section 3.1 (Composition) and translated to the equivalent rate measured by gallons of slurry seal per square yard.

4) TEST SECTION

Prior to full production, the Contractor shall prepare a quantity of mixture sufficient to place a test section of approximately 16 feet wide by 100 feet long at the application rate specified in Section 3.3 (Application). The area to be tested will be designated by the Engineer and will be located on the existing pavement.

The test section should be used to verify the adequacy of the mixture and to determine the exact application rate. The same equipment and method of operations shall be used on the test section as will be used on the remained of the work. If the test section should prove to be unsatisfactory, the necessary adjustments to the mix composition, application rate, placement operations and equipment shall be made. Additional test sections shall be placed and evaluated if required.

5) CONSTRUCTION METHODS

5.1 Weather Limitations:

The slurry seal shall be applied only when the surface is dry and the air temperature is above 50 degrees F (10 degrees C). It should not be applied when the humidity or impending weather conditions will not allow proper curing.

5.2 Equipment and Tools:

Descriptive information on the mixing and application equipment proposed for use shall be submitted to the Engineer not less than 10 days before work starts. All methods employed in performing the work and all equipment, tools, and machinery used for handling materials and executing any part of the work shall be subject to the approval of the Engineer before the work is started.

A. Slurry Machine. The slurry machine shall be a truck-mounted mobile mixing plant with a towed-type spreader box. It shall have a water tank and water pump capable of delivering a constant volume of water.

   The slurry machine shall have an agitated storage tank for the thermoplastic emulsion and a non-shearing peristaltic pump with variable rate of flow for the delivery of this material. The slurry machine shall have a hopper for holding aggregate, supplying this material to the mixing chamber by a conveyor belt. The rate of aggregate delivery shall be volumetrically controlled by an adjustable gate opening. The speed of the conveyor shall be mechanically dependent upon the speed of the peristaltic pump.

The slurry machine shall be a continuous-flow mixing unit capable of delivering predetermined quantities of thermoplastic emulsion, aggregate, and if necessary water, to the mixing chamber and discharging the thoroughly mixed slurry on a continuous basis. The slurry machine shall deliver the materials to the mixing chamber in a constant proportion in a manner not dependent on power plant or vehicle speed. The machine shall be equipped with a water spraybar capable of fogging the pavement surface with up to 0.05 gallons of water per square yard.

B. Batch-Mixing Machine. The batch-mixing machine shall be a truck-mounted 500 to 1000 gallon tank containing suitably driven mixing blades to combine predetermined quantities of thermoplastic emulsion, aggregate, and, if necessary, water into a homogeneous slurry. It shall be equipped with a water tank and pump capable of delivering a constant volume of water to a spraybar. The spraybar shall be capable of fogging the pavement surface with up to 0.05 gallons of water per square yard.

C. Spreading Equipment. Attached to the mixing machine shall be a mechanical-type squeegee distributor, equipped with flexible material in contact with the surface to prevent loss of slurry from the distributor. It shall be maintained to prevent loss of slurry on varying grades and adjusted to assure uniform spread. There shall be a lateral control device and a flexible strike-off capable of being adjusted to lay the slurry at the specified rate of application. The spreader box shall have an adjustable width. The box shall be kept clean; dried slurry build-up on the box shall not be permitted.

D. Auxiliary Equipment. Other tools or equipment such as power brooms, power blowers, air compressors, hand brooms hand squeegees, etc., shall be provided as required.

5.3 Preparation of Pavement:

A. Prior to placing the slurry seal, unsatisfactory areas shall be repaired and the surface shall be cleaned of dust, dirt or other loose foreign matter. Any standard cleaning method will be acceptable except that water flushing will not be permitted in areas where considerable cracks are present in the pavement surface. Remove vegetation growing in cracks with compressed air (hot air lance).

B. Any painted stripes on surface to be treated, shall be removed before applying slurry seal.

C. Small oil spots are to be treated by scraping off excess oil, heating with a torch, brushing loosened material away and primed with a solution containing one part water and one part thermoplastic coal-tar emulsion.

D. When large oil or grease soiled areas are present, the area shall be cleaned of the contaminants by chemical or mechanical abrasion.

E. All oil spot areas shall be prime sealed with thermoplastic coal-tar emulsion diluted with 50 percent water applied to the areas at the rate of 0.10 gallons per square yard.

F. A minimum period of 30 days shall elapse between the placement of a bituminous surface course and the application of the slurry seal.

5.4 Crack Filling and Sealing:

Crack Filler shall be thermoplastic coal-tar emulsion and aggregate as described below. Thermoplastic coal-tar emulsion must meet the performance requirements outlined in Section 2.2 (Bituminous Materials).

A. Cracks wider than ¼-inch shall be filled with a mixture of 6-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

B. Cracks wider than 1-inch shall be filled with a mixture of 10-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

C. Cracks wider than 2-inch shall be filled with a mixture of 20-lbs of crushed granite per 1-gallon of thermoplastic coal-tar emulsion.

D. Crack sealant (thermoplastic coal-tar emulsion binder with aggregate) shall be applied, as an overband, four to six inches wide over cracks in the existing pavement.

5.5 Application of Tack Coat:

Following preparation of the pavement, a tack coat of thermoplastic-coal tar emulsion diluted with 50 percent water shall be applied to the pavement at the rate of 0.05 gallons per square yard.

5.6 Application of Slurry Seal:

The Surface shall be prewet by fogging ahead of the spreader box. Water used in prewetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the spreader box. The mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. A sufficient amount of mixture shall be carried in the spreader box at all times so that even distribution is obtained. No clumped or unmixed aggregate shall be permitted. No segregation of the emulsion and aggregate fines from the coarse aggregate will be permitted. If the coarse aggregate settles to the bottom of the slurry, the applied slurry will be removed from the pavement surface.

Upon completion of the work, the slurry shall have no pin holes, bare spots or cracks through which liquids or foreign matter could penetrate to the underlying pavement. No excessive buildup, uncovered aggregate, or unsightly appearance shall be permitted on longitudinal or transverse joints. The finished surface shall present a uniform texture.

In areas where the spreader box cannot be used, the slurry shall be applied by means of a hand squeegee.

5.7 Curing:

The slurry shall be permitted to dry a minimum of 24 hours before opening to traffic and shall be sufficiently cured to drive over without damage to the slurry seal.

5.8 Contractor's Certification:

The Contractor shall furnish the manufacturer's certification that each consignment of thermoplastic coal-tar emulsion shipped to the project meets the requirements of Section 2.2 (Bituminous Materials). The Contractor shall submit a certification that the material proposed has been in field use for a minimum of five (5) years. The Contractor shall furnish a certification demonstrating their experience in the application of a thermoplastic coal-tar emulsion slurry seal for a minimum of two (2) years.

6) WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **five (5) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

7) MEASUREMENT AND PAYMENT

7.1 Measurement:

The Thermoplastic Coal-Tar Emulsion Slurry Seal-Type B, tack coat, repairs, and preparations shall be measured by the square yard of the area indicated on the contract drawings or designated by the Engineer. Crack sealing will be measured according to the contract item "Thermoplastic Coal – Tar Emulsion Crack Fill."

7.2 Basis of Payment:

Payment shall be made at the contract unit price per square yard for the Thermoplastic Coal-Tar Emulsion Slurry Seal-Type B. This price shall fully compensate the Contractor for furnishing all materials and for all labor, equipment tools and incidentals necessary to complete the Thermoplastic Coal-Tar Emulsion Slurry Seal-Type B, including mix design and data sheets stipulated in these specifications. Payment for crack sealing shall be made according to the contract item "Thermoplastic Coal – Tar Emulsion Crack Fill."

Payment will be made under:

"Thermoplastic Coal-Tar Emulsion Slurry Seal-Type B ……Square Yard"

THERMOPLASTIC COAL-TAR EMULSION SLURRY SEAL – TYPE C, FINE

1) DESCRIPTION

This item shall consist of an application of a thermoplastic coal-tar emulsion slurry seal, with mineral aggregate, applied on an existing, previously prepared asphalt or concrete surface, in accordance with these specifications. This specification outlines the installation of a Type C Thermoplastic Coal-Tar Emulsion Slurry Seal.

2) MATERIALS

2.1 Aggregate

The Type C aggregate shall be clean washed silica sand and conform to the gradation of Table 1. Samples of aggregates shall be submitted by the Contractor at least 14 days prior to the start of production. During production, the sampling points and intervals will be designated by the Engineer. The samples will be the basis of approval from the standpoint of the quality requirements of this section.

TABLE 1. GRADATION OF AGGREGATES

Sieve Size	Percentage By Weight Passing Sieves TYPE C
No. 4	100
No. 8	95 - 100
No. 16 (1.18mm)	80 – 95
No. 30 (0.60mm)	60 – 80
No. 50 (0.30mm)	35 – 50
No. 100 (0.15mm)	1 - 15

2.2 Bituminous Materials

The emulsion material shall be a thermoplastic emulsion made up of plastic resin and emulsified coal-tar pitch conforming to the requirements of ASTM D 3320. The thermoplastic coal-tar emulsion shall be manufactured as a complete product which can be tested at the manufacturing plant. The water content of the emulsion shall not exceed 48 percent +/- 1 percent when tested in accordance with ASTM D 244, section 3. A dried film of combination of plastic resin and coal-tar with the remaining percentage being inorganic filler. The dried emulsion shall have a softening point greater than 212 degrees F (100 degrees C) when tested in accordance with ASTM D 36. A film of the dried emulsion material, 8 mils thick, shall stretch to 5 times its original length at 70 degrees F (21 degrees C) without breaking, and recover 35 percent of this length in one minute.

3) COMPOSITION AND APPLICATION

3.1 Composition:

The aggregate shall be mixed homogeneously with the thermoplastic coal-tar emulsion at the rate of 15-17 pounds of aggregate per gallon of emulsion.

3.2 Job Mix Formula:

Based on the data herein this specification, the Contractor shall submit the proportions of water, emulsion, and aggregate proposed for use to the Engineer for approval prior to the start of operations. A copy of the mix design and test data required by this specification shall be submitted to the Engineer for approval along with the above information. No thermoplastic coal tar slurry seal shall be produced for payment until a job mix formula has been approved in writing by the Engineer.

3.3 Application:

The thermoplastic emulsion slurry seal shall be applied in one coat at a minimum application rate of 5 pounds per square yard of uncured slurry for Type C. The application rate submitted with the job mix formula shall be verified and/or adjusted during placement of the test section. The submitted application rate provided for in Section 3.2 (Job Mix Formula) will be selected from Section 3.1 (Composition) and translated to the equivalent rate measured by gallons of slurry seal per square yard.

4) TEST SECTION

Prior to full production, the Contractor shall prepare a quantity of mixture sufficient to place a test section of approximately 16 feet wide by 100 feet long at the application rate specified in Section 3.3 (Application). The area to be tested will be designated by the Engineer and will be located on the existing pavement.

The test section should be used to verify the adequacy of the mixture and to determine the exact application rate. The same equipment and method of operations shall be used on the test section as will be used on the remained of the work. If the test section should prove to be unsatisfactory, the necessary adjustments to the mix composition, application rate, placement operations and equipment shall be made. Additional test sections shall be placed and evaluated if required.

5) CONSTRUCTION METHODS

5.1 Weather Limitations:

The slurry seal shall be applied only when the surface is dry and the air temperature is above 50 degrees F (10 degrees C). It should not be applied when the humidity or impending weather conditions will not allow proper curing.

5.2 Equipment and Tools:

Descriptive information on the mixing and application equipment proposed for use shall be submitted to the Engineer not less than 10 days before work starts. All methods employed in preforming the work and all equipment, tools, and machinery used for handling materials and executing any part of the work shall be subject to the approval of the Engineer before the work is started.

A. Slurry Machine. The slurry machine shall be a truck-mounted mobile mixing plant with a towed-type spreader box. It shall have a water tank and water pump capable of delivering a constant volume of water.

The slurry machine shall have an agitated storage tank for the thermoplastic emulsion and a non-shearing peristaltic pump with variable rate of flow for the delivery of this material. The slurry machine shall have a hopper for holding aggregate, supplying this material to the mixing chamber by a conveyor belt. The rate of aggregate delivery shall be volumetrically controlled by an adjustable gate opening. The speed of the conveyor shall be mechanically dependent upon the speed of the peristaltic pump.

The slurry machine shall be a continuous-flow mixing unit capable of delivering predetermined quantities of thermoplastic emulsion, aggregate, and if necessary water, to the mixing chamber and discharging the thoroughly mixed slurry on a continuous basis. The slurry machine shall deliver the materials to the mixing chamber in a constant proportion in a manner not dependent on power plant or vehicle speed. The machine shall be equipped with a water spraybar capable of fogging the pavement surface with up to 0.05 gallons of water per square yard.

B. Batch-Mixing Machine. The batch-mixing machine shall be a truck-mounted 500 to 1000 gallon tank containing suitably driven mixing blades to combine predetermined quantities of thermoplastic emulsion, aggregate, and, if necessary, water into a homogeneous slurry. It shall be equipped with a water tank and pump capable of delivering a constant volume of water to a spraybar. The spraybar shall be capable of fogging the pavement surface with up to 0.05 gallons of water per square yard.

C. Spreading Equipment. Attached to the mixing machine shall be a mechanical-type squeegee distributor, equipped with flexible material in contact with the surface to prevent loss of slurry from the distributor. It shall be maintained to prevent loss of slurry on varying grades and adjusted to assure uniform spread. There shall be a lateral control device and a flexible strike-off capable of being adjusted to lay the slurry at the specified rate of application. The spreader box shall have an adjustable width. The box shall be kept clean; dried slurry build-up on the box shall not be permitted.

D. Auxiliary Equipment. Other tools or equipment such as power brooms, power blowers, air compressors, hand brooms hand squeegees, etc., shall be provided as required.

5.3 Preparation of Pavement:

A. Prior to placing the slurry seal, unsatisfactory areas shall be repaired and the surface shall be cleaned of dust, dirt or other loose foreign matter. Any standard cleaning method will be acceptable except that water flushing will not be permitted in areas where considerable cracks are present in the pavement surface. Remove vegetation growing in cracks with compressed air (hot air lance).

B. Any painted stripes on surface to be treated, shall be removed before applying slurry seal.

C. Small oil spots are to be treated by scraping off excess oil, heating with a torch, brushing loosened material away and primed with a solution containing one part water and one part thermoplastic coal-tar emulsion.

D. When large oil or grease soiled areas are present, the area shall be cleaned of the contaminants by chemical or mechanical abrasion.

E. All oil spot areas shall be prime sealed with thermoplastic coal-tar emulsion diluted with 50 percent water applied to the areas at the rate of 0.10 gallons per square yard.

F. A minimum period of 30 days shall elapse between the placement of a bituminous surface course and the application of the slurry seal.

5.4 Crack Filling and Sealing:

Crack Filler shall be thermoplastic coal-tar emulsion and aggregate as described below. Thermoplastic coal-tar emulsion must meet the performance requirements outlined in Section 2.2 (Bituminous Materials).

A. Cracks wider than ¼-inch shall be filled with a mixture of 6-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

B. Cracks wider than 1-inch shall be filled with a mixture of 10-lbs of 40 mesh crushed sand per 1-gallon of thermoplastic coal-tar emulsion.

C. Cracks wider than 2-inch shall be filled with a mixture of 20-lbs of crushed granite per 1-gallon of thermoplastic coal-tar emulsion.

D. Crack sealant (thermoplastic coal-tar emulsion binder with aggregate) shall be applied, as an overband, four to six inches wide over cracks in the existing pavement.

5.5 Application of Tack Coat:

Following preparation of the pavement, a tack coat of thermoplastic-coal tar emulsion diluted with 50 percent water shall be applied to the pavement at the rate of 0.05 gallons per square yard.

5.6 Application of Slurry Seal:

The Surface shall be pre-wet by fogging ahead of the spreader box. Water used in pre-wetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the spreader box. The mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. A sufficient amount of mixture shall be carried in the spreader box at all times so that even distribution is obtained. No clumped or unmixed aggregate shall be permitted. No segregation of the emulsion and aggregate fines from the coarse aggregate will be permitted. If the coarse aggregate settles to the bottom of the slurry, the applied slurry will be removed from the pavement surface.

Upon completion of the work, the slurry shall have no pin holes, bare spots or cracks through which liquids or foreign matter could penetrate to the underlying pavement. No excessive buildup, uncovered aggregate, or unsightly appearance shall be permitted on longitudinal or transverse joints. The finished surface shall present a uniform texture.

In areas where the spreader box cannot be used, the slurry shall be applied by means of a hand squeegee.

5.7 Curing:

The slurry shall be permitted to dry a minimum of 24 hours before opening to traffic and shall be sufficiently cured to drive over without damage to the slurry seal.

5.8 Contractor's Certification

The Contractor shall furnish the manufacturer's certification that each consignment of thermoplastic coal-tar emulsion shipped to the project meets the requirements of Section 2.2 (Bituminous Materials). The Contractor shall submit a certification that the material proposed has been in field use for a minimum of 2 years. The Contractor shall furnish a certification demonstrating their experience in the application of a thermoplastic coal-tar emulsion slurry seal for a minimum of two years.

6) WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **five (5) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

7) MEASUREMENT AND PAYMENT

7.1 Measurement:

The Thermoplastic Coal-Tar Emulsion Slurry Seal-Type B, tack coat, repairs, and preparations shall be measured by the square yard of the area indicated on the contract drawings or designated by the Engineer. Crack sealing will be measured according to the contract item "Thermoplastic Coal – Tar Emulsion Crack Fill."

7.2 Basis of Payment:

Payment shall be made at the contract unit price per square yard for the Thermoplastic Coal-Tar Emulsion Slurry Seal-Type B. This price shall fully compensate the Contractor for furnishing all materials and for all labor, equipment tools and incidentals necessary to complete the Thermoplastic Coal-Tar Emulsion Slurry Seal-Type B, including mix design and data sheets stipulated in these specifications. Payment for crack sealing shall be made according to the contract item "Thermoplastic Coal – Tar Emulsion Crack Fill."

Payment will be made under:

"Thermoplastic Coal-Tar Emulsion Slurry Seal-Type C ……Square Yard"

AIRCRAFT TIE DOWNS

DESCRIPTION

Description:
This item shall consist of furnishing, installing, maintaining and removing Aircraft Tie Down Anchors and Aircraft Tie Down Ropes in locations designated on the drawings or as required by the Engineer.

References:

- FAA Advisory Circular 20-35C

MATERIALS

Aircraft Tie Downs:

TABLE 1 – Aircraft Tie Down Anchor Properties

Working Load (lbs)	Breaking Strength (lbs)	Length (inches)	Weight (lbs)	Part #	Description:
1,000	8,920	22	2	Sladek AN 1022	100% Stainless Steel anchor, with 1.5" ID Weldless Ring, with and without cover
2,000	13,500	22	3	Sladek AN 2022	100% Stainless Steel anchor, with 1.25" ID Weldless Ring, with and without cover
5,000	40,500	24	6	Sladek AN 5000	100% Stainless Steel anchor, with 2.5" ID Weldless Ring, with and without cover

Notes:

1. The above specification are those of Sladek Aircraft Tie Down Anchors.
2. Other products may be available which meet or exceed these criteria and such products may be used, however, proof of conformance to criteria must be submitted with your bid

Aircraft Tie Down Rope:

TABLE 2 – Aircraft Tie Down Rope Properties

Material:	Double Braided, High Tenacity Nylon Fiber
Rope Diameter:	½ inch
Minimum Breaking Strength:	6,800 lbs
Length:	15 ft , hot cut with smooth edges
Weight per 100ft:	6 ¼ lbs min. 7 lbs max.
Color:	White with 1 Blue tracer and 1 Kelly Green tracer, with tracers in same direction next to each other. Rope must contain 4 reflective tracers double sided - 1/23" Style P2P. 2 Bobbins of 1 reflective and 1 nylon "s" twisted yarn. 2 Bobbins of 1 reflective and 1 nylon "z" twisted yarn. Bobbins placed equally apart on braiding machine for cover.
Description:	Core shall be braided with high tenacity white core on 24 strands, 4 picks per inch. Cover shall be braided with one twisted yarn per carrier on 24 carrier machine, and must have a balance "S" and "Z" twist using a twist count of at least 70 TPM. Braid must be no less than 8 picks per inch and no more than 8.5 picks per inch.

Notes:

1. The above specification are those of Wound About Inc., Aircraft Rope
2. Other products may be available which meet or exceed these criteria and such products may be used, however, proof of conformance to criteria must be submitted with your bid

Concrete:
Use a commercial grade Portland Cement Concrete with a minimum 28–day compressive strength of 3,000 psi, meeting the requirements of Class A Concrete in the Standard Specifications for Roads and Structures.

Joint Sealer:
Self leveling silicone joint sealer shall meet the requirements of the silicone joint and crack sealing specification within this contract.

Herbicide/Soil Sterilant:
The herbicide/soil sterilant must kill all vegetation residing within and in close proximity to the tie down locations, and render the soil sterile for a period of 6 months or more. Material Safety Data Sheets for the herbicide/soil sterilant must be readily available by the Contractor onsite at all times, and a copy submitted to the Engineer prior to any application. A compatible dye shall be properly mixed with the herbicide/sterilant prior to application. Contractor must follow all applicable local, state, and federal laws for the handling and application of herbicide/soil sterilant. All herbicide/soil sterilant materials must be supplied in accordance with section 1060-13 of the Standard Specifications for Roads and Structures.

CONSTRUCTION METHODS

Weather Limitations:
Do not install aircraft tie down anchors when pavement surface temperature is below 40°F, moisture is present on the surface of the pavement, or rain is imminent.
ation shall conform to location and details shown on the Plans.

Preparation:
Contractor will remove any existing failing anchors, chains, ropes, and implements in accordance with the plans, without damage to the surrounding pavement and subsurface.

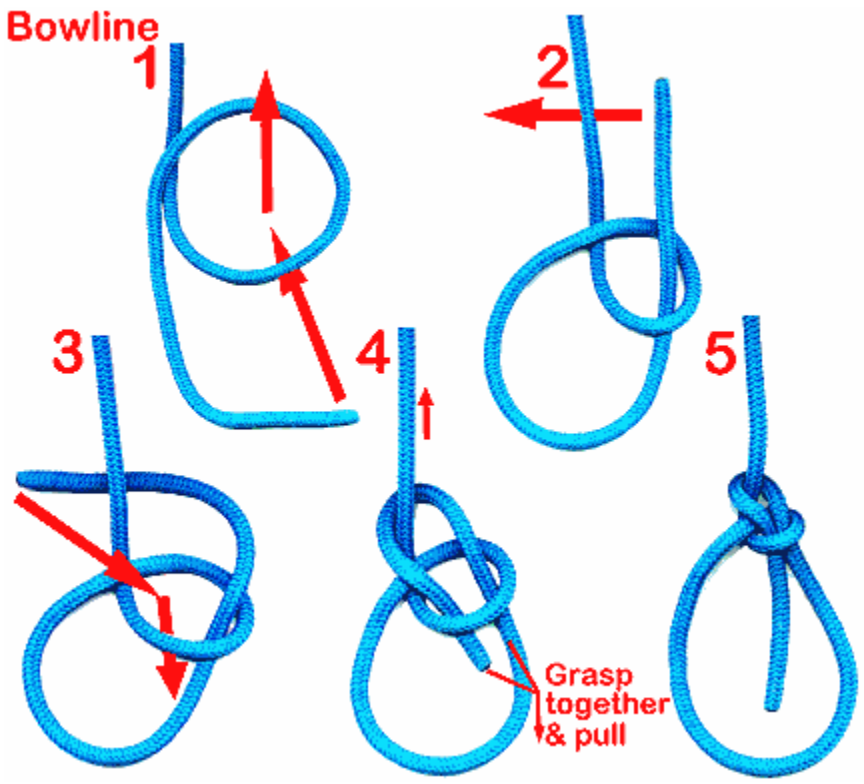
Prior to installation of new anchors, Contractor will cleanly saw-cut, augur, and excavate a hole to the specified width, depth, and profile needed to achieve the new anchor manufacturer's warranted working load, breaking strength, and pull out strength, or as directed by the Engineer. The anchor hole excavations shall be inspected by the Engineer prior to backfilling and anchor installation.

Prior to installation of new rope, all anchor eyelets shall be clean of vegetation, foreign material, debris, and shall easily accept the ½" diameter aircraft tie down ropes as specified in Table 1. The Contractor will be required to treat excessive vegetation growth around tie down locations with an approved herbicide/soil sterilant prior to vegetation removal.

Installation:
Aircraft tie down anchors and aircraft tie down ropes shall be constructed in accordance with the manufacturer's instructions, details, lines, grades, dimensions, and locations as shown on the plans or as directed by the Engineer.

Excavated anchor holes will be inspected and approved by the Engineer prior to backfilling. Backfill properly excavated anchor holes with concrete, embed anchor completely flush with the surface, and finish to grade. A manufactured stencil shall be used to clearly impress the working load rating of the installed tie down into the uncured concrete. The construction joint between the newly backfilled anchor and the existing pavement shall be sealed in accordance with the requirements of the silicone joint sealant specification within this contract after fully curing.

Aircraft tie down ropes shall be installed on aircraft tie down anchors using a **bowline knot**, and left neatly coiled adjacent to the anchor.



Source: www.boatsafe.com

Protection and Cleanup:
All open excavations will be advertised to airport traffic, clearly marked, barricaded off, covered with plywood not less than ¾" thick, and shall be left open no more than 24 hours. Do not allow traffic on the newly constructed aircraft tie down anchors for at least three (3) days after initial set, or as directed by the Engineer. The Contractor shall protect the newly constructed aircraft tie down anchors until ready for traffic by placing guarding or warning devices as necessary.

The Contractor shall be responsible for clean-up and removal from the work area all debris, waste, excavated material, residual repair materials, and by-products generated by the preparation and installation operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **one (2) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

Aircraft tie down anchors and aircraft tie down ropes will be measured as the actual anchors and ropes that have been satisfactorily placed and accepted by the Engineer.

BASIS OF PAYMENT

Payment will be made at the contract unit price per Each for aircraft tie down anchors and aircraft tie down ropes constructed in accordance with the Contract Documents. Payment for each item will be full compensation for furnishing all materials, preparation, and installation of tie downs, including restoration of existing surfaces, all labor, equipment, tools, and incidentals necessary to complete the work.

Payment will be made under:

"1,000 lb Aircraft Tie Down Anchor with Cover…….……Each"
"1,000 lb Aircraft Tie Down Anchor without Cover…….……Each"
"2,000 lb Aircraft Tie Down Anchor with Cover…….……Each"
"2,000 lb Aircraft Tie Down Anchor without Cover…….……Each"
"4,500 lb Aircraft Tie Down Anchor with Cover…….……Each"
"4,500 lb Aircraft Tie Down Anchor without Cover…….……Each"
"Aircraft Tie Down Rope…….. Each"
"Remove Failing Aircraft Anchor……. Each"

ANCHORED AIRFIELD LIGHT MATS

DESCRIPTION

This item shall consist of furnishing, installing, maintaining and removing Anchored Airfield Light Mats in compliance with this specification and all manufacturers recommendations, in locations designated on the drawings or as required by the Engineer.

MATERIALS

Airfield Light Matting:
The specifications in Tables 1 and 2 are those Airfield Mat Systems, Inc. Other products may be available which meet or exceed these specifications and such products may be used; however, proof of conformance to these criteria and proof of performance on airports must be submitted with your bid and accepted by the Engineer.

TABLE 1 – AIRFIELD LIGHT MATTING PROPERTIES

PROPERTY	ASTM	SPEC-METRIC	SPEC-ENGLISH
Tensile Strength with grain, min. across grain, min.	 D412 Die C	 4.8 MPa 2.1 MPa	 696.0 psi 304.5 psi
Elongation (%) with grain, min. across grain, min.	 D412 Die C	 15 40	 15 40
Hardness, Shore A	D2240	75-85	75-85
Tear Resistance with grain, min. across grain, min.	 D624 Die B	 21 kN/m 44 kN/m	 119.7 pli 250.8 pli
Heat Aging change in: Tensile, % max. Elongation, % max. Hardness, Pts max.	D573 70 hrs @ 70ºC	+/-25 +/-25 + 10	 SAME
Ozone Resistance Tear across grain, kN/m min.	80pphm 50hrs @ 38ºC	 19.0 kN/m	 108.3pli
Specific Gravity		0.9-1.3	0.9-1.3
Low Temperature Brittle @-40ºC	D-2137 Method A	non brittle in both directions	 SAME
Flammability Shall conform to current MVSS No.302, Flammability of Interior Materials.			

TABLE 2 – AIRFIELD LIGHT MATTING MEASUREMENTS

Product Code	Description	Center Hole Dia. (inches)	Width (inches)	Length (inches)	Thickness (inches)	Collar Insert Dia. (inches)	Application:
FM-1	Elliptical shaped mat Includes 8 Staple Stake anchors	12	48	84	.25	No Insert	For Base Can Mounted Lights
FM-1wi-18	Elliptical shaped mat Includes 8 Staple Stake anchors	12	48	84	.25	18	Dual Application: For Base Can and Stake Mounted Lights
FM-2wi	Elliptical shaped mat Includes 8 Staple Stake anchors	8	48	84	.25	12	For Stake Mounted Lights
SM-1	30’ Strip Mat Includes 15 Staple Stake anchors	NA	25.5	360	.25	NA	Perimeter Matting around Airfield Signs and Equipment
SM-2	60’ Strip Mat Includes 30 Staple Stake anchors	NA	25.5	720	.25	NA	Perimeter Matting around Airfield Signs and Equipment

Sustainability:

Mats shall be made of 100% recycled rubber, comprised of a combination of post-consumer and post industrial products. Upon delivery of matting products to the project site, the Contractor will provide the Engineer contact information for at least one end-of-life recycling option/contact. The Engineer and Airport Sponsor (owner) will retain this contact information with the project file, and at the end of their serviceable life, all mats and anchors should be recycled and re-used as post-consumer material.

Airfield Mat Anchors:
The specification in Table 3 and 3.1 are that of Airfield Mat Systems, Inc. Other products may be available which meet or exceed these specifications and such products may be used; however, proof of conformance to these criteria and proof of performance on airports must be submitted with your bid and accepted by the Engineer.

TABLE 3 – AIRFIELD MAT ANCHOR PROPERTIES
MILITARY OPERATIONS TESTED
AIRFIELD MAT ANCHOR PROPERTIES

Material	Steel
Anchor Length:	12 inches
Anchor Staple Top Length:	4 inches
Anchor Secondary Ground Penetration Length:	2 Inches
Finish:	Rust Resistant Forged Steel
Ground Penetration Mechanism:	The long shaft of the anchor penetrates through the mat's pilot hole with the shorter tip of the anchor penetrating the ground over the perimeter of the mat. The anchor's penetration is achieved by a heavy hand or sledge hammer. If anchor his concrete or impenetrable rock a hammer drill can be used to assist in setting the anchor. See Manufactures installation sheet.

CONSTRUCTION METHODS

Weather Limitations:
Do not install anchored airfield mats when ground temperature is below 40°F, water is present in the area of the mat installation, or rain is imminent.

Preparation:
Confirm anchored airfield mat locations conform to locations and details shown in the Plans. Contractor will prepare the ground so that the mats are installed on a level and stable surface to prevent buckling, high spots, and erosion. Prior to installation of airfield mats, Contractor will correct trouble spots where the mat might not lay flat or where the elevation of the apron around the mat might be such that where a mower deck could scalp the ground. If there is uncertainty, Contractor should run mower equipment over the area to confirm proper mower deck ground clearance. In the event of existing thick vegetation, Contractor will trim the vegetation to ground level to minimize settling. Ground density and viscosity needs to be adequate to allow anchors to grip the soil in its 10-12 inches of penetration. Typical compacted soils are adequate. Extremely loamy, sandy soils should be tested for practical anchor tensions. (Note Military Osprey testing was done in a moderate loamy sandy soils conditions and proved adequate.)

Installation:
All anchored airfield light matting shall be constructed in accordance with the manufacturer's instructions, details, lines, grades, dimensions, and locations as shown on the plans or as directed by the Engineer. All matting shall be installed and secured in a manner rated for sustained 120mph hurricane force wind.

Mat Placement: Can Mounted:
The 12 inch center hole of the mat shall be fit snuggly around the can lid, while still allowing access to the bolts to remove the lid for general maintenance and troubleshooting of the light. Lay the mat over the light with the major axis of the ellipse pointing in the direction lawn mower equipment will travel. When using the dual application elliptical mat system, the collar insert is installed and removed through the 12" center hole for access to base can lid without removing entire mat.

Mat Placement: Stake Mounted:
The collar insert is to first wrap around the light for a snug fit up against the light post. The elliptical mat will overlay the center insert. Place the collar around the stake light. Sometimes the collar's best fit it is to lay flat. Other times the collar can be pulled to have its edges over lapping, forming a conical shape sloping from the light post down to the outer edge. Place the elliptical mat over the collar on the light with the major axis of the ellipse pointing in the direction lawn mower equipment will travel.

Mat Placement: Strip
The strip matting will be used along buildings, fences, airfield signs or other equipment where vegetation control is desired to allow a contingency space between the object and mowing equipment. The strip mat can be cut to length on site with a razor knife. Mat strips shall adequately overlap each other at corners. Anchor placement shall be determined upon installation and anchor holes cut in the strip mat accordingly. The Anchor hole is best cut with a hole saw. When installing around an object with a concrete base, such as an airfield sign, the mat would over lap the concrete service 3-5 inches. A caulking adhesive such as a black top and roof sealant shall be used to seal the overlapping mat to the concrete base. The strip mat shall overlap at corners to at least 12 inches past the first common anchor. Anchors shall be placed at each corner and at least 2 to 3 feet apart.

Anchoring:
Anchoring will have site specific considerations with various techniques that the Contractor finds best. Generally the anchor can hammered into the ground and is strong enough to penetrate rocks and buried concrete splattering. NOTE: The mat has a **small pilot hole for each anchor**. Using this hole will position the anchor with its 2 inch" pin reaching over the mats edge. In the event the anchor hits a rock or other impenetrable object., have a hammer drill handy to make a pilot hole for the anchor through the ground s short work of the stubborn ground. Contractor will ensure anchoring will not interfere or damage the airfield lighting and electrical system.

Quality Control:
Adjust anchors and mats if necessary to prevent buckling and to accomplish a flush installation. With cooperation from airport personnel, Contractor shall run mower equipment over the final airfield mat installations to ensure clearance. In the case of freshly graded soils or thick ground growth it is necessary to return to the mats a season later, once the soil and or the vegetation has settled, to further tighten the anchors keeping them flush with the mat and the ground.

Protection and Cleanup:
Unsecured airfield matting shall NOT be permitted to be stored or left unattended on the airfield. The Contractor shall be responsible for clean-up and removal from the work area all debris, waste, excavated material, residual repair materials, and by-products generated by the preparation and installation operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **five (5) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or Contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

Airfield Light Matting will be measured as the actual mats and anchors have been satisfactorily placed and accepted by the Engineer.

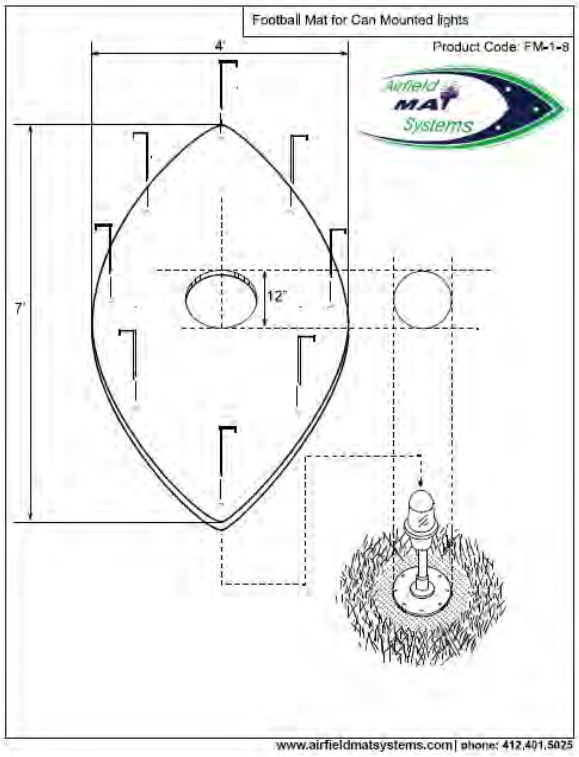
BASIS OF PAYMENT

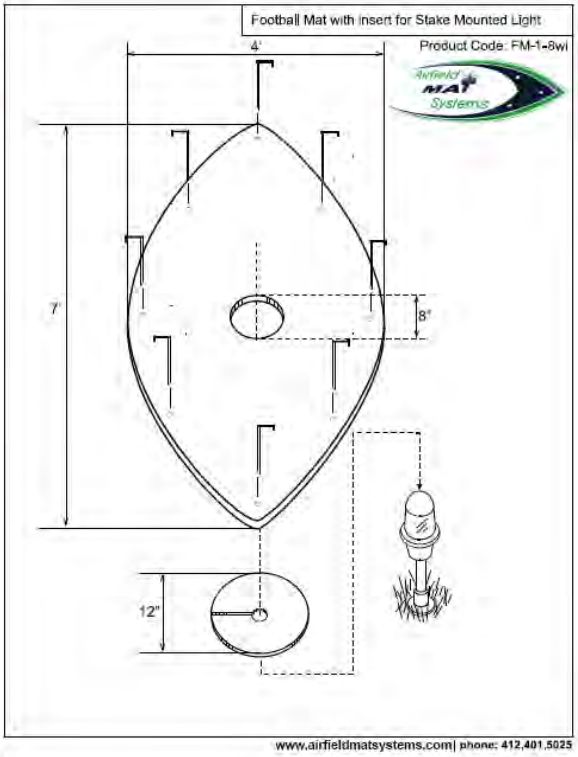
Payment will be made at the contract unit price per Each for airfield light matting installed in accordance with the Contract Documents. Payment for each item will be full compensation for furnishing all materials, preparation, and installation of mats, all labor, equipment, tools, and incidentals necessary to complete the work.

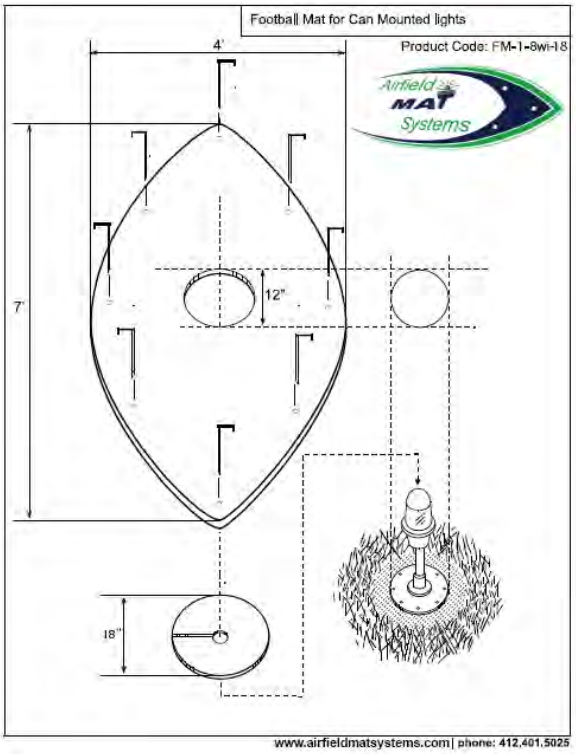
Payment will be made under:

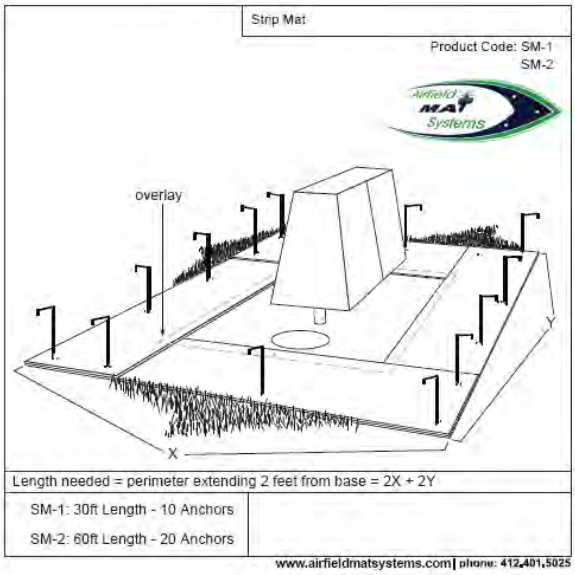
"Anchored Airfield Elliptical Light Mat with 12" Collar Insert ……..…...Each"
"Anchored Airfield Elliptical Light Mat with 18" Collar Insert……..Each"
"Anchored Airfield Elliptical Light Mat without Collar Insert……Each"
"Anchored Airfield 30' Strip Mat…….Each"
"Anchored Airfield 60' Strip Mat……..…Each"

EXAMPLE MANUFACTURER INSTALLATION DRAWINGS:
MILITARY AIRCRAFT TESTED OPTION









The Echo Advisory™ Airfield Mat Systems aka. "LightSaver™ Mat" is protected by US. Patent 6,527,407 and Federal Case No. 03-61343-CIV-MORENO in the US District Court of Southern District of Florida. Numerous suppliers are licensed throughout the US in order to assure competitive pricing options for contactors. Steve Byers, inventor and sole owner of Patent Number 6,527,407 requests purchaser verify suppliers licensing rights at 412-401-5025

PAVEMENT MARKING AND SURFACE CLEANING

DESCRIPTION

This item shall consist of cleaning existing pavement markings and pavement surfaces designated on the drawings or as required by the Engineer. This item will be used when typical surface preparation methods prove to be insufficient as determined by the Engineer. The degree of airfield marking and pavement surface cleaning will be determined by the Engineer.

MATERIALS

Water:
Water to be used by the Contractor for the cleaning of the pavement markings shall be potable and free from soluble salt. The Contractor is responsible for obtaining the water.

Chemicals:
The use of chemicals for the cleaning of pavement markings will not be permitted unless approved by the Engineer.

EQUIPMENT

Mechanical pavement marking and pavement surface cleaning equipment includes waterblasting or other approved systems. Equipment used on pavement surfaces for cleaning shall be controlled to minimize disturbance. Basic hand tools and the following major type of mechanical equipment will be considered acceptable for this specification.

LP Waterblasting Equipment:
Provide mobile low pressure waterblasting equipment (up to 10,000 psi) capable of producing a pressurized stream of water that will effectively clean both pavement markings and pavement surfaces. Equipment shall be vehicular or trailer mounted, and shall be capable of operating two or more wands, tips, floor machines, or other hand operated cleaning devices simultaneously. Equipment shall have adjustable pressure regulators or relief valves, gauges measuring actual line pressure, and shall be supported on pneumatic tires.

UHP Waterblasting Equipment:
Provide mobile ultra-high pressure waterblasting equipment (up to 50,000 psi) capable of producing a pressurized stream of water that will effectively clean both pavement markings and pavement surfaces. Equipment shall be capable of cleaning without damaging the pavement surface or joint sealant. Equipment shall be self-recovering and recovered debris shall be disposed of properly in accordance with EPA regulations. If high pressure water is delivered from a spray bar, the nozzles shall be spaced to provide total coverage of the area being treated. The nozzle shall have adjustable pressure regulators or relief valves and gauges measuring actual line pressure. Regulate water pressure so that pavement markings and pavement surfaces are substantially cleaned during execution of the work. The equipment shall be supported on pneumatic tires.

WEATHER LIMITATIONS

Except as approved by the Engineer, do not perform work when the atmospheric temperature is below 40°F or when the pavement is covered with snow or ice.

CONSTRUCTION METHODS

Test Section:
Prior to the start of work, clean pavement markings and/or pavement surface on designated test area(s) not less than 50 square feet in size. Use approved procedures and equipment needed to achieve the required degree of cleaning. The test section will be inspected and approved by the Engineer before any further cleaning work will be allowed. After approval of the Contractor's test section, the cleaned area will become the standard for the remainder of the cleaning operation.

Degree of Cleaning:
Remove a minimum of 90% of all dirt, grease, oil, laitance, biological matter, or other foreign material from pavement markings. Remove a minimum of 80% of all dirt, grease, oil, laitance, biological matter, or other foreign material from pavement surfaces. The degree of cleaning on pavement markings should result in only cleaning the existing surface of the markings and not remove any portion of the actual pavement markings, unless the existing pavement markings are poorly bonded to the pavement surface. The degree of cleaning on pavement surfaces should result in only cleaning the existing surface and not permanently damaging the existing surface.

Cleaning Methods:
All areas to be cleaned by waterblasting, or other methods approved by the Engineer, as required to remove all dirt, grease, oil, laitance, biological matter, and other foreign material from the surface of the existing pavement markings and/or pavement surface.

It is incumbent on the Contractor to not inflict damage to the pavement surface or structure with the use of excessive water pressure or other mechanical force. If damage to the pavement surface or structure results from the cleaning operation, the Contractor shall repair, at his expense, said damage to the pavement, surface texture, sealant or appurtenances caused by the cleaning work by methods acceptable to the Engineer.

Any cleaning method that causes objectionable dust, contaminated water runoff, or other such hazard or nuisance shall be controlled by means approved by the Engineer that eliminate such causes of objection or its use will not be allowed.

Removal of Deposits:
Sand, water, residue, and other waste material that may be deposited on the pavement as a result of cleaning operations shall be removed as the work progresses. Additional flushing and / or vacuuming may be necessary. Obtain the approval of residue removal and disposal method from the Engineer prior to beginning work. Accumulations of residue or other waste materials which might interfere with drainage or might constitute a hazard to aircraft or aircraft operations will not be permitted.

COMPLIANCE

In order to determine compliance with the degree of cleaning, a clear grid containing 100 equal squares, each approximately 1-inch square, may be placed on the areas of pavement markings and/or pavement surface where cleaning operations have been conducted at the discretion of the Engineer. The degree of cleaning required as outlined in the "Degree of Cleaning" section above should equal the number of squares within the grid that contain no visible contaminants. For example, if 90% cleaning is required, 90 squares should show that contaminants have almost been completely removed, but 10 squares can contain heavier contaminant remnants.

METHOD OF MEASUREMENT

The quantity of pavement marking and pavement surface cleaning to be paid for shall be the number of square feet cleaned in accordance with these specifications, complete, and accepted by the Engineer.

BASIS OF PAYMENT

This contract price shall be full compensation for all disposal work and for furnishing all material, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

"Pavement Marking Cleaning – LP Waterblasting …….. Square Feet"
"Pavement Marking Cleaning – UHP Waterblasting ……... Square Feet"

"Pavement Surface Cleaning – LP Waterblasting …… Square Feet"
"Pavement Surface Cleaning – UHP Waterblasting …… Square Feet"

SHOULDER, SLOPE, AND ERODED SECTION RECONSTRUCTION

DESCRIPTION

This item shall consist of reconstructing outside shoulders, slopes, and eroded sections to match existing typical sections, and upon completion, seeding and mulching.

MATERIALS

The Contractor shall furnish all earth material necessary for the construction of the shoulders, slopes, and eroded sections, as directed by the Engineer. All materials are subject to testing, and acceptance or rejection by the Engineer.

Borrow Excavation shall be in accordance with section 1018 of the Standard Specifications for Roads and Structures. Remove stones, roots, stumps, and other foreign material 2 inches or larger in diameter.

Select Material shall be in accordance with section 1016, Class I, of the Standard Specifications for Roads and Structures.

WEATHER LIMITATIONS

Reconstruction shall not be performed when the soil is frozen, extremely wet, or when the Engineer determines that it is an otherwise unfavorable working condition.

CONSTRUCTION METHODS

Prior to adding earth material, the existing shoulder, slope, and eroded sections shall be scarified to provide the proper bond, and shall be compacted to the satisfaction of the Engineer. Contractor shall obtain earth material consisting of Borrow Excavation and/or Select Material, from an approved source. After placement of earth material in properly prepared areas, Contractor shall fine grade to match existing typical section, and condition and ready the soil for placement of seeding and mulch.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **one (1) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

Shoulder, Slope, and Eroded Section Reconstruction will be measured and paid for as the actual number of acres that have been reconstructed. Measurement will be made along the surface of the ground. Such price will include disposing of any excess material in an approved disposal site, and for all labor, tools, equipment, and incidentals necessary to complete the work.

Borrow Excavation used on this project will be measured for payment by truck measurement as provided in Subarticle 230-5 of the Standard Specifications for Roads and Structures,

Select Material used on this project will be measured per cubic yard, for earth material furnished by the Contractor. No adjustment will be made for shrinkage.

Seeding and Mulching will be measured and paid for as shown elsewhere in the contract documents, which will be determined based on a projects eastern or western location.

BASIS OF PAYMENT

These contract prices shall be full compensation for furnishing all material, labor, equipment, tools, disposal work, and incidentals necessary to complete the item.

Payment will be made under:

"Shoulder, Slope, and Eroded Section Reconstruction……..…….. Acre"
"Borrow Excavation ……..…….. Cubic Yard"
"Select Material……. Cubic Yard"

SEEDING AND MULCHING

DESCRIPTION

Description:
This item shall be to prepare seedbed; furnish, place, and incorporate limestone, fertilizer, and seed; compact seedbed; furnish, place, and secure mulch; mow; and perform other operations necessary for the permanent establishment of vegetation from seed on shoulders, slopes, ditches, or other airside areas in locations shown on the plans, or as directed by the Engineer.

References:
In addition to the specific requirements herein modified, section 1660 of the Standard Specifications for Roads and Structures is by reference incorporated into this specification.

MATERIALS

Seed & Limestone:
The Contractor shall furnish seed of quality and in compliance and certified with the "NCDOT General Seed Specification for Seed Quality" as outlined in the Standard Special Provisions of this Contract. The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below.

During periods of overlapping dates, the kind of seed to be used shall be determined by the Engineer. All rates are in pounds per acre. On cut and fill slopes 2:1 or steeper add 20# of Sericea Lespedeza from January 1 - December 31. Bahiagrass may be NOT be substituted for either Centipede or Bermudagrass in ANY location.

Western Airfield Locations

August 1 - June 1	May 1 - September 1
20# Kentucky Bluegrass	20# Kentucky Bluegrass
75# Hard Fescue	75# Hard Fescue
25# Rye Grain	10# German or Browntop Millet
500# Fertilizer	500# Fertilizer
4000# Limestone	4000# Limestone

Eastern Airfield Locations

March 1 - August 31	September 1 - February 28
50# Tall Fescue	50# Tall Fescue
10# Centipede	10# Centipede
25# Bermudagrass (hulled)	35# Bermudagrass (unhulled)
500# Fertilizer	500# Fertilizer
4000# Limestone	

Western Waste and Borrow Locations

March 1 – August 31	September 1 - February 28
100# Tall Fescue	100# Tall Fescue
15# Kentucky Bluegrass	15# Kentucky Bluegrass
30# Hard Fescue	30# Hard Fescue
25# Rye Grain	10# German or Browntop Millet
500# Fertilizer	500# Fertilizer
4000# Limestone	4000# Limestone

Eastern Waste and Borrow Locations

March 1 – August 31	September 1 - February 28
75# Tall Fescue	75# Tall Fescue
25# Bermudagrass (hulled)	35# Bermudagrass (unhulled)
500# Fertilizer	500# Fertilizer
4000# Limestone	4000# Limestone

Approved Tall Fescue Cultivars

2nd Millennium	Duster	Magellan	Rendition
Avenger	Endeavor	Masterpiece	Scorpion
Barlexas	Escalade	Matador	Shelby
Barlexas II	Falcon II, III, IV & V	Matador GT	Signia
Barrera	Fidelity	Millennium	Silverstar
Barrington	Finesse II	Montauk	Southern Choice II
Biltmore	Firebird	Mustang 3	Stetson
Bingo	Focus	Olympic Gold	Tarheel
Bravo	Grande II	Padre	Titan Ltd
Cayenne	Greenkeeper	Paraiso	Titanium
Chapel Hill	Greystone	Picasso	Tomahawk
Chesapeake	Inferno	Piedmont	Tacer
Constitution	Justice	Pure Gold	Trooper
Chipper	Jaguar 3	Prospect	Turbo
Coronado	Kalahari	Quest	Ultimate
Coyote	Kentucky 31	Rebel Exeda	Watchdog
Davinci	Kitty Hawk	Rebel Sentry	Wolfpack
Dynasty	Kitty Hawk 2000	Regiment II	
Dominion	Lexington	Rembrandt	

Approved Kentucky Bluegrass Cultivars:

Alpine	Bariris	Envicta	Rugby
Apollo	Bedazzled	Impact	Rugby II
Arcadia	Bordeaux	Kenblue	Showcase
Arrow	Champagne	Midnight	Sonoma
Award	Chicago II	Midnight II	

Approved Hard Fescue Cultivars:

Chariot	Nordic	Rhino	Warwick
Firefly	Oxford	Scaldis II	
Heron	Reliant II	Spartan II	
Minotaur	Reliant IV	Stonehenge	

Fertilizer:
Fertilizer shall be 10-20-20 analysis, and shall be applied at the rate of 500 pounds per acre. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed by the Engineer.

Straw Mulch:
Straw mulch shall be of sufficient length and quality to withstand the crimping operation.

Tack:
Tack shall be an undiluted emulsified asphalt

Hydraulic Mulch:
Hydraulic mulch shall consist of wood or paper fibers manufactured from wood chips or recycled paper products. The fibers shall be processed in such a manner as to contain no growth or germination inhibiting factors. The packaging for the hydraulic mulch shall contain current labels, the manufacturers name, the net weight and the specifications listed below.

Specifications:

Moisture Content	10 % Max.
Ash Content	1.6 % Max.
pH	4.0 - 8.0
Organic Matter	98.4 % Min.

Water:
All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. Brackish water shall not be used at any time.

WEATHER LIMITATIONS

Seeding and mulching shall not be performed when the soil is frozen, extremely wet, or when the Engineer determines that it is an otherwise unfavorable working condition.

CONSTRUCTION METHODS

All areas to be seeded and mulched shall be smooth, firm, stable and free of rock and other debris. Prior to Seeding and Mulching, all areas will be inspected for proper preparation, proper final grade, and will be approved by the Engineer.

Dry Application:
Contractor shall seed and mulch in accordance with section 1660 of the Standard Specifications for Roads and Structures. In addition, crimping shall be required on all seedbeds. Straw shall be applied and then crimped. Crimping equipment including power source shall be subject to the approval of the Engineer providing that maximum spacing of crimper blades shall not exceed 8". After the crimping operation is complete, an additional application of straw shall be applied and immediately tacked with a sufficient amount of undiluted emulsified asphalt.

Wet Application:
Limestone shall be applied separately and prior to seeding and fertilizing, and shall be worked into the top 2 to 3 inches, after which the seedbed shall again be properly graded and dressed to a smooth finish. Seed and fertilizer mixing in Hydraulic seeder shall be no longer than 30 minutes prior to application. Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime shall have already been worked in. The hydraulic mixture of seed and fertilizer shall be applied by means of a high pressure and uniform spray. Hydraulic mulch is to be applied after seeding and fertilizer, and shall be required at a rate of 2000 lbs/Acre with the application of the standard seed and fertilizer rates. No additional applications of grain straw and emulsified tackifier will be required when Hydraulic Seeding and Hydraulic mulching is performed unless otherwise directed.

Mowing:
Contractor shall mow at the locations and times as directed. The approximate mowing height shall be 6 inches, or as directed by the Engineer.

WARRANTY

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **one (1) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

METHOD OF MEASUREMENT

Seeding and Mulching will be measured and paid for as the actual number of acres seeded and mulched, that have been completed and accepted. Measurement will be made along the surface of the ground.

Mowing will be measured and paid for in acres measured along the surface of the ground, that has been mowed as directed. Where an area has been mowed more than once at the direction of the Engineer, separate measurement will be made each time the area is mowed.

BASIS OF PAYMENT

These contract prices shall be full compensation for furnishing all material, labor, equipment, tools, disposal work, and incidentals necessary to complete the item.

Payment will be made under:

"Seeding and Mulching, Dry Application……..……..... Acre"
"Seeding and Mulching, Wet Application……...……..... Acre"
"Mowing……...……..... Acre"

REFINED COAL TAR EMULSION WITH ADDITIVES, SLURRY SEAL - SURFACE TREATMENT

1) DESCRIPTION

1.1 Description:

This item shall consist or a mixture of refined coal tar emulsion, mineral aggregate, additives, and water properly proportioned, mixed and applied as a slurry seal on new or existing (aged) asphalt concrete pavement.

1.2 References:

FAA AC 150/5370-10F, Item P-631

2) MATERIALS

2.1 Refined Coal Tar Emulsion:

A refined coal tar emulsion prepared from a high temperature refined coal tar conforming to the requirements of ASTM specification D 490 for grade 11-12. The use of oil and water gas tar is not allowed. Base refined coal tar emulsion must conform to all requirements of Federal Specification R-P-355.

2.2 Aggregate:

The aggregate shall be washed dry silica sand or boiler slag free of dust, trash, clay, organic materials or other deleterious substances. The aggregate shall meet the gradation in Table 1, when tested in accordance with ASTM C 136. Table 1 is on the proceeding page.

Table 1. Gradation Of Aggregates*

Sieve Size		Percent Retained	
		Minimum	Maximum
#20 or coarser	(0.850 mm)	0	2
#30	(0.600 mm)	0	12
#40	(0.425 mm)	2	60
#50	(0.300 mm)	5	60
#70	(0.212 mm)	5	60
#100	(0.150 mm)	5	30
#140	(0.106 mm)	0	10
#200	(0.075 mm)	0	2
Finer than #200		0	0.3
* Table 1 represents the maximum range of aggregate gradations. In all cases the refined coal tar emulsion supplier is to give written approval of the aggregate used in the mix design.			

2.3 Additive:

As specified by the coal tar emulsion manufacturer. Additives are one or more ingredients that can be added to a specific refined coal tar emulsion, water and/or sand mixture to improve the coatings final properties. These properties include durability, fuel resistance, drying time, color uniformity, and/or length of cure time. Additives may also be used to modify the wet mixture's viscosity to improve aggregate suspension. The type of additive to be used should be specified by the coal tar emulsion manufacturer and will depend on which final properties are desired. The engineer should specify the desired properties.

2.4 Water:

Water for mixing shall be potable, free of harmful soluble salts and at least 50 º F (10 ºC).

2.5 Crack Sealant:

Crack sealant shall be certified for compatibility with the refined coal tar emulsion by the manufacturer of the refined coal tar emulsion, and approved by the engineer.

2.6 Oil Spot Primer:

Oil spot primer shall be certified for compatibility with the refined coal tar emulsion by the manufacturer of the refined coal tar emulsion, and approved by the engineer.

2.7 Pavement Primer:

Pavement primer shall be certified for compatibility with the refined coal tar emulsion by the manufacturer of the refined coal tar emulsion, and approved by the engineer.]

3) COMPOSTION AND APPLICATION

3.1 Composition:

The refined coal tar emulsion seal coat is to consist of a mixture of refined coal tar emulsion, water, additive and aggregate, and be proportioned as shown in Table 2. The composition must have written approval of the coal tar emulsion manufacturer.

3.2 Job Mix Formula:

The contractor shall submit the recommended formulation of water, emulsion, aggregate and application rate proposed for use to a testing laboratory together with sufficient materials to verify the formulation at least **7** days prior to the start of operations. The mix design shall be within the range shown in Table 2. No seal coat shall be produced for payment until a job mix formula has been approved by the Engineer. The formulation shall pass the fuel resistance test in Addendum A.

The job mix formula for each mixture shall be in effect until modified in writing by the Engineer. Improper formulations of coal-tar pitch emulsion seal produce coatings that crack prematurely or do not adhere properly to the pavement surface. A minimum of 5 days is recommended for job mix approval.

Table 2. Composition Of Mixture Per 100 Gal Of Refined Coal Tar Emulsion

Application	Refined Coal Tar Emulsion Gallons	Water Gallons	Additive Gallons	Aggregate Pounds	Formula Rate of Application of Mix per Square Yard (Liters)	
					Minimum Gallon	Maximum Gallons
Prime Coat (where required) as specified by the coal tar emulsion manufacturer						
1st Seal Coat	100	25-70	2-6	300-700	0.12	0.20
2nd Seal Coat	100	25-70	2-6	300-700	0.12	0.20

***** The numbers shown in Table 2 represent the maximum recommended range of values. In all cases, the refined coal tar emulsion supplier is to give written approval of specific composition numbers to be used in the mix design.

3.3 Application Rate:

Application rates are not to exceed 0.20 gal/yd. ^{2}/coat, and at no time are total coats to exceed 0.51 gal/yd^2.

4) TEST SECTION

Prior to full production, the Contractor shall prepare a quantity of mixture in the proportions shown in the approved mix design. The amount of mixture shall be sufficient to place a test section a minimum of 250 sq yd at the rate specified in the job mix formula. The area to be tested will be designated by the Engineer and will be located on a representative section of the pavement to be seal coated. The actual application rate will be determined by the Engineer during placement of the test section and will depend on the condition of the pavement surface.

The test section shall be used to verify the adequacy of the mix design and to determine the application rate. The same equipment and method of operations shall be used on the test section as will be used on the remainder of the work.

If the test section should prove to be unsatisfactory, the necessary adjustments to the job mix formula, mix composition, application rate, placement operations, and equipment shall be made. Additional test sections shall be placed and evaluated, if required. Full production shall not begin without the Engineer's approval. Acceptable test sections shall be paid for in accordance with paragraph 7.2.

The test section affords the Contractor and the Engineer an opportunity to determine the quality of the mixture in place as well as the performance of the equipment. The application rate depends on the surface texture. If operational conditions preclude placement of a test section on the pavement to be seal coated, it may be applied on a pavement with similar surface texture. The only test required on the composite mix placed in the field is the viscosity test. The fuel resistance test may be specified, however, this test takes 96 hours to run.

5) CONSTRUCTION METHODS

5.1 Weather Limitations:

The seal coat shall not be applied when the surface is wet or when the humidity or impending weather conditions will not allow proper curing. The seal coat shall be applied only when the atmospheric or pavement temperature is 50 °F (10 °C) and rising and is expected to remain above 50 °F (10 °C) for 24 hours, unless otherwise directed by the Engineer.

5.2 Equipment and Tools:

The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work.

A. Distributors. Distributors or spray units used for the spray application of the seal coat shall be self-propelled and capable of uniformly applying 0.12 to 0.55 gallons per square yard (0.54 to 2.5 liters per square meter) of material over the required width of application. Distributors shall be equipped with removable manhole covers, tachometers, pressure gauges, and volume-measuring devices.

The mix tank shall have a mechanically powered, full-sweep, mixer with sufficient power to move and homogeneously mix the entire contents of the tank.
The distributor shall be equipped with a positive placement pump so that a constant pressure can be maintained on the mixture to the spray nozzles.

B. Mixing Equipment. The mixing machine shall have a continuous flow mixing unit capable of accurately delivering a predetermined proportion of aggregate, water, and emulsion, and of discharging the thoroughly mixed product on a continuous basis. The mixing unit shall be capable of thoroughly blending all ingredients together and discharging the material to the spreader box without segregation.

C. Spreading Equipment. Spreading equipment shall be a mechanical-type squeegee distributor attached to the mixing machine, equipped with flexible material in contact with the surface to prevent loss of slurry from the spreader box. It shall be maintained to prevent loss of slurry on varying grades and adjusted to assure uniform spread. There shall be a lateral control device and a flexible strike-off capable of being adjusted to lay the slurry at the specified rate of application. The spreader box shall have an adjustable width. The box shall be kept clean; coal-tar emulsion and aggregate build-up on the box shall not be permitted.

D. Hand Squeegee or Brush Application. The use of hand spreading application shall be restricted to places not accessible to the mechanized equipment or to accommodate neat trim work at curbs, etc. Material that is applied by hand shall meet the same standards as that applied by machine.

E. Calibration. The Contractor shall furnish all equipment, materials and labor necessary to calibrate the equipment. It shall be calibrated to assure that it will produce and apply a mix that conforms to the job mix formula. Commercial equipment should be provided with a method of calibration by the manufacturer. All calibrations shall be made with the approved job materials prior to applying the seal coat to the pavement. A copy of the calibration test results shall be furnished to the Engineer.

5.3 Preparation of Existing Asphalt Pavement:

Existing asphalt pavements indicated to be seal coated shall be prepared as follows.

A. Patch bituminous pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause.

B. Remove damaged pavement to the full depth of the damage and replace with new bituminous concrete similar to that of the existing pavement. If a solvent containing cold-applied material is used, complete patching a minimum of 90 days prior to the planned application of the sealer to permit solvent to escape before sealing.

C. Remove all vegetation and debris from cracks to a minimum depth of 1″. If extensive vegetation exists treat the specific area with a concentrated solution of a water-based herbicide approved by the engineer. Fill all cracks, ignoring hairline cracks (< 1/4″ wide) with a crack sealant. Wider cracks (over 1½″ wide (38.4 mm)), along with soft or sunken spots, indicate that the pavement or the pavement base should be repaired or replaced as stated above.

D. Clean pavement surface immediately prior to placing the prime coat or seal coat by sweeping, flushing well with water leaving no standing water, or a combination of both, so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film.

E. Remove oil or grease that has not penetrated the asphalt pavement by scraping or by scrubbing with a detergent, then wash thoroughly with clean water. After cleaning, treat these areas with the oil spot primer.

F. To insure adhesion to sound but oxidized pavements, mix and apply a prime coat of a type and at a rate recommended by the coal tar emulsion manufacturer, after all loose aggregate is removed.

5.4 Preparation of New Asphalt Pavement:

New asphalt pavements indicated to be seal coated shall be prepared as follows.

A. Cure new asphalt pavement surfaces so that there is no concentration of oils on the surface.

B. A period of at least 60 days at +70 ºF daytime temperatures must elapse between the placement of a hot mixed asphalt concrete surface course and the application of the seal coat.

C. Perform a water-break-free test to confirm that the surface oils have degraded and dissipated. (Cast one gallon of clean water out over the surface. The water should sheet out and wet the surface uniformly without crawling or showing oil rings.) If asphalt does not pass this test, additional time must be allowed for extra curing and retesting prior to sealing.

D. Where oil spot priming is needed, remove oil or grease that has not penetrated the asphalt pavement by scraping or by scrubbing with a detergent, then wash thoroughly with clean water. After cleaning, treat these areas with the oil spot primer.

E. To ensure adhesion to sound but oxidized pavements, mix and apply a prime coat of a type and at a rate recommended by the coal tar emulsion manufacturer, after all loose aggregate is removed.

5.5 Mixing:

Blend the coal tar emulsion mixture in the equipment described in paragraph 631-4.2 using the ingredients described in Table 2. The mixing must produce a smooth homogeneous mixture of uniform consistency. (Consult coal tar emulsion supplier for its recommended order of addition of the ingredients.) During the entire mixing and application process, no breaking, segregating or hardening of the emulsion, nor balling or lumping of the sand is to be permitted. Continue to agitate the seal coating mixture in the mixing tank at all times prior to and during application so that a consistent mix is available for application.

Small additional increments of water may be needed to provide a workable consistency, but in no case is the water content to exceed the specified amount.

5.6 Application of Slurry Seal Coat:

The aggregate filled slurry seal coat shall be applied at a uniform rate determined in paragraph 4.

In order to provide maximum adhesion, the pavement shall be dampened with a fog spray of water if recommended by the supplier. No standing water shall remain on the surface.

If a prime coat is required, mix and apply the prime coat as specified in paragraph 5.3 for existing pavements or paragraph 5.4 for new pavements.

Apply the first coat uniformly to obtain the rate determined in paragraph 5.4.

Each coat shall be allowed to dry and cure initially before applying any subsequent coats. The initial drying shall allow evaporation of water of the applied mixture, resulting in the coating being able to sustain light foot traffic. The initial curing shall enable the mixture to withstand vehicle traffic without damage to the seal coat.

Apply the second coat in the same manner as outlined for the first coat.

Additional coats shall be applied over the entire surface as directed by the engineer.

The finished surface shall present a uniform texture.

The final coat shall be allowed to dry a minimum of eight hours in dry daylight conditions before opening to traffic, and initially cure enough to support vehicular traffic without damage to the seal coat.

Where marginal weather conditions exist during the eight hour drying time, additional drying time shall be required. The length of time shall be as specified by the supplier. The surface shall be checked after the additional drying time for traffic ability before opening the section to vehicle traffic.

Continued on next page……

Where striping is required, the striping paint used shall meet the requirements of P-620, shall be compatible with the seal coat and as recommended by the coal tar emulsion manufacturer.

6) QUALITY CONTROL

6.1 Contractor's Certification:

The Contractor shall furnish the manufacturer's certification that each consignment of emulsion shipped to the project meets the requirements of Federal specification R-P-355, except that the water content shall not exceed 50 percent. The certification shall also indicate the solids and ash content of the emulsion and the date the tests were conducted. The certification shall be delivered to the Engineer prior to the beginning of work. The manufacturer's certification for the emulsion shall not be interpreted as a basis for final acceptance. Any certification received shall be subject to verification by testing samples received for project use.

The Contractor shall also furnish a certification demonstrating a minimum of three years' experience in the application of coal-tar emulsion seal coats.

6.2 Inspection:

The Owner shall have an independent technical consultant on the job site at the beginning of operations for application of coal-tar emulsion seal coats. The consultant shall have knowledge of the materials, procedures, and equipment described in this specification and shall assist the Contractor regarding proper mixing of the component materials and application of the seal coat. The consultant shall have a minimum of 3 years' experience in the use of coal-tar seal coats. Documentation of this experience shall be furnished to the Engineer prior to the start of operations. The cost of the technical consultant shall be paid for by the Owner.

6.3 Sampling:

A minimum of one sample per day shall be tested for the properties of Table 2. A random sample of approximately one-quart of the composite mix will be obtained daily by the contractor and stored in a glass container. The containers shall be sealed against contamination and retained in storage by the Owner for a period of six months. Samples shall be stored at room temperature and not be subjected to freezing temperatures.

A sample of undiluted coal-tar emulsion shall be obtained from each consignment shipped to the job.

6.4 Engineering Records:

The Engineer will keep an accurate record of each batch of materials used in the formulation of the seal coat.

7) MEASUREMENT AND PAYMENT

7.1 Measurement:

The refined coal tar emulsion with additives shall be measured by the **gallon**. Only the actual quantity of undiluted refined coal tar emulsion with additives will be measured for payment.

7.2 Basis of Payment:

Payment shall be made at the contract unit price per **gallon** for the refined coal tar emulsion with additives. ***Aggregate shall be considered an incidental cost for this specification.

These prices shall be full compensation for furnishing all materials, preparing, mixing, and applying these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

"Refined Coal Tar Emulsion Slurry Seal (Spray)…….gallon"

"Refined Coal Tar Emulsion Slurry Seal (Mechanical Squeegee)……..…gallon"

~~"Aggregate ……ton"~~

TESTING REQUIREMENTS

ASTM C 67	Sampling and Testing Brick and Structural Clay Tile
ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM D 160	Practice of Sampling Bituminous Materials
ASTM D 2939	Standard Test Methods for Emulsified Bitumens used as Protective Coatings.

MATERIAL REQUIREMENTS

ASTM D 490	Standard Specification for Road Tar
ASTM D 692	Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
ASTM C 3699	Kerosene
ASTM D 4866	Standard Performance Specification for Coal Tar Pitch Emulsion Pavement Sealer Mix Formations Containing Mineral Aggregates and Optional Polymeric Admixtures
FED SPEC R-P-355	Pitch, Coal-tar Emulsion (Coating for Bituminous Pavements) ASTM D 5727 Emulsified Refined Coal Tar (Mineral Colloid Type)

ADDENDUM A
ITEM P-631 FUEL RESISTANCE TEST AND CRITERION

Scope. This method determines the resistance of the coal tar emulsion seal coat to kerosene.

Apparatus.

- 2 6″ X 6″ square 16 gauge sheet metal masks with a 4″ × 4″ square center removed
- 6″ X 6″ unglazed white ceramic tile with an absorption rate of 10-18 percent (determined in accordance with ASTM C 67
- Brass ring, 2″ diameter and 2″ high
- Kerosene meeting requirements of ASTM D 3699
- Silicone rubber sealant

Procedure.

1. Immerse the ceramic tile in distilled water for a minimum of ten minutes.
2. Remove excess water from the tile to produce a damp surface before applying the seal coat.

3. Using the mask described in 2.1 apply one layer of the coal tar emulsion mixture to the tile. Spread even with the top of the mask using a spatula or other straight edge.
4. Allow the sample to cure for 96 hours at 77 $\pm$ 2 °F. and 50 $\pm$ 10 percent relative humidity.
5. Position a second mask on top of the first mask.
6. Apply a second coat of coal tar emulsion mixture. Spread even with the top of the second mask.
7. Cure as in step 3.4.
8. After curing, affix the brass ring to the seal coat on the tile with silicone rubber sealant.
9. Fill the brass ring with kerosene.
10. After 24 hours, remove the kerosene from the brass ring, blot dry and immediately examine the film for softness and loss of adhesion. Immediately after the film is examined, break the tile in half, exposing that part of the tile whose film was subjected to the kerosene.
11. Evaluate for penetration of kerosene through the sealer and loss of adhesion.

Report. Report the results as pass or fail. Visible evidence of leakage or discoloration shall constitute failure of the fuel resistance test.

Criterion. A “pass” rating in the fuel resistance test is required prior to full production.

GENERAL LABOR CREWS

DESCRIPTION:

Description:
This item shall consist of the provision by the contractor, a set of various labor crews for general/small airfield projects. These projects will be focused on airfield maintenance needs and consist of NON-Pavement type work. Example projects could include replacing a damaged drop inlet, mending a wooden fence, repair of a downed light mast, or installation of bollards or delineators.

References:
- RS Means 2013

LABOR AND EQUIPMENT CREWS:

Crews shall consist of at minimum the following number of named positions and equipment. Each position shall be filled with a skilled and a properly licensed and competent worker; with knowledge and experience in the specific job responsibility they are tasked.

Light Equipment Crew – B63	Carpentry Crew – K1	Skilled Worker Crew – L4	Electrical Crew – R22
4 Laborers	1 Carpenter	2 Skilled Workers	.66 Electrical Foreman
1 Equip. Oper. (light)	1 Truck Driver (light)	1 Helper	2 Helpers
1 Loader, Skid Steer, 30 H.P.	1 Flatbed Truck, gas, 3 Ton		2 Electricians

Note: Above labor and equipment crews are based on descriptions taken from R.S. Means 2013

MATERIALS:

Contractor shall provide all necessary construction materials per specific job scope, and as required by the Engineer.

CONSTRUCTION METHODS:

The Engineer will direct the Contractor as to the general scope of airfield maintenance work needed, and the type of crew or crews generally needed to complete the task. The job scope, materials, and the total number of days needed to complete the task will be mutually agreed upon by the Engineer and Contractor prior to beginning work. Once established, the estimated duration in number of days will be itemized and shown on the "Airport Maintenance Project Estimate." Workers must comply with and adhere to all equipment and material hazards, warnings, and recommendations provided by the manufacturer when performing their respective job duties. Work must be done in such a manner as to minimize disturbance to both the airfield and the entire surrounding natural environment.

Work may not start or commence without approval by the Airport Manager and the Engineer

WARRANTY:

Following the date of the Engineer's final acceptance of all work under a given project, the Contractor shall provide the Department a **one (1) year warranty** on materials and workmanship against patent and latent defects arising from faulty materials, faulty workmanship, or contractor negligence pertaining to this contract item. All defective material and workmanship that fails to meet the requirements of this contract item during the warranty period shall be corrected by the Contractor for contract item compliance at no additional expense to the Department.

BASIS OF PAYMENT:

The payment will be full compensation for all work required to prepare, construct, fix, modify, remove, clean, or restore airfield assets specified in the assigned job. Material will be reimbursed to the nearest dollar based on receipts received, plus an additive markup per the submitted bid document.

Payment will be made under:

"Light Equipment Crew (B63)…… ……..……..Day"
"Carpentry Crew (K1)…… ……..……..Day"
"Skilled Worker Crew (L4)…… ……...….Day"
"Electrical Crew (R22)…… ……..……..Day"
"Material……....Ea"

PAVEMENT TEXTURING

DESCRIPTION

This Item shall consist of texturing existing asphaltic concrete pavement and/or Portland cement concrete pavement at the locations shown on the plans or as directed by the Engineer and in accordance with the requirements herein.

EQUIPMENT

The texturing shall be done by a machine designed and built for high production pavement texturing. Each machine shall have a minimum average production rate of 1200 square yards per hour for concrete surfaces and 1800 square yards per hour for asphalt surfaces. The machine shall employ the HVIM (High Velocity Impact Method) by hurling steel abrasive media at high velocity to abrade and texture the surface. The machine shall be capable of varying the velocity of the steel abrasive as well as the speed of the machine to produce the desired surface texture. Utilization of radial blades in multiple centrifugal wheels shall produce a continuous, minimum 6ft. wide swath. This is synchronous to the recycling of abrasive and vacuuming of surface materials into a self-contained vacuum unit of 6 cubic yards or more, meeting or exceeding all environmental air quality standards. No objectionable dust shall be emitted during the work. The machinery shall direct the velocity of abrasion in a bi-directional fashion, giving uniform abrasion to the surface. When transverse grooves are present, the abrasion will be at an angle transverse to the grooves to give equal texture to the groove edges.

On-board controls capable of providing and monitoring uniform velocity and direction will be required. Self-contained lighting for night operations will be required.

A generator driven electromagnet equal in width and production to the texturing machine will be available on the project. It will be used to pick up any steel abrasive left behind the machine as directed Engineer.

Verifiable proof of prior major pavement texturing, in accordance with this specification, or satisfactory test sections performed at the Contractor's expense will be necessary before the equipment will be approved.

WEATHER LIMITATIONS

Pavement surface shall be free of snow, ice or slush. Cease operation if rain is imminent. Cease texturing where surface water accumulation alters the effectiveness of material removal.

CONSTRUCTION METHODS

Texturing shall be done on the areas indicated on the plans or as directed by the Engineer. Texturing shall be performed in a continuous operation of consecutive passes up to 6 ft. in width (if necessary), parallel to the centerline. The textured surface shall have a uniform surface appearance and be devoid of machine produced streaks, ruts, or over-lap grooves which will inhibit the free flow of water. It shall have a non-directional texture. Following the texturing operation, the electromagnet shall pass over the entire surface as directed by the Engineer. The texturing shall not encroach on the existing airfield pavement markings unless otherwise directed by the Engineer. The distance from the edge of retained airfield markings to the texture shall be a maximum of 3 in.

CLEANUP AND WASTE DISPOSAL

All surface materials removed during the texturing process shall be collected and stored in the vacuum unit until it can be removed from the project and disposed of by the Contractor. No on-site transfer of, or storage of, the materials will be permitted. No loose material will be left on paved surfaces or swept off to the side. Keep the worksite clean of debris and waste at all times. Cleanup operations shall be continuous. Debris and waste materials shall be accumulated and disposed at approved sites.

TESTING

One of the following two testing procedures by the Contractor will be required by the Engineer. Contractor will provide Engineer opportunity and time to perform his own QA testing.

(1) Test Method Tex-436-A Sand Patch. When texturing first starts, a minimum of 1 sand patch test shall be taken per thousand feet of Runway at randomly selected wheelpath locations. The minimum average macrotexture depth required for each lane mile using this test shall be shown on the plans or as direceted by

the Engineer. Surfaces not meeting this texture depth shall be retextured at the Contractor's expense.

(2) FHWA Type Outflow Meter. When texturing first starts, a minimum of 1 outflow meter tests shall be take per thousand feet of Runway at randomly selected wheel path locations as approved by the Engineer. Testing shall be performed by the Contractor's technician under the supervision of the Engineer. An average of 10 seconds or less shall be obtained. Sections not meeting this criteria shall be retextured at the Contractor's expense.

METHOD OF MEASUREMENT

Texturing will be measured by the square yard of surface area for each pavement type. Pavement types are Asphaltic Concrete Pavement and Portland Cement Concrete Pavement. Square yard calculations will be based on the neat dimensions shown on the plans or as adjusted by the Engineer.

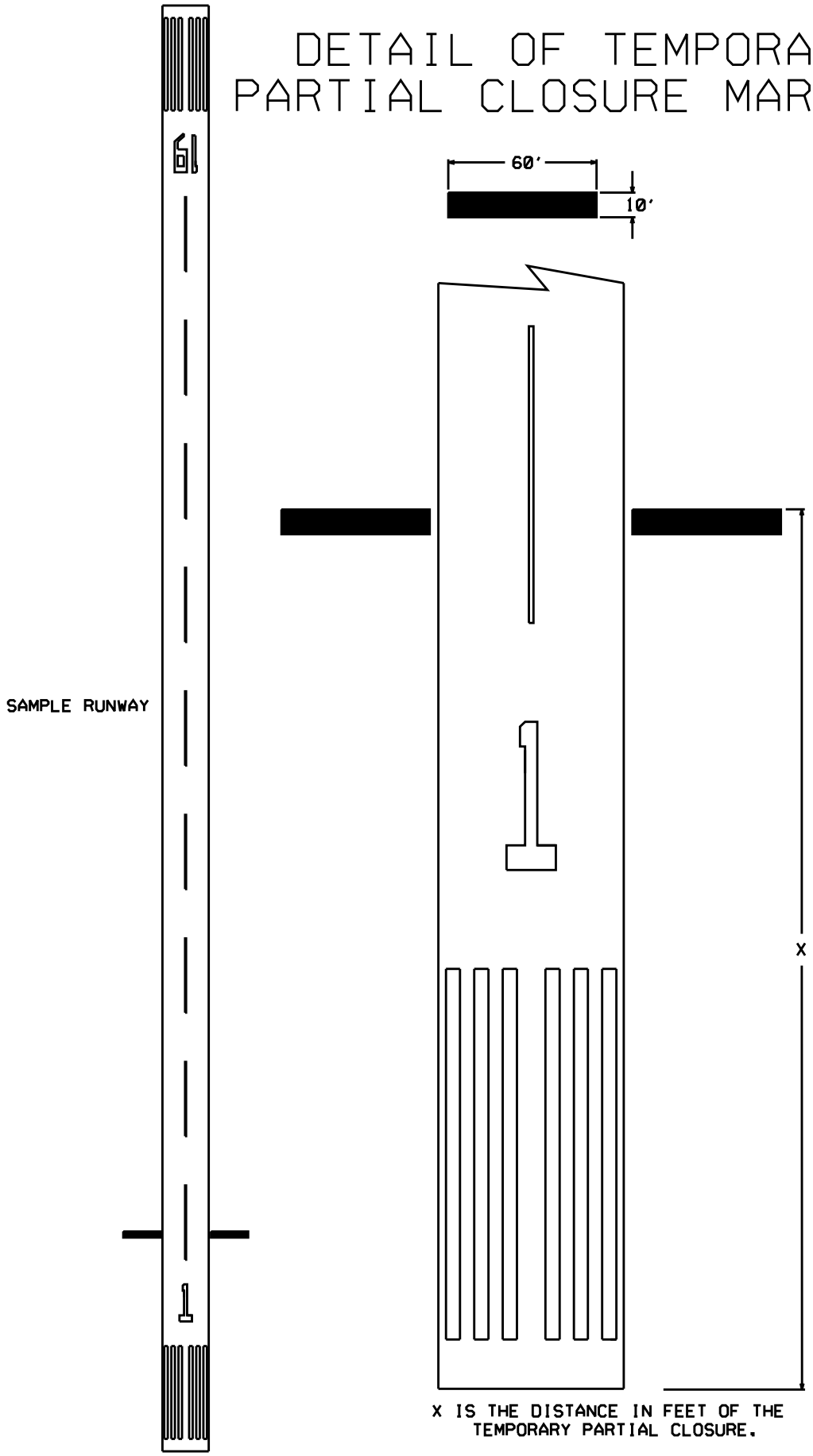
BASIS OF PAYMENT

The work performed in accordance with this item and measured as provided under "Measurement," will be paid for at the unit price bid for "Texturing Asphaltic Concrete Pavement" or "Texturing Portland Cement Concrete Pavement."
This price shall be full compensation for texturing the pavement surface as well as vacuuming, hauling, unloading, and satisfactory storing or disposing of the material, for all labor, equipment, supplies, and incidentals.

Payment will be made under:

"Texturing Asphaltic Concrete Pavement"…….....Square Yard"
"Texturing Portland Cement Concrete Pavement"……Square Yard"

DETAIL OF TEMPORARY PARTIAL CLOSURE MARKING



NOTES:
TEMPORARY PARTIAL CLOSURE MARKINGS ARE PLACED ADJACENT TO OR ON THE EDGE OF THE RUNWAY PAVEMENT. THEY ARE TO BE MADE OF A HIGHLY VISIBLE, COLORED MATERIAL AND SHOULD APPEAR SOLID. THE MEASURED DISTANCE OF THE DISPLACEMENT IS FROM THE FRONT OF THE MARKING TO THE LINE OF REGULAR DISPLACEMENT ON THE PARTICULAIR RUNWAY THAT IS DISPLACED OR CLOSED.

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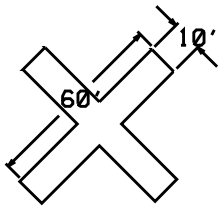
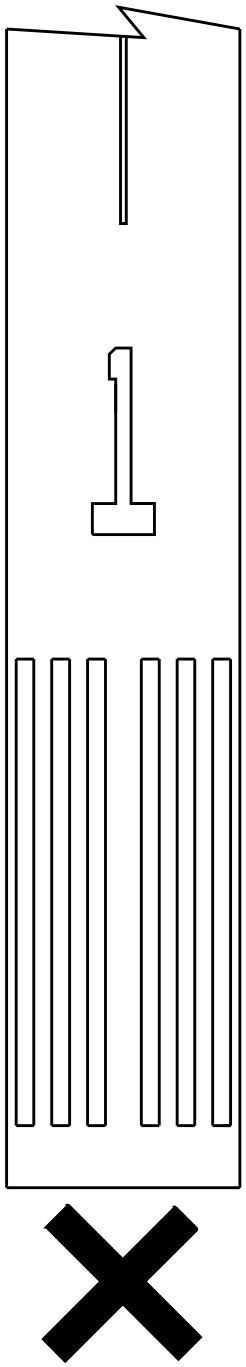
DETAIL OF TEMPORARY CLOSURE MARKING



CLOSURE PLACEMENT DETAIL



SAMPLE RUNWAY

NOTES:
WHEN CLOSURE MARKERS INTERFERE WITH WORK BEING PERFORMED ON A RUNWAY, THE CLOSURE MARKS SHOULD BE MOVED TO AN AREA BEYOND THE PAVEMENT, IN LINE WITH THE RUNWAY (AS SHOWN ABOVE). THE CROSSES MUST BE OF A BRIGHT COLOR (YELLOW OR ORANGE) SO AS TO CONTRAST THE RUNWAY PAVEMENT SURFACE. MATERIALS USED FOR CLOSURE MARKING SHOULD PROVIDE A SOLID APPEARANCE. TO ENHANCE VISIBILITY OF THE CROSS, A 6" BLACK BORDER MAY BE USED ON THE CLOSURE MARKING.

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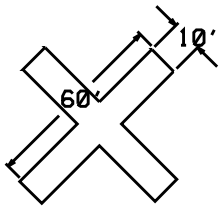
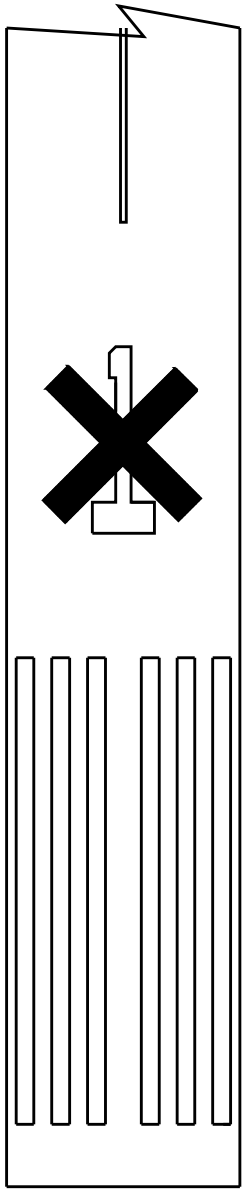
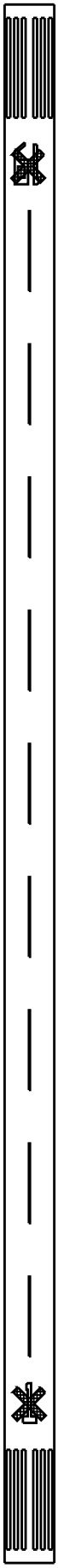
DETAIL OF TEMPORARY CLOSURE MARKING



CLOSURE PLACEMENT DETAIL



SAMPLE RUNWAY



NOTES:

CROSSES ARE ONLY PLACED AT EACH END OF THE RUNWAY. THE CROSSES MUST BE OF A BRIGHT COLOR (YELLOW OR ORANGE) SO AS TO CONTRAST THE RUNWAY PAVEMENT SURFACE. MATERIALS USED FOR CLOSURE MARKING SHOULD PROVIDE A SOLID APPEARANCE. TO ENHANCE VISIBILITY OF THE CROSS, A 6" BLACK BORDER MAY BE USED ON THE CLOSURE MARKING.

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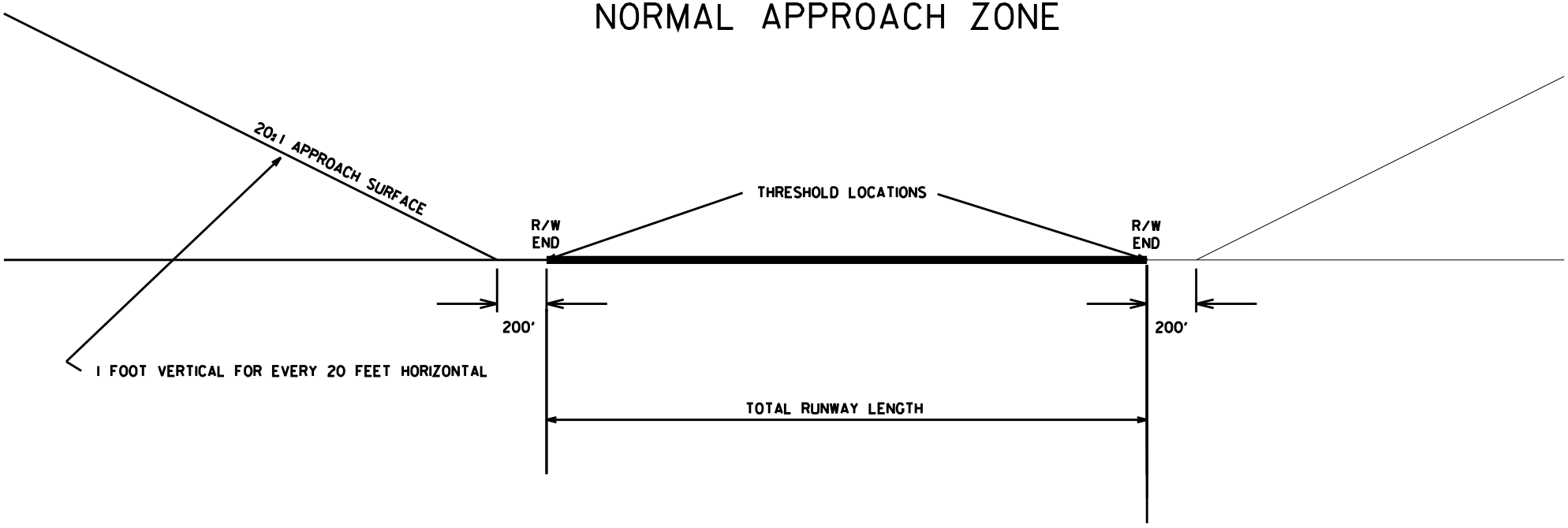
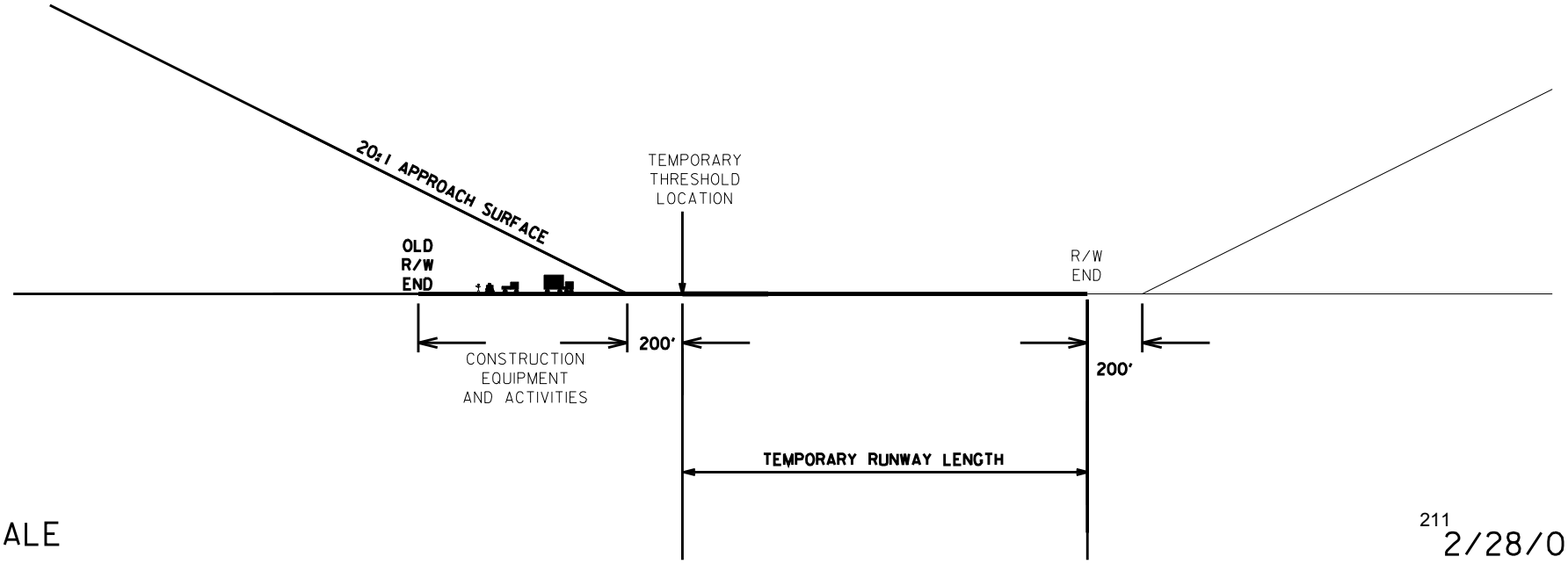
NORMAL APPROACH ZONE



APPROACH ZONE LOCATION DURING CONSTRUCTION



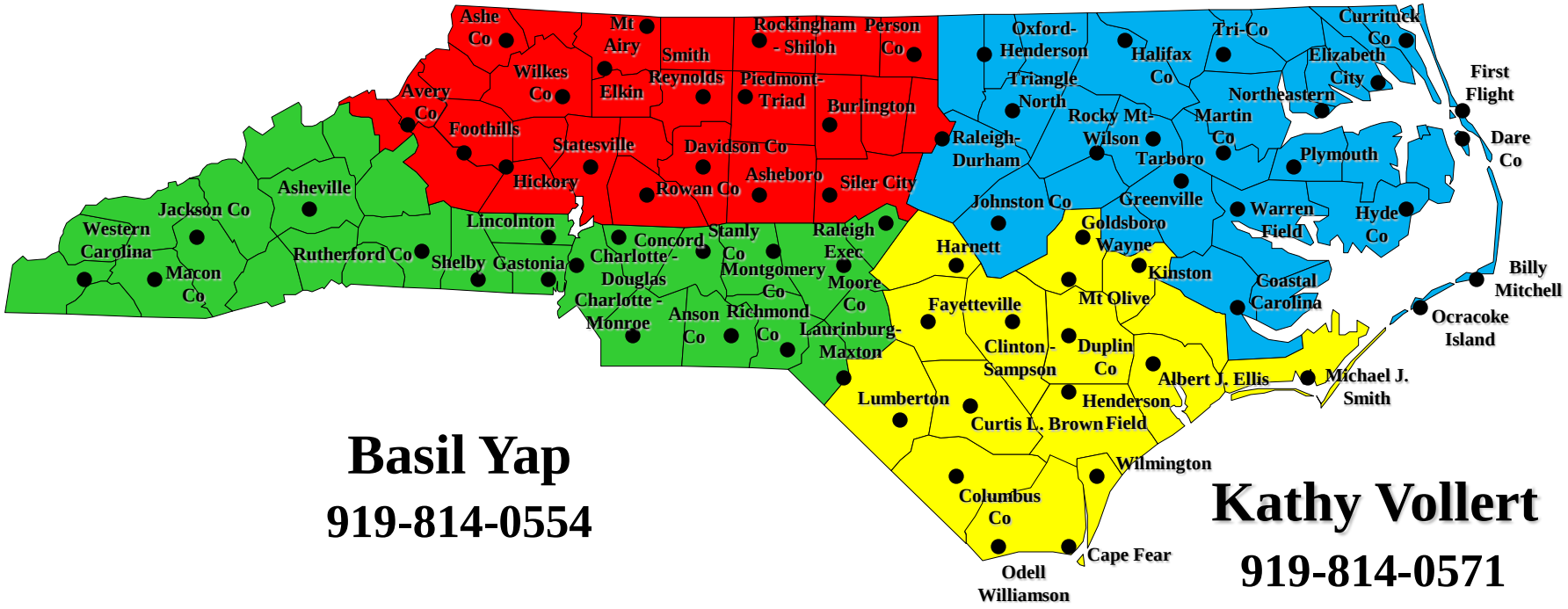
NOT TO SCALE

NCDOT – Division of Aviation
Airport Project Managers

Effective: January 6, 2013

Rachel Bingham
919- 814-0570

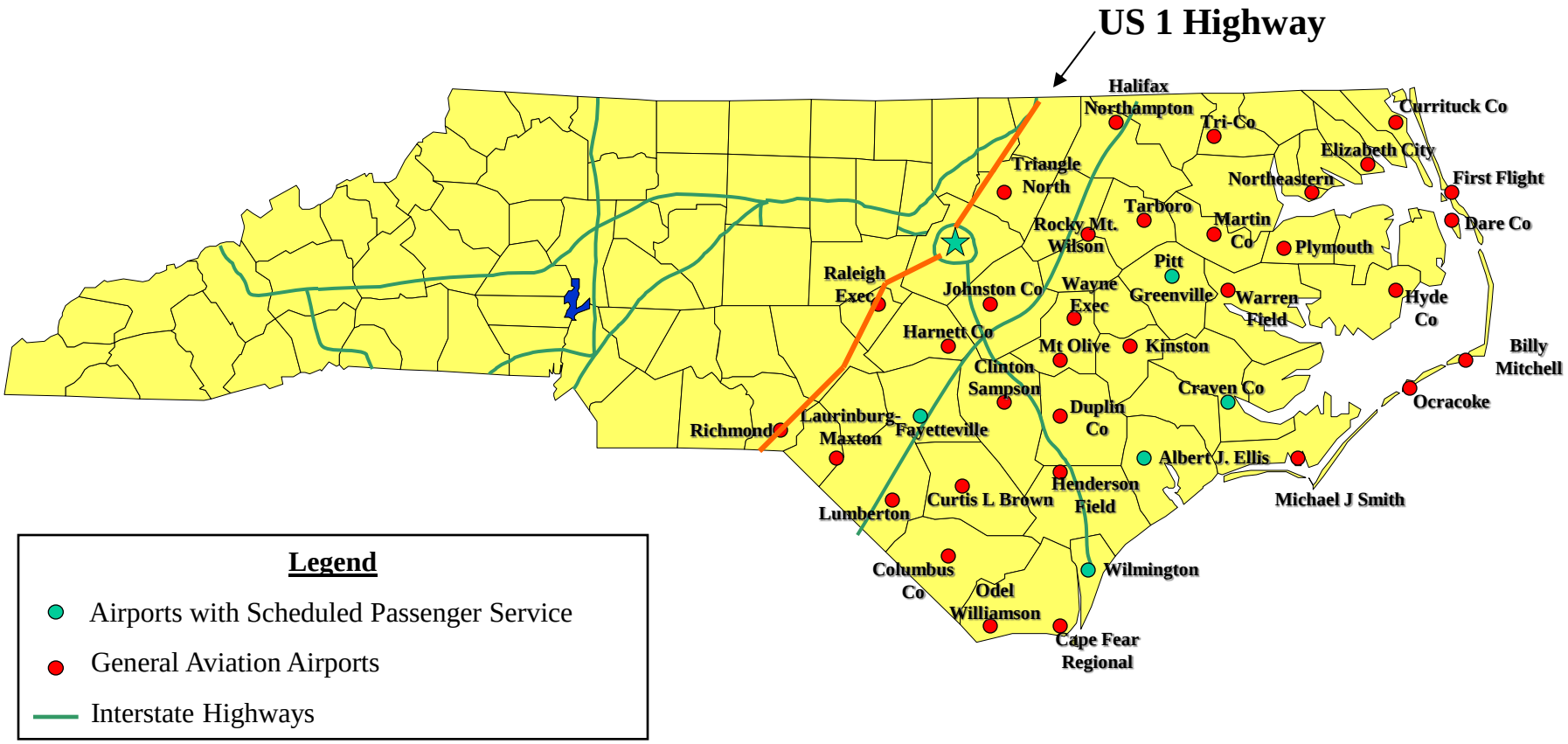
Philip Lanier
919-814-0562



Basil Yap
919-814-0554

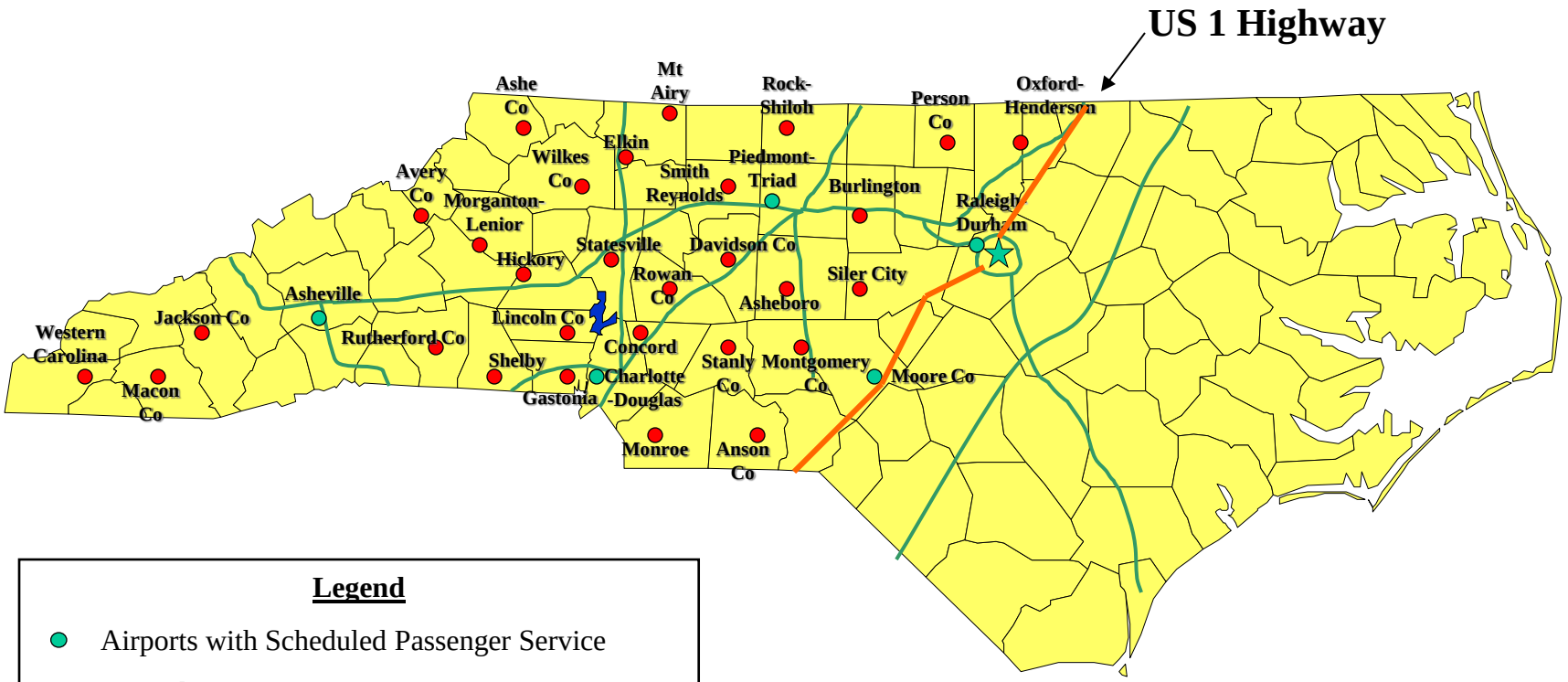
Kathy Vollert
919-814-0571

Eastern NC Airports Seeding Map



2014

Western NC Airports Seeding Map



2014 Airport Maintenance at NC Airports

PO#:

Contractor:

Airport:

ITEM	DESCRIPTION	ESTIMATE QUANTITY	UNIT	UNIT PRICE	ITEM COST	DAILY PRODUCTION RATE	UNIT	PRODUCTION TIME ALLOTTED
1	**Mobilization for Hot-Applied Crack and Joint Sealing**		Ea		$0.00	1	Day	0.0
2	Hot-Applied Asphalt Crack and Joint Sealing		Lbs		$0.00	3,500	Lbs / Day	0.0
3	Hot-Applied Concrete Crack and Joint Sealing		Lbs		$0.00	1,500	Lbs / Day	0.0
4	**Mobilization for Full Depth Asphalt Pavement Patching**		Ea		$0.00	1	Day	0.0
5	Full Depth Asphalt Pavement Patching		Tons		$0.00	50	Tons / Day	0.0
6	**Mobilization for Flexible Repair of Concrete and Asphalt Pavement**		Ea		$0.00	1	Day	0.0
7	Concrete/Asphalt Repair - Fibercrete B		Lbs		$0.00	10,000	Lbs / Day	0.0
8	Concrete/Asphalt Repair - Fibercrete G		Lbs		$0.00	10,000	Lbs / Day	0.0
9	**Mobilization for Rigid Repair of Concrete Pavement**		Ea		$0.00	1	Day	0.0
10	Type 1 Rigid Repair of Concrete		Cu Yd		$0.00	50	Cu Yd / Day	0.0
11	Type 2A Rigid Repair of Concrete		Sq Ft		$0.00	150	Sq Ft / Day	0.0
12	Type 2B Rigid Repair of Concrete		Sq Ft		$0.00	150	Sq Ft / Day	0.0
13	Type 3 Rigid Repair of Concrete		Sq Ft		$0.00	150	Sq Ft / Day	0.0
14	**Mobilization for Silicone Joint and Crack Sealing**		Ea		$0.00	1	Day	0.0
15	Silicone Joint and Crack Sealing, 3/8" – 5/8"		LF		$0.00	700	LF / Day	0.0
16	Silicone Joint and Crack Sealing, 3/4" – 1 and 1/2"		LF		$0.00	700	LF / Day	0.0
17	**Mobilization for Asphalt Rejuvenation**		Ea		$0.00	1	Day	0.0
18	Asphalt Rejuvenation		Sq Yd		$0.00	25,000	Sq Yd / Day	0.0
19	**Mobilization for Runway Rubber Removal**		Ea		$0.00	1	Day	0.0
20	Runway Rubber Removal - UHP Waterblasting		Sq Ft		$0.00	80,000	Sq Ft / Day	0.0
21	Runway Rubber Removal - Shotblasting		Sq Ft		$0.00	80,000	Sq Ft / Day	0.0
22	Runway Rubber Removal - Sandblasting		Sq Ft		$0.00	80,000	Sq Ft / Day	0.0
23	Runway Rubber Removal - Chemical		Sq Ft		$0.00	80,000	Sq Ft / Day	0.0
24	**Mobilization for Airfield Marking**		Ea		$0.00	1	Day	0.0
25	Airfield Marking (Type II Paint, Quarter-Rate, No Beads)		Sq Ft		$0.00	20,000		
26	Airfield Marking (Type II Paint, Half-Rate, No Beads)		Sq Ft		$0.00	20,000	Sq Ft / Day	0.0
27	Airfield Marking (Type II Paint, Full-Rate, Type I Beads)		Sq Ft		$0.00	20,000	Sq Ft / Day	0.0
28	Airfield Marking (Type II Paint, Full-Rate, Type III Beads)		Sq Ft		$0.00	20,000	Sq Ft / Day	0.0
29	Airfield Marking (Type III Paint, Full-Rate, Type IV Beads)		Sq Ft		$0.00	20,000	Sq Ft / Day	0.0
30	Airfield Marking (Preformed Thermoplastic, Type III Beads)		Sq Ft		$0.00	3,000	Sq Ft / Day	0.0
31	Airfield Marking (Preformed Thermoplastic, Type IV Beads)		Sq Ft		$0.00	3,000	Sq Ft / Day	0.0
32	Airfield Marking (Surface Painted Hold Position Signs)		Sq Ft		$0.00	3,000	Sq Ft / Day	0.0
33	**Mobilization for Pavement Marking Removal**		Ea		$0.00	1	Day	0.0
34	Pavement Marking Removal - UHP Waterblasting		Sq Ft		$0.00	20,000	Sq Ft / Day	0.0
35	Pavement Marking Removal - Grinding		Sq Ft		$0.00	20,000	Sq Ft / Day	0.0
36	Pavement Marking Removal - Shotblasting		Sq Ft		$0.00	20,000	Sq Ft / Day	0.0
37	**Mobilization for Polymer Composite Micro-Overlay**		Ea		$0.00	1	Day	0.0
38	PCMO Crack-Filler		LF		$0.00	5,000	LF / Day	0.0
39	PCMO		Sq Yd		$0.00	5,000	Sq Yd / Day	0.0
40	**Mobilization for Raised Pavement Markers**		Ea		$0.00	1	Day	0.0
41	Permanent Raised Pavement Markers		Ea		$0.00	250	Ea / Day	0.0
42	**Mobilization for Pipe Joint Sealing Backgrouting and Soil Stabilization**		Ea		$0.00	1	Day	0.0
43	Joint Sealing (36" to 48" diameter)		Ea		$0.00	5	Ea / Day	0.0
44	Joint Sealing (54" to 72" diameter)		Ea		$0.00	5	Ea / Day	0.0
45	Joint Sealing (> 72" diameter)		Ea		$0.00	5	Ea / Day	0.0
46	Backgrouting		Gal		$0.00	10	Gal / Day	0.0
47	Soil Stabilization		Gal		$0.00	100	Gal / Day	0.0
48	CCTV Inspection		Day		$0.00	1	Day	0.0
49	**Mobilization for Concrete Pavement Leveling and Undersealing**		Ea		$0.00	1	Day	0.0
50	HDPF Concrete Pavement Leveling		Lbs		$0.00	1,000	Lbs / Day	0.0
51	**Mobilization for Thermoplastic Coal-Tar Emulsion**		Ea		$0.00	1	Day	0.0
52	Thermoplastic Coal-Tar Emulsion Crack-Filler		LF		$0.00	5,000	LF / Day	0.0
53	Thermoplastic Coal-Tar Emulsion Sealcoat with Aggregate		Sq Yd		$0.00	5,000	Sq Yd / Day	0.0
54	Thermoplastic Coal-Tar Emulsion Sealcoat Without Aggregate		Sq Yd		$0.00	5,000	Sq Yd / Day	0.0
55	Thermoplastic Coal-Tar Emulsion Slurry Seal-Type A		Sq Yd		$0.00	5,000	Sq Yd / Day	0.0
56	Thermoplastic Coal-Tar Emulsion Slurry Seal-Type B		Sq Yd		$0.00	5,000	Sq Yd / Day	0.0
57	Thermoplastic Coal-Tar Emulsion Slurry Seal-Type C		Sq Yd		$0.00	5,000	Sq Yd / Day	0.0
58	**Mobilization for Aircraft Tie Downs**		Ea		$0.00	1	Day	0.0
59	1,000 lb Aircraft Tie Down Anchor with Cover		Ea		$0.00	30	Ea / Day	0.0
60	1,000 lb Aircraft Tie Down Anchor without Cover		Ea		$0.00	30	Ea / Day	0.0
61	2,000 lb Aircraft Tie Down Anchor with Cover		Ea		$0.00	30	Ea / Day	0.0
62	2,000 lb Aircraft Tie Down Anchor without Cover		Ea		$0.00	30	Ea / Day	0.0
63	4,500 lb Aircraft Tie Down Anchor with Cover		Ea		$0.00	30	Ea / Day	0.0
64	4,500 lb Aircraft Tie Down Anchor without Cover		Ea		$0.00	30	Ea / Day	0.0
65	Aircraft Tie Down Rope		Ea		$0.00	500	Ea / Day	0.0
66	Remove Failing Aircraft Anchor		Ea		$0.00	15	Ea / Day	0.0
67	**Mobilization for Anchored Airfield Light Mats**		Ea		$0.00	1	Day	0.0
68	Anchored Airfield Elliptical Light Mat with 12" Collar Insert		Ea		$0.00	50	Ea / Day	0.0
69	Anchored Airfield Elliptical Light Mat with 18" Collar Insert		Ea		$0.00	50	Ea / Day	0.0
70	Anchored Airfield Elliptical Light Mat without Collar Insert		Ea		$0.00	50	Ea / Day	0.0
71	Anchored Airfield 30' Strip Mat		Ea		$0.00	20	Ea / Day	0.0
72	Anchored Airfield 60' Strip Mat		Ea		$0.00	20	Ea / Day	0.0
73	**Mobilization for Pavement Marking & Surface Cleaning**		Ea		$0.00	1	Day	0.0
74	Pavement Marking Cleaning – LP Waterblasting		Sq Ft		$0.00	20,000	Sq Ft / Day	0.0
75	Pavement Marking Cleaning – UHP Waterblasting		Sq Ft		$0.00	80,000	Sq Ft / Day	0.0
76	Pavement Surface Cleaning – LP Waterblasting		Sq Ft		$0.00	30,000	Sq Ft / Day	0.0
77	Pavement Surface Cleaning – UHP Waterblasting		Sq Ft		$0.00	100,000	Sq Ft / Day	0.0
78	**Mobilization for Shoulder, Slope, and Eroded Section Reconstruction**		Ea		$0.00	1	Day	0.0
79	Shoulder, Slope, and Eroded Area Reconstruction		Acre		$0.00	1	Acre / Day	0.0
80	Borrow Excavation		Cu Yd		$0.00	40	Cu Yd / Day	0.0
81	Select Material		Cu Yd		$0.00	60	Cu Yd / Day	0.0
82	**Mobilization for Seeding and Mulching**		Ea		$0.00	1	Day	0.0
83	Seeding and Mulching, Dry Application		Acre		$0.00	6	Acre / Day	0.0
84	Seeding and Mulching, Wet Application		Acre		$0.00	4	Acre / Day	0.0
85	Mowing		Acre		$0.00	15	Acre / Day	0.0
					$0.00			
86	**Mobilization for Coal Tar Emulsion Slurry Seal**		Ea		$0.00	1	Day	0.0
87	Refined Coal Tar Emulsion Slurry Seal (Spray)		Gal		$0.00	400	Gal	0.0
88	Refined Coal Tar Emulsion Slurry Seal (Mechanical Squeegee)		Gal		$0.00	800	Gal	0.0
					$0.00			
89	**Mobilization for General Labor Crew**		Ea		$0.00	1	Day	0.0
90	Light Equipment Crew (B63)		Day		$0.00	1	Day	0.0
91	Carpentry Crew (K1)		Day		$0.00	1	Day	0.0
92	Skilled Worker Crew (L4)		Day		$0.00	1	Day	0.0
93	Electrical Crew (R22)		Day		$0.00	1	Day	0.0
94	Materials (Actual Cost + Markup)		Ea	$1.00	$0.00	None	Ea	
95	**Mobilization for Pavement Texturing**		Ea		$0.00	1	Day	0.0
96	Texturing Asphaltic Concrete Pavement		Sq Yd		$0.00	15,000	Sq Yd / Day	0.0
97	Texturing Portland Cement Concrete Pavement		Sq Yd		$0.00	15,000	Sq Yd / Day	0.0

Total Cost: **$0.00**

Total Time Alloted (Days): **0**

Date of Notification:

Construction must begin by:

Date Construction Began:

Construction must be completed by: **1/0/1900**

LISTING OF MB & WB SUBCONTRACTORS

Sheet___of ____

FIRM NAME AND ADDRESS	MB OR WB	ITEM NO.	ITEM DESCRIPTION	* AGREED UPON UNIT PRICE	DOLLAR VOL. OF SUBLET ITEM

DOLLAR VOLUME OF WB SUBCONTRACTOR_____
WB PERCENTAGE OF TOTAL CONTRACT BID PRICE_____
DOLLAR VOLUME OF MB SUBCONTRACTOR_____
MB PERCENTAGE OF TOTAL CONTRACT BID PRICE_____

*** THE DOLLAR VOLUME SHOWN IN THIS COLUMN SHALL BE THE ACTUAL PRICE AGREED UPON BY THE PRIME CONTRACTOR AND THE MB\WB SUB-CONTRACTOR. THESE PRICES WILL BE USED TO DETERMINE THE PERCENTAGES OF MB\WB PARTICIPATION IN THE CONTRACT.**

NON COLLUSION AFFIDAVIT

(To Be Executed and Returned with Quotation)

The person executing this bid solemnly swears (or affirms) that neither he, nor any official, agent, or employee of the bidder has entered into any agreement, restraint of free competitive bidding in connection with this bid.

NAME OF CONTRACTOR _____

SIGNATURE OF CONTRACTOR _____

NOTE - AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to me this the ____ day of _____ 20 ____.

NOTARY SEAL

_____

(SIGNATURE OF NOTARY PUBLIC)

Of _____ County.

State of _____.

My Commission Expires: _____.

North Carolina Department of Transportation
CONTRACT BID FORM

Purchase Order Number: To be determined

Airfield Maintenance Activities at North Carolina Airports

ITEM	SECT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT BID
1	**SP**	Mobilization for Hot-Applied Crack and Joint Sealing	**2**	**Ea**		
2	**SP**	Hot-Applied Asphalt Crack and Joint Sealing	**10,200**	**Lbs**		
3	**SP**	Hot-Applied Concrete Crack and Joint Sealing	**1,000**	**Lbs**		
4	**SP**	Mobilization for Full Depth Asphalt Pavement Patching	**1**	**Ea**		
5	**SP**	Full Depth Asphalt Pavement Patching	**35**	**Tons**		
6	**SP**	Mobilization for Flexible Repair of Concrete and Asphalt Pavement	**2**	**Ea**		
7	**SP**	Concrete/Asphalt Repair - Fibercrete B	**1,500**	**Lbs**		
8	**SP**	Concrete/Asphalt Repair - Fibercrete G	**1,500**	**Lbs**		
9	**SP**	Mobilization for Rigid Repair of Concrete Pavement	**2**	**Ea**		
10	**SP**	Type 1 Rigid Repair of Concrete	**15**	**Cu Yd**		
11	**SP**	Type 2A Rigid Repair of Concrete	**5**	**Sq Ft**		
12	**SP**	Type 2B Rigid Repair of Concrete	**5**	**Sq Ft**		
13	**SP**	Type 3 Rigid Repair of Concrete	**5**	**Sq Ft**		
14	**SP**	Mobilization for Silicone Joint and Crack Sealing	**2**	**Ea**		
15	**SP**	Silicone Joint and Crack Sealing, 3/8” – 5/8"	**1,500**	**LF**		
16	**SP**	Silicone Joint and Crack Sealing, 3/4” – 1 and 1/2"	**1,500**	**LF**		

17	**SP**	Mobilization for Asphalt Rejuvenation	**5**	**Ea**		
18	**SP**	Asphalt Rejuvenation	**55,000**	**Sq Yd**		
19	**SP**	Mobilization for Runway Rubber Removal	**2**	**Ea**		
20	**SP**	Runway Rubber Removal - UHP Waterblasting	**5,000**	**Sq Ft**		
21	**SP**	Runway Rubber Removal - Shotblasting	**200**	**Sq Ft**		
22	**SP**	Runway Rubber Removal - Sandblasting	**200**	**Sq Ft**		
23	**SP**	Runway Rubber Removal - Chemical	**5,000**	**Sq Ft**		
24	**SP**	Mobilization for Airfield Marking	**5**	**Ea**		
25	**SP**	Airfield Marking (Type II Paint, Quarter-Rate, No Beads)	**20,000**	**Sq Ft**		
26	**SP**	Airfield Marking (Type II Paint, Half-Rate, No Beads)	**5,000**	**Sq Ft**		
27	**SP**	Airfield Marking (Type II Paint, Full-Rate, Type I Beads)	**100,000**	**Sq Ft**		
28	**SP**	Airfield Marking (Type II Paint, Full-Rate, Type III Beads)	**5,000**	**Sq Ft**		
29	**SP**	Airfield Marking (Type III Paint, Full-Rate, Type IV Beads)	**1,500**	**Sq Ft**		
30	**SP**	Airfield Marking (Preformed Thermoplastic, Type III Beads)	**300**	**Sq Ft**		
31	**SP**	Airfield Marking (Preformed Thermoplastic, Type IV Beads)	**100**	**Sq Ft**		
32	**SP**	Airfield Marking (Surface Painted Hold Position Signs)	**2,500**	**Sq Ft**		
33	**SP**	Mobilization for Pavement Marking Removal	**2**	**Ea**		
34	**SP**	Pavement Marking Removal - UHP Waterblasting	**3,500**	**Sq Ft**		

35	**SP**	Pavement Marking Removal - Grinding	**3,500**	**Sq Ft**		
36	**SP**	Pavement Marking Removal - Shotblasting	**500**	**Sq Ft**		
37	**SP**	Mobilization for Polymer Composite Micro-Overlay	**1**	**Ea**		
38	**SP**	PCMO Crack-Filler	**500**	**LF**		
39	**SP**	PCMO	**250**	**Sq Yd**		
40	**SP**	Mobilization for Raised Pavement Markers	**1**	**Ea**		
41	**SP**	Permanent Raised Pavement Markers	**50**	**Ea**		
42	**SP**	Mobilization for Pipe Joint Sealing Backgrouting and Soil Stabilization	**1**	**Ea**		
43	**SP**	Joint Sealing (36” to 48” diameter)	**4**	**Ea**		
44	**SP**	Joint Sealing (54” to 72” diameter)	**4**	**Ea**		
45	**SP**	Joint Sealing (> 72” diameter)	**1**	**Ea**		
46	**SP**	Backgrouting	**15**	**Gal**		
47	**SP**	Soil Stabilization	**25**	**Gal**		
48	**SP**	CCTV Inspection	**1**	**Day**		
49	**SP**	Mobilization for Concrete Pavement Leveling and Undersealing	**1**	**Ea**		
50	**SP**	HDPF Concrete Pavement Leveling	**500**	**Lbs**		
51	**SP**	Mobilization for Thermoplastic Coal-Tar Emulsion	**1**	**Ea**		
52	**SP**	Thermoplastic Coal-Tar Emulsion Crack-Filler	**500**	**LF**		
53	**SP**	Thermoplastic Coal-Tar Emulsion Sealcoat with Aggregate	**500**	**Sq Yd**		

54	**SP**	Thermoplastic Coal-Tar Emulsion Sealcoat Without Aggregate	**500**	**Sq Yd**		
55	**SP**	Thermoplastic Coal-Tar Emulsion Slurry Seal-Type A	**100**	**Sq Yd**		
56	**SP**	Thermoplastic Coal-Tar Emulsion Slurry Seal-Type B	**500**	**Sq Yd**		
57	**SP**	Thermoplastic Coal-Tar Emulsion Slurry Seal-Type C	**100**	**Sq Yd**		
58	**SP**	Mobilization for Aircraft Tie Downs	**1**	**Ea**		
59	**SP**	1,000 lb Aircraft Tie Down Anchor with Cover	**1**	**Ea**		
60	**SP**	1,000 lb Aircraft Tie Down Anchor without Cover	**1**	**Ea**		
61	**SP**	2,000 lb Aircraft Tie Down Anchor with Cover	**1**	**Ea**		
62	**SP**	2,000 lb Aircraft Tie Down Anchor without Cover	**1**	**Ea**		
63	**SP**	4,500 lb Aircraft Tie Down Anchor with Cover	**1**	**Ea**		
64	**SP**	4,500 lb Aircraft Tie Down Anchor without Cover	**1**	**Ea**		
65	**SP**	Aircraft Tie Down Rope	**65**	**Ea**		
66	**SP**	Remove Failing Aircraft Anchor	**1**	**Ea**		
67	**SP**	Mobilization for Anchored Airfield Light Mats	**1**	**Ea**		
68	**SP**	Anchored Airfield Elliptical Light Mat with 12” Collar Insert	**1**	**Ea**		
69	**SP**	Anchored Airfield Elliptical Light Mat with 18” Collar Insert	**1**	**Ea**		
70	**SP**	Anchored Airfield Elliptical Light Mat without Collar Insert	**1**	**Ea**		
71	**SP**	Anchored Airfield 30’ Strip Mat	**1**	**Ea**		
72	**SP**	Anchored Airfield 60’ Strip Mat	**1**	**Ea**		
73	**SP**	Mobilization for Pavement Marking and Pavement Surface Cleaning	**3**	**Ea**		

74	**SP**	Pavement Marking Cleaning – LP Waterblasting	**20,000**	**Sq Ft**		
75	**SP**	Pavement Marking Cleaning – UHP Waterblasting	**20,000**	**Sq Ft**		
76	**SP**	Pavement Surface Cleaning – LP Waterblasting	**20,000**	**Sq Ft**		
77	**SP**	Pavement Surface Cleaning – UHP Waterblasting	**20,000**	**Sq Ft**		
78	**SP**	Mobilization for Shoulder, Slope, and Eroded Section Reconstruction	**1**	**Ea**		
79	**SP**	Shoulder, Slope, and Eroded Area Reconstruction	**1**	**Acre**		
80	**SP**	Borrow Excavation	**1**	**Cu Yd**		
81	**SP**	Select Material	**1**	**Cu Yd**		
82	**SP**	Mobilization for Seeding and Mulching	**1**	**Ea**		
83	**SP**	Seeding and Mulching, Dry Application	**1**	**Acre**		
84	**SP**	Seeding and Mulching, Wet Application	**1**	**Acre**		
85	**SP**	Mowing	**1**	**Acre**		
86	**SP**	Mobilization for Coal Tar Emulsion Slurry Seal	**3**	**Ea**		
87	**SP**	Refined Coal Tar Emulsion Slurry Seal (Spray)	**400**	**Gal**		
88	**SP**	Refined Coal Tar Emulsion Slurry Seal (Mechanical Squeegee)	**400**	**Gal**		
89	**SP**	Mobilization for General Labor Crew	**1**	**Ea**		
90	**SP**	Light Equipment Crew (B63)	**1**	**Day**		
91	**SP**	Carpentry Crew (K1)	**1**	**Day**		
92	**SP**	Skilled Worker Crew (L4)	**1**	**Day**		
93	**SP**	Electrical Crew (R22)	**1**	**Day**		
94	**SP**	Materials (Insert Markup Percentage in Unit Price Column)	**1**	**Ea**	**%**	**$1.00**

95	**SP**	Mobilization for Pavement Texturing	**1**	**Ea**		
96	**SP**	Texturing Asphaltic Concrete Pavement	**2500**	**Sq Yd**		
97	**SP**	Texturing Portland Cement Concrete Pavement	**2500**	**Sq Yd**		

***** Unit Prices Must Be Limited To TWO Decimal Places *****

TOTAL BID FOR PROJECT:_____

CONTRACTOR_____ NCDOT Vendor #:_____

ADDRESS_____

Federal Identification Number_____Contractors License Number_____

Authorized Agent_____Title_____

Signature_____Date_____

Witness_____Title_____

Signature_____Date_____

THIS SECTION TO BE COMPLETED BY NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

This bid has been reviewed in accordance with Article 103-1 of the Standard Specifications for Roads and Structures (2012 or newer adopted version)

Reviewed by_____ _____(date)

Accepted by NCDOT_____ _____(date)