STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

Invitation for Bid (IFB) # 54-MKB-12082920C

Airport Maintenance

Date Issued: February 27, 2024.

Bid Opening Date: March 22, 2024

At 2:00 pm ET

Direct all inquiries concerning this IFB to:

Mike Beaver
Procurement Specialist III

Email: mkbeaver@ncdot.gov

Phone: 919-707-2626

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INSTRUCTIONS TO CONTRACTORS

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

Date: February 27, 2024 **Bid Number: 54-MKB-12082920C**

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 pricing form furnished by NCDOT with the Invitation for Bid (IFB) shall be used and shall not be altered in any manner. **DO NOT SEPARATE THE PRICING FORM FROM THE IFB**
2. All entries on the pricing form, including signatures, shall be written in ink.
3. The Contractor shall submit a unit price for every item on the pricing form. The unit prices for the various contract items shall be written in figures.
4. An amount bid shall be entered on the pricing form for every item. The amount bid for each item shall be determined by multiplying each unit price 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 pricing form. 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. The Contractor shall initial the change in ink.
7. The bid shall be submitted with the entire IFB and 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 contractor 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 IFB WITH THE PRICING FORM ATTACHED SHALL BE PLACED IN A SEALED ENVELOPE AND SHALL BE DELIVERED TO AND RECEIVED IN THE NCDOT PURCHASING SECTION NO LATER THAN 2:00 PM, March 22, 2024.**
12. The sealed bid must display the Contractor's name and address and the following statement on the front of the sealed envelope:
    Bid# 54-MKB-12082920C, TO BE OPENED AT 2:00 P.M., March 22, 2024.
13. If delivered by delivery service, the sealed package shall be addressed as follows:

MAILING ADDRESS FOR DELIVERY OF BID VIA U.S. POSTAL SERVICE	OFFICE ADDRESS FOR DELIVERY BY ANY OTHER MEANS, SPECIAL DELIVERY, HAND DELIVERY, OVERNIGHT DELIVERY OR BY ANY OTHER CARRIER
BID NUMBER: 54-MKB-12082920C Attn: Mike Beaver North Carolina Department of Transportation Purchasing Section Address: 1510 Mail Service Center Raleigh, NC 27611	***BID NUMBER: 54-MKB-12082920C*** Attn: Mike Beaver North Carolina Department of Transportation Purchasing Section Address: 1 South Wilmington Street, Room **334B** Raleigh, NC 27601

Note that the U.S. Postal Service does not deliver mail to this specified street address but to the State's Mail Service Center. Contractors are cautioned that IFB's sent via U.S. Mail, including Express Mail, may not be delivered by the Mail Service Center to the agency's purchasing office on the due date in time to meet the IFB deadline. All Vendors are urged to take the possibility of delay into account when submitting a IFB. **Attempts to submit an IFB via facsimile (FAX) machine, telephone or electronic means, including but not limited to email, in response to this IFB shall NOT be accepted.**

1. General

1.1 Purpose and Background

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.

Bids shall be submitted in accordance with the Standard Provisions of this IFB and any addenda issued hereto.

1.2 IFB Schedule

Event	Responsibility	Date and Time
Issue IFB	State	**February 27, 2024.**
Site Visit	State	**March 8, 2024 @ 3:00PM ET**
Submit Written Questions	Contractor	**March 12, 2024 @ 11:00AM ET**
Provide Responses to Questions	State	**March 18, 2024**
Submit Bids	Contractor	**March 22, 2024, by 2:00PM ET**
Contract Award	State	**ASAP**

Mandatory Site Visit

Date: **March 8, 2024**
Time: 3:00PM Eastern Time
Location: Division of Aviation, 1050 Meridian Drive, Morrisville, NC 27560 Contact #: Raj Kondapalli (919) 814-0559

Instructions: It shall be MANDATORY that each Contractor representative be present for a pre-bid site visit on **March 8, 2024**. Attendees shall meet promptly at 3:00PM Eastern Time at NCDOT Division of Aviation, 1050 Meridian Drive, Morrisville, NC 27560. All attendees shall sign in upon arrival. LATE ARRIVALS WILL NOT BE ALLOWED TO SIGN IN, NOR SHALL THEIR BID BE CONSIDERED. Late arrivals may be excluded from the meeting room until all on-time attendees have completed sign-in, and the sign-in sheet secured. Once the sign-in process is complete, all other persons wishing to attend may do so to the extent that space and circumstances allow. On- time attendance will be strictly enforced.

The purpose of this visit is for all prospective Contractors to apprise themselves with the conditions and requirements which will affect the performance of the work called for by this Invitation for Bid. Contractor shall stay for the duration of the site visit. No allowances will be made for unreported conditions that a prudent Contractor would recognize as affecting the

work called for or implied by this bid.

Contractors are cautioned that any information released to attendees during the site visit, other than that involving the physical aspects of the facility referenced above, and which conflicts with, supersedes, or adds to requirements in this Invitation for Bid, must be confirmed by written addendum before it can be considered to be a part of this bid.

1.3 IFB Questions

Upon review of the IFB documents, Contractors may have questions to clarify or interpret the IFB in order to submit the best IIFB possible. To Accommodate the IFB Questions process, Contractors shall submit any such questions by 11:00 AM ET, March 12, 2024.

Written questions shall be emailed to mkbeaver@ncdot.gov by the date and time specified above. Contractor should enter "IFB #54-MKB-12082920C: Questions" as the subject for the email. Questions submittals should include a reference to the applicable IFB section and be submitted in a format shown below:

Reference	Contractor Question
IFB Section, Page Number	Contractor question …?

Questions received prior to the submission deadline date, the State's response, and any additional terms deemed necessary by the State will be posted in the form of an addendum to the NC DOT site at https://connect.ncdot.gov/letting/Pages/Aviation.aspxConnect and shall become an Addendum to this IFB. No information, instruction or advice provided orally or informally by any State personnel, whether made in response to a question or otherwise in connection with this IFB, shall be considered authoritative or binding. Contractors shall rely *only* on written material contained in an Addendum to this IFB.

2. Standard Provisions

2.1 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, the Federal Highway Administration - Manual of Uniform Traffic Control Devices (2009 with revisions 1 and 2 incorporated or newer

adopted version), the Federal Aviation Administration - Advisory Circular 150/5370-10H Standards for Specifying Construction of Airports (12/21/2018 or newer adopted version), and the Federal Aviation Administration - Advisory Circular 150/5370-2G Operational Safety on Airports During Construction (12/13/2017 or newer adopted version), with the exception that bid bonds are not required.

The Contractor shall keep itself 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.

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

2.2 Term of Contract

The Contract shall have an initial term of one (1) year, beginning on the date of final Contract execution or [insert date], whichever is later. The Contractor shall submit a bid for this one (1) year term. At the option of the Division of Aviation, this contract may be extended for four (4) additional periods of one (1) year each, for a maximum period of five (5) years total. The unit bid prices will be increased by three percent (3%) for each one- year extension. No changes to the Standards Provisions, 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. No extensions of a completion date, intermediate completion date or intermediate completion time of a project as defined in this paragraph 2.4 will be authorized except as authorized by Article 108-10 of the Standard Specifications for Roads and Structures.

2.3 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 IFB, that this agreement **does not** constitute an exclusive contract. The Contractor further understands and agrees, by signature on the IFB, that Contractor is not guaranteed to receive any amount of work under this contract, and this contract does not constitute a guarantee of work. The contracts may be awarded and executed with up to three (3) 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.

2.4 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. A start date and tentative schedule shall be provided to the Engineer or his authorized representative no less than fourteen (14) calendar days prior to start of work.

The Contractor shall notify the Engineer or an authorized representative three (3) calendar 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.

2.5 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 but only as provided by Article 108-10 of the Standard Specifications for Roads and Structures

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 work is begun at the airport. At any time prior to or after the start of work the Engineer may cancel or reassign the planned work without warning. No compensation shall be made for canceled or reassigned work. Acceptably completed work shall be paid according to contract line items.

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.

2.6 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 for 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 three (3) calendar days 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.

2.7 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 travel way 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 an herbicide and the required period of time necessary to allow the chemical to effectively work prior to the commencement of further work.

2.8 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 online at www.ncdot.gov/business/.

2.9 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 are to submit those items to the Engineer for approval or disapproval no later than seven (7) calendar 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.

2.10 Authority of the Engineer

The Engineer for this contract shall be the Statewide Programs 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.

2.11 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.

2.12 Plan and 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 project's completion date as result of alterations will be determined by the Engineer.

2.13 Availability of Funds – Contract Termination

Payments on this contract are subject to allocation and appropriation of funds to the agency for the purposes set forth in the contract. If such funds are not appropriated or allocated, 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) calendar 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.

2.14 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 with Article of 108-6 of the Standard Specifications for Roads and Structures.

2.15 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 with Article 108-9 of the Standard Specifications for Roads and Structures.

2.16 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.

2.17 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.

2.18 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 the projects' completion date will be allowed for the above suspensions except as may be provided for in Article 108-10.

2.19 Liability Insurance

In accordance with 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. Prior to beginning services, all contractors shall provide proof of coverage issued by a workers' compensation insurance carrier, or a certificate of compliance issued by the Department of Insurance for self-insured subcontractors***,*** *irrespective of whether having regularly in service fewer than three employees*. 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 always 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.

2.20 Contract Payment a Performance Bond

Bonds 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 its 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) calendar 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.

2.21 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.

2.22 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 Tests Manual (ncdot.gov). However, the Engineer may reduce the frequency of sampling

and testing where he deems it appropriate for the project under construction. The Engineer may inspect or test any of the work product at any time. Delays incurred due to testing or inspection shall be considered incidental to the work.

The Contractor shall furnish the applicable certifications and documentation for all materials as required by the Section 106-3 of the Standard Specifications for Roads and Structures. Material which is not properly certified will not be accepted.

2.23 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 be competent in radio communications and safety on an active airport; shall meet the Division of Aviation's safety requirements, and 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. The individual shall be an employee of the Contractor unless otherwise approved by the Engineer.

The Contractor may, at its 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.

2.24 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 monthly, or other interval as approved by the Engineer. The number 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:

Raj Kondapalli
rkondapalli@ncdot.gov

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

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

Telephone: (919) 814-0559
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.

2.25 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) calendar days after project completion, and prior to project final inspection. The failure of the Contractor to submit the claim(s) within thirty (30) calendar days shall be a bar to recovery.

2.26 Prompt Payment of Subcontractors and Suppliers

Contractors at all levels; prime, subcontractor, or second tier contractor, shall within seven (7) 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 (7) 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.

2.27 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.

2.28 Laws to be Observed

The Contractor shall be up to date on all Federal, State, and local laws, ordinances and regulations, and all orders and decrees of bodies or tribunals having any jurisdiction or authority which may in any manner affect those engaged or employed in the work or which in any way affect the conduct of the work. The Contractor shall always observe and comply with all such laws, ordinances, regulations, orders and decrees; and shall indemnify and hold harmless the Board of Transportation and the Department and their agents and employees from any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, by the Contractor or by its agents and employees. If during the course of the contract any such laws, ordinances and regulations, and all orders and decrees may be changed, the Contractor shall comply fully with the same. The Standard Specifications for Roads and Structures (SSRS) § 101, p 1-4 has the definition of Board of Transportation.

2.29 Gifts from Vendors and Contractors

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.

Nondiscrimination: The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, national origin, Limited English proficiency, income level, sex, sexual orientation, gender identity, age, or disability (or religion, where applicable), in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

The Contractor shall comply with all Federal, State, and local regulations when performing building removal, asbestos removal and disposal, or underground storage tank removal and disposal. Any fines resulting from violations of any regulation are the sole responsibility of the Contractor and the Contractor agrees to indemnify and hold harmless the Board and the Department and their agents and employees against any assessment of such fines.

2.30 Outsourcing Outside the USA

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.

2.31 Domestic Steel and Iron Products (Buy America)

All steel and iron products that 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 material cost of the items involved does not exceed 0.1% of the total amount bid for the entire project or $2,500, whichever is greater. If invoices showing the cost of the material are not provided, the amount of the bid item involving the foreign material will be used for calculations. This minimal amount of foreign produced steel and iron products permitted for use is not applicable to high strength fasteners. Domestically produced high strength fasteners are required.

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, shall occur in the United States.

Before each steel or iron product is incorporated into any project or included for partial payment in a monthly estimate, the Contractor shall furnish the Engineer a notarized certification certifying that the product conforms to the above. 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 any 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 any 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.

2.32 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.

2.33 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 for Roads and Structures. Silt fence and erosion control measures shall be installed in accordance with Section 1605 of the Standard Specifications for Roads and Structures and in locations directed by the Engineer or his representative.

2.34 NCDOT General Seed Specification for Seed Quality

Seed shall be sampled and tested by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory at link: https://www.ncagr.gov/nc-seed-lab. 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 out 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	Japanese Millet
Crownvetch	Reed Canary Grass
Pensacola Bahiagrass	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

2.35 Plant and Pest Quarantines (Imported Fire Ant, Gypsy Moth, Witchweed, and Other Noxious Weeds)

2.35.1 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.

2.35.2 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.

2.35.3 Contact

Contact the N.C. Department of Agriculture/United States Department of Agriculture at 1-800-206-9333, or www.ncagr.gov/plantindustry/ 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.

2.35.4 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 grabbing 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, emerald ash borer, or other noxious weeds.

2.36 Work Zone Safety and Traffic Control

In accordance with Article 107-21 of the Standard Specifications for Roads and Structures, 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, the current edition of the Manual of Uniform Traffic Control Devices (MUTCD), and the current edition of FAA AC 150/5370-2G *Operational Safety on Airports During Construction* (12/13/2017).

2.37 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) calendar 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. NOTAM is the acronym for Notice to Air Missions.

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 Engineer, or his authorized representative 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 on page 153) 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 must be closed for work under 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 150/5340-1M (12/23/2020), 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 always remain open except for time when work is required at intersection of the two runways.

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

All equipment, tools, machinery, incidentals, implements, and other devices used in the execution of this contract shall be always safe and in good working condition, 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 150/5370-2G.

The Contractor shall coordinate ingress-egress requirements with the Engineer or his authorized representative. The Contractor shall be responsible for securing all gates at the end of each day's operations.

The Contractor shall fully always comply with FAA Advisory Circular 150/5370-2, "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., daily, 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, industrial blower, or vacuum truck available on site whenever crack routing or other maintenance activities generate appreciable foreign object debris (FOD). Vacuum trucks are highly recommended, but not required, on all work near buildings, hangars, and aircraft to prevent damage from flying debris. Other methods of cleaning may be used if approved by the Engineer.

Employees, 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 details on page 153).

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 always conduct his operations so 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 sub article 108-7(B) of the Standard Specifications for Roads and Structures.

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

2.38 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
Veterans' Day
Thanksgiving
Christmas

2.39 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 perform contract operations safely and effectively.

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 for Roads and Structures and the current edition of FAA AC 150/5370-2G *Operational Safety on Airports During Construction*.

2.40 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.

2.41 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.

2.42 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 (See FAA Master Order Form 5010).

2.43 Minority Business Enterprise and Women Business Enterprise (Divisions)

2.43.1 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.

2.43.2 Definitions

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

Combined MBE/WBE Goal: A portion of the total contract, expressed as a percentage that is to be performed by committed MBE/WBE subcontractors.

Committed MBE/WBE Subcontractor - Any MBE/WBE submitted at the time of bid that is being used to meet the Combined MBE / 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 Goal Requirement - The approved participation at time of award, but not greater than the advertised Combined MBE/WBE contract goal.

Goal Confirmation Letter - Written documentation from the Department to the bidder confirming the Contractor's approved, committed 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 Participation (Anticipated) - A portion of the total contract, expressed as a percentage that is anticipated 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.

Replacement / Substitution – A full or partial reduction in the amount of work subcontracted to a committed (or an approved substitute) MBE/WBE firm.

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 Participation (Anticipated) - A portion of the total contract, expressed as a percentage that is anticipated 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.

2.43.3 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.
https://connect.ncdot.gov/business/Turnpike/Documents/Form%20DBE-IS%20Subcontractor%20Payment%20Information.pdf

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

SAF *Subcontract Approval Form* - Form required for approval to sublet the contract.
https://connect.ncdot.gov/search/Pages/results.aspx?k=subcontractor%20approval%20form

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 estimated amount (based on quantities and unit prices) 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 the Combined MBE/WBE goal.
http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/09%20M

BE-WBE%20Subcontractors%20(State).docx

Subcontractor Quote Comparison Sheet - Spreadsheet 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

2.43.4 Combined MBE/WBE Goal

The Combined MBE/WBE Goal for this project is **0.0 %**

The Combined Goal was established utilizing the following anticipated participation for Minority Business Enterprises and Women Business Enterprises:

(A) Minority Business Enterprises **0.0 %**

(1) *If the anticipated MBE participation 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.

(2) *If the anticipated MBE participation is zero*, the Contractor shall make every 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 **0.0 %**

(1) *If the anticipated WBE participation 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.

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

The Bidder is required to submit only participation to meet the Combined MBE/WBE Goal. The Combined Goal may be met by submitting all MBE participation, all WBE participation, or a combination of MBE and WBE participation.

2.43.5 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 Combined MBE / WBE goal. The Directory can be found at the following link.

https://www.ebs.nc.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.

2.43.6 Listing of MBE/WBE Subcontractors

At the time of bid, bidders shall submit all MBE and WBE participation that they anticipate using during the life of the contract. Only those identified to meet the Combined MBE/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 above the goal will follow the banking guidelines found elsewhere in this provision. All other additional MBE/WBE subcontractor participation submitted at the time of bid will be used toward the Department's 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) Electronic Bids

Bidders shall submit a listing of MBE and WBE participation in the appropriate section of Expedite, the bidding software of Bid Express®.

(1) Submit the names and addresses of MBE and WBE firms identified to participate in the contract. If the bidder uses the updated listing of MBE and WBE firms shown in Expedite, the bidder may use the dropdown menu to access the name and address of the firms.

(2) Submit the contract line numbers of work to be performed by each MBE and WBE firm. When no figures or firms are entered, the bidder will be considered to have no MBE or WBE participation.

(3) The bidder shall be responsible for ensuring that the MBE and WBE are 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 Combined MBE/WBE goal.

(B) Paper Bids

(1) *If the Combined MBE/ WBE goal is more than zero,*

(a) 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 for the bid to be considered responsive. Bidders shall indicate the total dollar value of the MBE and WBE participation for the contract.

(b) 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. **Blank forms will not be deemed to represent zero participation.** 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.

(c) 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 Combined MBE/WBE goal.

(2) *If the Combined MBE/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.

2.43.7 MBE or WBE Prime Contractor

When a certified MBE or WBE firm bids on a contract that contains a Combined MBE/WBE Goal, the firm is responsible for meeting the goal or making good faith efforts to meet the goal, just like any other bidder. In most cases, a MBE or WBE bidder on a contract will meet the Combined MBE/WBE goal 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, to receive credit toward the goals.

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.

2.43.8 Written Documentation – Letter of Intent

The bidder shall submit written documentation for each MBE/WBE that will be used to meet the Combined MBE/WBE goal 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*.

LETTER OF INTENT TO PERFORM AS A SUBCONTRACTOR (ncdot.gov)

The documentation shall be received in the office of the Engineer no later than 2:00 p.m. of the fifth calendar day following opening of bids, unless the fifth 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 10:00 a.m. 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 Combined MBE/WBE goal, or if the form is incomplete (i.e. both signatures are not present), the MBE/WBE participation will not count toward meeting the Combined MBE/WBE goal. If the lack of this participation drops the commitment below the Combined MBE/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 2:00 p.m. 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 10:00 a.m. on the next official state business day.

2.43.9 Banking MBE/WBE Credit

If the committed MBE/WBE participation submitted exceeds the algebraic sum of the Combined MBE/WBE goal by $1,000 or more, the excess will be placed on deposit by the Department for future use by the bidder. Separate accounts will be maintained for MBE and WBE participation and these may accumulate for a period not to exceed 24 months.

When the apparent lowest responsive bidder fails to submit sufficient participation by MBE and WBE firms to meet the advertised goal, as part of the good faith effort, the Department will consider allowing the bidder to withdraw funds to meet the Combined MBE/WBE goal if there are adequate funds available from the bidder's MBE and WBE bank accounts.

2.43.10 Submission of Good Faith Effort

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

One complete set and **one (1)** copy of this information shall be received in the office of the Engineer no later than 2:00 p.m. of the fifth calendar day following opening of bids, unless the fifth 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 10:00 a.m. 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.

2.43.11 Consideration of Good Faith Effort for Projects with a Combined MBE/WBE Goal 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 that are also prequalified subcontractors. The bidder must solicit this interest within at least ten (10) calendar 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 to increase the likelihood that the Combined MBE/WBE goal 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 advertised goal when the work to be sublet includes potential for MBE/WBE participation (2nd and 3rd tier subcontractors).

(C) Providing interested certified MBEs/WBEs that are also prequalified subcontractors 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) Negotiating in good faith with interested MBEs/WBEs.

(1) 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, 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 several factors in negotiating with subcontractors, including MBE/WBE subcontractors, and would take a firm's price and capabilities as well as the advertised goal 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 advertised goal, 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 aid in the recruitment and placement of MBEs/WBEs. Contact within seven (7) calendar days from the bid opening the Business Opportunity and Work Force Development Unit at BOWD@ncdot.gov 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 reasonably good faith efforts to meet the advertised 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 Combined MBE/WBE goal.

(2) The bidders' past performance in meeting the contract goal.

(3) The performance of other bidders in meeting the advertised goal. For example, when the apparent successful bidder fails to meet the goal, but others meet it, you may reasonably raise the question of whether, with additional reasonable efforts, the apparent successful bidder could have met the goal. If the apparent successful bidder fails to meet the advertised goal 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 the Department that the Combined MBE/WBE goal can be met or that an adequate good faith effort has been made to meet the advertised goal.

2.43.12 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 two (2) business days of notification of the determination of non-good faith.

2.43.13 Counting MBE/WBE Participation Toward Meeting the Combined MBE/WBE Goal

(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)

An MBE/WBE may enter into subcontracts. Work that an MBE subcontracts to another MBE firm may be counted toward the anticipated MBE participation. The same holds for work that a WBE subcontracts to another WBE firm. Work that an MBE/WBE subcontracts to a non-MBE/WBE firm does not count toward the contract goal requirement. 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 MBE or WBE participation breakdown. 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 firms and there is no interest or availability, and they can get assistance from other certified firms, the Engineer will not hold the prime responsible for meeting the individual MBE or WBE breakdown. 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.

(D) Joint Venture

When an 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 /WBE requirement 60 percent of its expenditures for materials and supplies required to complete the contract and obtained

from an MBE or WBE regular dealer and 100 percent of such expenditures from an MBE or WBE manufacturer.

(F) Manufacturers and Regular Dealers

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

(1) The fees or commissions charged by an 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.

2.43.14 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 an 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. If it is determined that an MBE or WBE is not performing a Commercially Useful Function, the contractor may present evidence to rebut this presumption to the Department.

(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 Combined MBE/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 an 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), to fulfill the participation breakdown. 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 responsible for meeting the individual MBE or WBE participation breakdown.

(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 because 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) An MBE/WBE may lease truck(s) from an established equipment leasing business open to the 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.

2.43.15 MBE/WBE Replacement

When a Contractor has relied on a commitment to an 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. An MBE/WBE may only be terminated after receiving the Engineer's written approval based upon a finding of good cause for the proposed termination. The prime contractor must give the MBE/WBE firm five (5) calendar days to respond to the prime contractor's notice of intent to terminate and advise the prime contractor and the Department of the reasons, if any, why the firm objects to the proposed termination of its subcontract and why the Department should not approve the action.

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/WBE is terminated for good cause as stated above, an additional MBE/WBE that was submitted at the time of bid may be used to fulfill the MBE/WBE commitment to meet the Combined MBE/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 sub bids 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 Combined 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).

2.43.16 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 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 an MBE/WBE, the Contractor shall seek

additional participation by MBEs/WBEs equal to the reduced MBE/WBE participation caused by the changes.

2.43.17 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 an 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.

2.43.18 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 through the Department's DBE Payment Tracking System.

2.43.19 Failure to Meet Contract Requirements

Failure to meet contract requirements in accordance with Sub article 102-15(J) of the Standard Specifications for Roads and Structures may be cause to disqualify the Contractor.

2.44 Erosion and Sediment Control/Stormwater Certification

2.44.1 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 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, ensure 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.

2.44.2 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 it 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 seven (7) calendar days and within 24 hours after a rainfall event of 0.5 inch that occurs within a 24- hour period. Additional monitoring may be required at the discretion of Division of Water Resources personnel if the receiving stream is 303(d) listed for turbidity and the project has had documented problems managing turbidity.

(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 always make records available 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.

2.44.3 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 two (2) days of change.

2.44.4 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.

2.44.5 Revocation or Suspension of Certification

Upon recommendation of the Chief 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 Chief 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 Chief Engineer within 10 calendar days after receiving notice of the proposed adverse action.

Chief Engineer
1536 Mail Service Center
Raleigh, NC 27699-1536

Failure to appeal within ten (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 Chief Engineer will hear the appeal and decide within seven (7) days of hearing the appeal. Decision of the Chief 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.

2.44.6 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.

2.45 Communication Plan

The purpose of this plan is to ensure effective communication between the Contractor, the Airport, the Department of Aviation (DOA) Representative, and the Engineer. Except for imminent emergency, all coordination for a project must go through the Engineer or the DOA Representative. The DOA Representative will be identified at the Pre-Construction Meeting. It is the responsibility of the contractor to communicate its work plan with the Engineer or DOA Representative. The Engineer will then communicate that plan to the Airport.

The Airport is not to confront the contractor except in the case of imminent danger to person or property at the Airport. The Airport is to make all communication through the Engineer or DOA Representative on site.

3. Special Provisions

3.1 Mobilization

3.1.1 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.

3.1.2 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.

3.1.3 Production Time

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

3.1.4 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 Raised Pavement Markers..... Ea.”
“Mobilization for Pipe Joint Sealing Backgrouting and Soil Stabilization..... Ea.”
“Mobilization for Concrete Pavement Leveling and Undersealing..... 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."
"Mobilization for Emulsified Asphalt Seal Coat ..... Ea."

3.2 Hot-applied Crack and Joint Sealing for Concrete and Asphalt Pavements

3.2.1 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.

3.2.2 References

FAA AC 150/5380-6B, Appendix B, Item M-361
ASTM D6690-21
CRAFCO Asphalt Rubber Plus Product Data Sheet (latest version)
CRAFCO Poly-Fiber Type 4 Product Data Sheet (latest version)
CRAFCO Roadsaver 211 Product Data Sheet (September 2016)

3.2.3 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 1 Limits:

Table 1 – Type A Material Properties

Test	ASTM D6690, Type I Limits
Cone Penetration	90 max.
Flow, 140°F (60°C), 5 h	5 mm max.
Softening Point	176°F (80°C) min.
Bond, 0°F (-18°C), 50% ext.	Pass 5 cycles
Minimum Application Temperature	380°F (193°C)
Maximum Heating Temperature	400°F (204°C)

Table 2 – Type A Material Composition

Composition	Requirement
Recycled Rubber Content (by asphaltic components)	18% min.
Recycled Rubber Gradation, % passing No. 8 sieve	100%
Unit weight @ 60°F (15.5°C)	10 lb./gal. Max.

The above specifications are those of CRAFCO product "Asphalt Rubber Plus" dated December 2022**.** 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 +/- 1 % by weight polyester fibers blended with high quality modified asphalt cement.

Table 3 – Type B Fiber Properties

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	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 Compatibility (ASTM D5329)	Pass

The above specifications are those of CRAFCO product "Poly-Fiber Type 4" dated October 2021. 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:

Table 5 – Type C Material Properties

Test	ASTM D6690, Type I Limits
Cone Penetration	90 max.
Softening Point	176°F (80°C)
Bond, 0°F (-18°C), 50% ext.	Pass 5 cycles
Asphalt Compatibility	Pass
Minimum Application Temperature	380°F (193°C)
Maximum Heating Temperature	400°F (204°C)

The above specifications are those of CRAFCO product "Roadsaver 211" dated September 2016. 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. 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.

3.2.4 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 always maintained in a satisfactory working condition.

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 agitate the sealant vigorously and continuously. 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 more than 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.

3.2.5 Weather Limitations

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.

3.2.6 Construction Methods

Herbicide/Soil Sterilant

A minimum of ten (10) calendar days and a maximum of thirty (30) calendar 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 than 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. Cracks in grooved pavements shall be routed deeper to allow a 1:1 width to depth ratio below the bottom of the adjacent grooves.

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. In grooved pavements, the sealant material shall be level with the bottom of the adjacent groves. Application shall be neat and free from material drips, tool marks, and spills. 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.

3.2.7 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.

3.2.8 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.

3.2.9 Basis of Payment

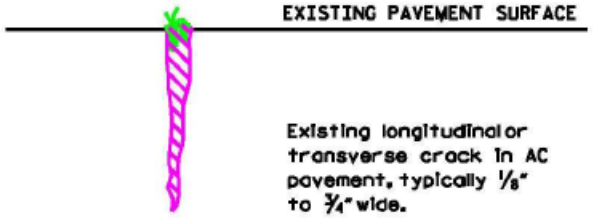
The quantity of sealant material, measured as above, will be paid for at the contract unit price per pound. The above price and payment will be full compensation for all work required to seal

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:

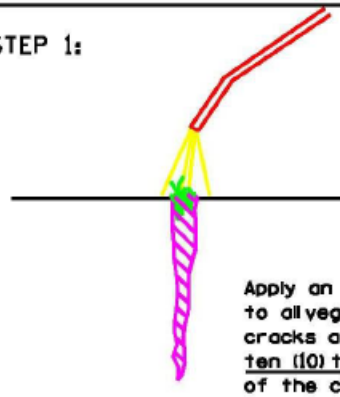
“Hot–Applied Asphalt Crack and Joint Sealing.....Pounds”
“Hot-Applied Concrete Crack and Joint Sealing.....Pounds”

PAVEMENT CRACK AND JOINT SEALING PROCEDURE



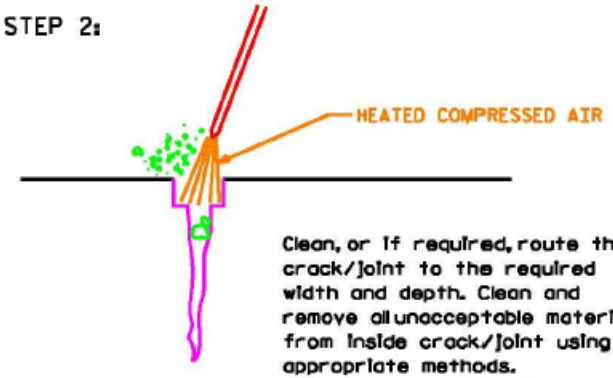
Existing longitudinal or transverse crack in AC pavement, typically ⅛" to ¾" wide.

STEP 1:



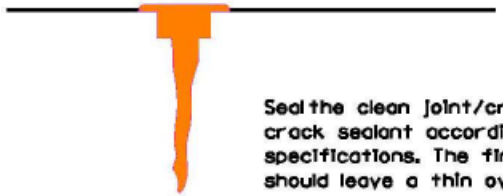
Apply an approved soil sterilant/herbicide to all vegetation growing in the cracks and joints to be sealed ten (10) to thirty (30) days in advance of the cleaning and sealing operation.

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

3.3 Full Depth Asphalt Pavement Patching

3.3.1 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.

3.3.2 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, B25.0B, and the asphalt concrete surface course shall be Superpave S9.5B mix.

3.3.3 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.

3.3.4 Weather Limitations

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.

3.3.5 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 – Removal of Existing Pavement of the Standard Specifications for Roads and Structures.

All asphalt patching shall be constructed in accordance with Section 654 of the Standard Specifications for Roads and Structures. Asphalt concrete base course, Superpave B25.0B, shall be placed in lifts not less than 3 inches compacted and not to exceed 5.5 inches compacted. Asphalt concrete surface course, Superpave S9.5B, 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 Engineer's representative 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.

3.3.6 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.

3.3.7 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.

3.3.8 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"

3.4 Flexible Repair of Concrete and Asphalt Pavement

3.4.1 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.

3.4.2 References

Fibrecrete Preservation Technologies SAMIscreed Product Data Sheet (January 2017)
Fibrecrete Preservation Technologies Fibrecrete “G” Product Data Sheet (April 2017)

3.4.3 Materials

Table 1 – SAMIscreed Material Properties

Binder Properties	Test Method	Requirement
Binder	ASTM 5078	Pass all requirements
Tensile Strain	FTL 548-C	25% minimum @2”/minute
Cone Flow	FTL 549-C	15% Maximum
Aggregate Settlement	FTL 551-C	10% Maximum
Flexibility / Mandrel	FTL 550-C	Good or Better (no tearing at bend point)
Resilience	FTL 547-C	35% Recovery
Recommended Application Temp.		350°F-380°F
Specific Gravity		1.7-2.0

The specifications in Table 1 are those of SAMIscreed. SAMIscreed is a hot applied, pourable, aggregate filled, polymer modified mastic for concrete and asphalt pavements. It is used for large cracks (> 1"), cold joints, and asphalt overlayed joints that are cracking. It is also an effective repair for spalls and potholes in asphalt and concrete when used with bulking aggregates. It is a hot applied polymer modified mastic asphalt binder that is factory blended with graded fillers, steel fibers, granite aggregates and recycled tire rubber.

Table 2 – Fibrecrete "G" Material Properties

Binder Properties	Test Method	Requirement
Color		Grey
Tensile Strain	FTL 548-C	20% and 50 psi minimum
Cone Flow	FTL 549-C	4% maximum
Aggregate Settlement	FTL 551-C	3mm maximum
Flexibility / Mandrel	FTL 550-C	Good or Better (no tearing at bend point)
Resilience	FTL 547-C	50% minimum
Recommended Application Temp.		300°F-380°F
Specific Gravity		1.8-2.0

The specifications in Table 2 are those of Fibrecrete "G". Fibrecrete "G" is a flexible repair for joint/ large cracks, spalls and potholes in concrete. It is a hot-applied, synthetic polymer modified resin compound containing mineral fillers, chopped fibers, and graded aggregates.

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 day's application.

3.4.4 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.

3.4.5 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.

3.4.6 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.

3.4.7 Construction Methods

Surface Preparation

The joint/crack, spall or pothole will be saw-cut/milled or jack hammered to the specified width and depth at the Engineers discretion. The joint/crack, spall, or pothole `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

A. Asphalt. The 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 320°F, the molten 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 asphalt repair material until within ¾" of the top of the repair. The final ¾" of the repair will be an asphalt repair material for optimum flexibility of the repair. Once this top layer has been screeded to a level grade, a high PSV (polished stone value) topping aggregate will be applied to the top of the repair to ensure proper skid resistance. The asphalt repair material shall be ready for traffic within 1 hour.

B. Concrete. The concrete repair material will be heated in a thermostatically controlled mixer, having a horizontal agitator that ensures complete mixing. Once the material has reached approximately 320°F, the molten repair material will be introduced into the prepared repair, sealing the bottom of the repair from water intrusion. The remainder of the repair process will consist of layering coarse hot angular aggregate (cleaned and dried) with the molten repair material until within ½" of the top of the repair. The final ½" of the repair will be a concrete repair material for optimum flexibility of the repair. Once this top layer has been screeded to a level grade, a high PSV aggregate will be applied to the top of the repair to ensure proper skid resistance. The concrete 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.

3.4.8 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.

3.4.9 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.

3.4.10 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:

"Flexible Repair of Asphalt Pavement.....Pounds"
"Flexible Repair of Concrete Pavement .....Pounds"

3.5 Rigid Repair of Concrete Pavement

3.5.1 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.

3.5.2 References

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

3.5.3 Materials

The repair method and material will be of the type specified below for the appropriate application, outlined in Table 1, below, or 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

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.

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 seven (7) calendar days when tested in accordance with ASTM C 39. Bond strength will be 2,000 psi in seven (7) calendar 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.

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 seven (7) days when tested in accordance with ASTM C 39. Bond strength will be 2,000 psi in seven (7) calendar 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.

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 one (1) calendar day when tested in accordance with ASTM C 109. Bond strength will be 2,000 psi in seven (7) calendar 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.

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.

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.

3.5.4 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. 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.

3.5.5 Construction Methods

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 be 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.

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 the Corner Breaks/Shattered Slabs/Blowups paragraph above. 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.

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 the Corner Breaks/Shattered Slabs/Blowups paragraph above.

Joint Spalling and Corner Spalling

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.

Patching, Small (less than 5 square feet)

Patching repairs can be made using the technique noted in the Joint Spalling and Corner Spalling paragraph above. For full-depth repairs, follow technique noted in the Patching, Large or Utility Cut paragraph below.

Patching, Large or Utility Cut

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 (4) and (5) in the Corner Breaks/Shattered Slabs/Blowups paragraph above 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.

3.5.6 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.

3.5.7 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.

3.5.8 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"

3.5.9 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

3.5.10 Material Requirements

ASTM C 33 Standard Specification for Concrete Aggregates

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

3.6 Silicone Joint and Crack Sealing for Concrete and Asphalt pavements

3.6.1 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.

3.6.2 References

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

3.6.3 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 always readily available by the Contractor onsite, 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 always readily available by the Contractor onsite, 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

3.6.4 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.

3.6.5 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.

3.6.6 Weather Limitations

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.

3.6.7 Construction Methods

Herbicide/Soil Sterilant Application

A minimum of ten (10) calendar days and a maximum of thirty (30) calendar 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 sewing, 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.

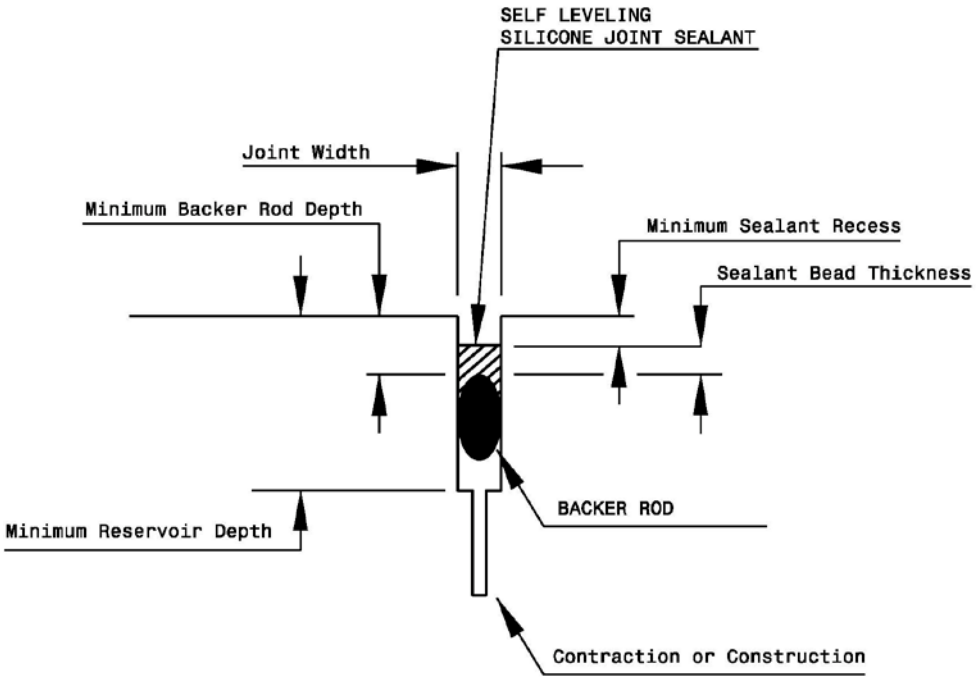
The backer rod material or bond breaker shall be installed per sealant manufacturer and Engineer requirements in the bottom of the joint /crack to be filled to control the depth of the sealant, to achieve the desired shape factor, and to support the sealant against indentation and sag.

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 1/4	1/2	172
1/2	5/16	5/8	1/4	1 1/2	5/8	130
5/8	5/16	3/4	5/16	1 3/4	11/16	82
3/4	3/8	7/8	3/8	1 7/8	3/4	58
7/8	3/8	1	7/16	2	13/16	41
1	3/8	1 1/4	1/2	2 3/8	7/8	31
1 1/8	1/2	1 1/2	1/2	2 5/8	1	27
1 1/4	1/2	1 1/2	1/2	2 7/8	1	22
1 3/8	1/2	1 3/4	1/2	3 1/8	1	20
1 1/2	1/2	2	1/2	3 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.

3.6.8 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.

3.6.9 Method of Measurement

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

3.6.10 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, delivery, 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, ⅜" – ⅝" ..... Linear Feet"
"Silicone Joint and Crack Sealing, ¾" – 1 ½" ..... Linear Feet"

3.7 Asphalt Rejuvenation

3.7.1 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.

3.7.2 References

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

3.7.3 Material

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 (below) 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 D2171
2a	Complex Modulus 60°C, G*	≥ 25% Decrease *	AASHTO T315
2b	Viscosity 60°C, η = G* / ώ Pa·s	≥ 25% Decrease *	AASHTO T315
2c	Phase Angle 60°C, δ, °	Report	AASHTO T315

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 D2171
2a	Complex Modulus 60°C, G*	≥ 40% Decrease *	AASHTO T315
2b	Viscosity 60°C, η = G* / ώ Pa·s	≥ 40% Decrease *	AASHTO T315
2c	Phase Angle 60°C, δ, °	Report	AASHTO T315

* 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 D1856 (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.

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 dry-cool, and contain data specified in 3.7.3.C above.

B. Friction Characteristics. Friction characteristics. For projects where rejuvenation product(s) are applied on runway and taxiway surfaces, the Contractor shall submit to the Engineer friction tests, from previous airport projects which used the rejuvenation product in a similar environment, in accordance with AC 150/5320-12, at 40 mph (65 km/h) wet, showing, as a minimum; friction value of pavement surface prior to sealant application; two values, tested between 24 and 96 hours after application, with a minimum of 24 hours between tests; and one value tested at no less than 180 days or greater than 360 days after the application. The results of the two tests between 24 and 96 hours shall indicate friction is increasing at a rate to obtain similar friction value of the pavement surface prior to application, and the long term test shall indicate no apparent adverse effect with time relative to friction values and existing pavement surface. The Contractor shall submit to the Engineer a list of airports which meet the above requirements, as well as technical details on application rates, aggregate rates, and point of contact at these airports to confirm use and success of sealer. Friction tests shall be submitted from no less than one of the airports on the list and each set of tests described above must be from one project. Rejuvenation product submittal without the required friction performance will not be approved. Friction tests performed on this project cannot be used as a substitute for this requirement.

C. Health, Safety, and Environment. The Contractor must provide a complete Material Safety Data Sheet (MSDS) in accordance with U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Regulations (Standards – 29 CFR), 1910.1200 which establishes the requirement and minimum information for the MSDS for hazardous materials. The MSDS, Section II, shall include the Chemical Abstracts Service (CAS) registry numbers for all applicable hazardous ingredients in the rejuvenation product. The Contractor must provide the manufacturer's certification that the rejuvenation product complies with the Code of Federal Regulation (CFR) 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.

3.7.4 Application Rate

Test Sections

Prior to full application, the Contractor must place a series of test sections (minimum one square yard (0.8 sq m)) 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, for example, 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 paragraph 3.7.7 "Field Sampling Procedures". 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 3.7.3 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.

Approval

The Contractor and the Engineer shall examine the test sections 24 hours after treatment to determine if the entire rejuvenation product has penetrated 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 3.7.4 "Test Sections."

3.7.5 Construction

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.

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.

During application, account for wind drift. Cover existing buildings, structures, runway edge lights, taxiway edge lights, informational signs, retro-reflective marking, and in-pavement duct markers as necessary to protect against overspray before applying the rejuvenation product. Should the rejuvenation product get on any light or marker fixture, promptly clean the fixture. If cleaning is not satisfactory to the Engineer, the Contractor shall replace any light, sign, or marker with equivalent equipment at no cost to the Owner.

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.

Preparation of asphalt pavement surfaces

Clean pavement surface immediately prior to placing the 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. 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. Any additional surface preparation, such as crack repair, shall be in accordance with paragraph 101-3.6 in AC 150/5370-10G.

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 D2995.

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

Other rejuvenation product application procedures include:

1. 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.

2. 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.

3. 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.'

4. 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 the pavement to achieve the required properties of the treated binder.

5. 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 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 3.7.3.

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 3.7.7 "Skid Resistance".

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.

3.7.6 Quality Control

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 ten (10) workdays prior to placement of the test sections. The cost of the manufacturer's representative will be included in the bid price.

Quality Control Plan

The contractor must submit a quality control plan to the engineer a minimum of ten (10) calendar days prior to applying test sections in accordance with paragraph 3.7.4 "Test Sections". 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.

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 paragraph 3.7.7 "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.

3.7.7 Rejuvenation Acceptance

Product Sampling

The Engineer will take samples of the rejuvenation product proposed for use upon delivery of each shipment in accordance with ASTM D140 and store in accordance with MSDS, Section VII for a period of at least six months after payment in accordance with paragraph 3.7.9 "Basis of Payment". Testing, as necessary, will be accomplished by the Engineer to verify information provided by the MSDS information.

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.

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 of the untreated pavement must be taken before the rejuvenation product is placed and three (3) cores or equivalent surface area samples of the treated pavement after application of the rejuvenation product must be taken. The before and after cores must be taken in the same general area, at a minimum within the same paving lane and within one foot (30 cm) 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 thirty to forty-five (30-45) calendar 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 3.7.3 "Material", 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 D3665 provided requirements of paragraph 3.7.7A “Field Sampling Procedures” 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.

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.

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 D2172, Method A (centrifuge) with toluene, and recovered according to ASTM D1856 (Abson Method) or ASTM D5404 (Roto-Vap Method).

   1. Viscosity of the bituminous material must be measured in accordance with ASTM D2171. 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)

   2. 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)

   3. 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.

Skid Resistance

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

A. For Runway 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 3.7.5 "Cure Time Remedial Option – Application of Sand" to the satisfaction of the Engineer Otherwise, the provisions of 3.7.7 "Skid Resistance" Paragraph A, above, may be directed by the engineer.

3.7.8 Method of Measurement

Asphalt Crack Preparation and Seal

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

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.

3.7.9 Basis of Payment

Payment

Payment for accepted rejuvenation product will be made at the contract unit price per square yard for bituminous rejuvenation adjusted according to paragraph 3.7.9A "Basis of Adjusted Payment". 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 below.

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 thirty to forty-five (30-45) calendar 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"

3.7.10 Testing Requirements

ASTM D140 Standard Practice for Sampling Bituminous Materials.

ASTM D1856 Standard Test Method for Recovery of Asphalt from Solution by Abson Method.

ASTM D2171 Standard Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer.

ASTM D2172 Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.

ASTM D2995 Standard Practice for Estimating Application Rate of Bituminous Distributors.

ASTM D3549 Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.

ASTM D3665 Standard Practice for Random Sampling of Construction Materials.

ASTM D5340 Standard Test Method for Airport Pavement Condition Index Surveys.

ASTM D5404 Standard Practice for Recovery of Asphalt from Solution Using the Rotary Evaporator.

AASHTO T315 Standard Method of Test for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR).

AC 150/5320-12 Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces

AC 150/5380-6 Guidelines and Procedures for Maintenance of Airport Pavements

3.8 Runway Rubber Removal

3.8.1 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.

3.8.2 References

UFGS-32 01 11.52 (August 2008)
UFGS-32 01 11.51 Change 2 (November 2023)
) FAA AC 150/5320-12C

3.8.3 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.

3.8.4 Equipment

Mechanical rubber removal equipment includes waterblasting 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.

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.

3.8.5 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.

3.8.6 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 as determined by the Engineer or his authorized representative(s).

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 of at approved sites.

3.8.7 Compliance Testing

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.

3.8.8 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.

3.8.9 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 – Chemical..... Square Feet"

3.9 Airfield Marking

3.9.1 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.

3.9.2 References

FAA AC 150/5370-10G, Item P-620
FAA AC 150/5340-1L

3.9.3 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 _ for all marking material shipped to the airport for use on the project.
Material needing certification shall include waterborne paint with microbicide, and reflective media. 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 55 gallons or smaller 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), green (34108) 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.

3.9.4 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 overspray. 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.

3.9.5 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.

3.9.6 Construction methods

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 spacing 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 of **three (3) calendar 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) calendar** 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 or green 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 Surface Painted Holding Position Signs (SPHPS)

Surface Painted Holding Position Signs required special care during installation. When repainting surface painted holding position signs (SPHPS), the red paint shall dry for at least 24 hours before painting the white inscriptions. The drying time gives a better bond between the white inscription and the red background and helps prevent flaking of the marking.

Red paint shall be applied with motorized or walk-behind application equipment as standard for airfield markings. White inscriptions shall be painted with the use of stencils in accordance with

FAA AC 150/5340-1L Appendix A. Application of reflective media shall be completed using an attached dispenser in accordance with Table 2.

Table 2 - SPHPS Application Rates for Glass Beads

Paint Type	RED PAINT Glass Beads, Type I, Gradation A Pounds per gallon of paint-lb/gal	WHITE PAINT Glass Beads, Type III Pounds per gallon of paint-lb/gal
Waterborne Type I or II	5 lb/gal	10 lb/gal min

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.

3.9.7 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.

3.9.8 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.

3.9.9 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 for Surface Painted Hold Position Signs shall include all white and red paint needed to complete the marking.

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 (Surface Painted Hold Position Signs)..... Square Feet"

3.10 Pavement Marking Removal

3.10.1 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.

3.10.2 References

UFGS-32 01 11.51 (May 2016)

3.10.3 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.

3.10.4 Equipment

Mechanical pavement marking removal equipment includes waterblasting, grinding, 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.

Provide mobile waterblasting equipment capable of producing a pressurized stream of water that effectively removes rubber and paint from the pavement surface without significantly damaging the pavement. All equipment, tools, and machinery are to be always in good working order. Provide equipment interlocks to prohibit high pressure water discharge when the vehicle or cleaning head is stationary (not moving forward or side to side).

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 remove required markings thoroughly and uniformly 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.

Provide equipment capable of removing surface contaminates, paint build-up, or extraneous markings from the pavement surface without leaving any residue. If a weed torch is used to remove paint, the surface must be cleaned by hydro blast afterwards to remove surface contaminates and ash.

3.10.5 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.

3.10.6 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 its 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 because 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.

3.10.7 Compliance Testing

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.

3.10.8 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.

3.10.9 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"

3.11 Raised Pavement Markers

3.11.1 Description

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

3.11.2 References

In addition to the specific requirements herein modified, sections 1250 and 1251 of the Standard Specifications for Roads and Structures are by reference incorporated into this specification.

3.11.3 Materials

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

Item	Section
Permanent Raised Pavement Markers	1086-2

3.11.4 Construction Methods

Install **permanent** raised pavement markers using a hot bitumen adhesive in accordance with Article 1081-3 of the Standard Specifications for Roads and Structures.

3.11.5 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.

2.11.6 Method of Measurement

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

2.11.7 Basis of Payment

Payment will be made under:
"Permanent Raised Pavement Markers`..... Each"

3.12 Pipe Joint Sealing, Pipeline Backgrouting and Soil Stabilization with Moisture-Activated Polyurethane Foam

3.12.1 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.

3.12.2 References

Prime Resins Prime Flex900 XLV Technical Data Sheet (June 2021)

Prime Resins Prime Flex 920 Technical Data Sheet (January 2023)
Prime Resins Prime Kat Catalyst Technical Data Sheet (October 2016)

3.12.3 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.

3.12.4 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 above specifications are those of Prime Resins product "Prime Flex900 XLV" dated October 2016. 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.

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 2 – Material Properties

Tensile Strength, ASTM D1623	Shrinkage, ASTM D1042/ D756
41 psi	None
Tensile Elongation, ASTM D1623	**Compressive Strength, ASTM D695**
3.4%	1027 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:

Table 3- Catalyst Reaction Times

Kat to 920 Mix Ratio	Kat to 920 Mix Quantities	Initial Reaction Time	Set Time	Unconfined 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

The above specifications are those of Prime Resins products "Prime Flex 920" dated January 2017 and "Prime Kat Catalyst" dated October 2016. 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.

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.

3.12.5 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 always maintained in a safe and satisfactory working condition.

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 colored, 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.

3.12.6 Weather Limitations

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

3.12.7 Construction Methods

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.

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.

3.12.8 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.

3.12.9 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.

3.12.10 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"

3.13 Concrete Pavement Leveling and Undersealing with High Density Polyurethane Foam

3.13.1 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.

3.13.2 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.

3.13.3 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.

3.13.4 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 always maintained in a safe and satisfactory working condition.

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.

3.13.5 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.

3.13.6 Construction Methods

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.

3.13.7 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.

3.13.8 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.

A. A conversion from pump counters to pounds will be provided with a manufacturer's certification of the accurate conversion factor.

B. Load cell(s) with printer(s) to verify weights before and after pumping with time date stamp, start weight, and end weight.

C. A visual measurement conversion on the actual totes/barrels of pounds per inches pumped.

3.13.9 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"

3.14 Aircraft Tie Downs

3.14.1 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.

3.14.2 References

FAA Advisory Circular 20-35C

3.14.3 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	1.5	AN 1022	100% Stainless Steel anchor, with 1.5" ID Weldless Ring, with and without cover
2,000	13,500	22	1.5	AN 2022	100% Stainless Steel anchor, with 1.25" ID Weldless Ring, with and without cover
5,000	40,500	24	6	AN 5000	100% Stainless Steel anchor, with 2.5" ID Weldless Ring, with and without cover

The above specifications are those of Anchor Manufacturing. 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.

The above specifications are those of Wound About Inc., Aircraft Rope. 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 section 1000-4 of 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 near the tie down locations and render the soil sterile for a period of 6 months or more. Safety Data Sheets for the herbicide/soil sterilant must be always readily available by the Contractor onsite, 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.

3.14.4 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.

3.14.5 Construction Methods

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.

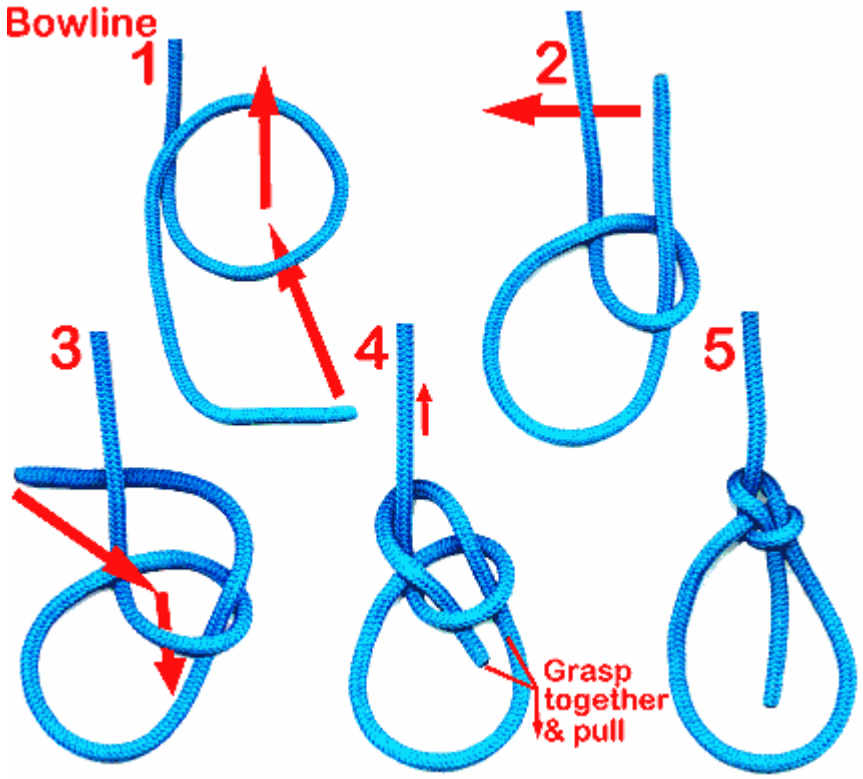
Prior to installation of new rope, all anchor eyelets shall be clean of vegetation, foreign material, debris, and shall easily accept the ½" diameter aircraft tie down ropes as specified in Table 1. The Contractor will be required to treat excessive vegetation growth around tied down locations with an 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) calendar days after initial set, or as directed by the Engineer. The Contractor shall protect the newly constructed aircraft by tying 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.

3.14.6 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.

3.14.7 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.

3.14.8 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"
"5,000 lb Aircraft Tie Down Anchor with Cover ..... Each"
"5,000 lb Aircraft Tie Down Anchor without Cover ..... Each"
"Aircraft Tie Down Rope ..... Each"
"Remove Failing Aircraft Anchor ..... Each"

3.15 Anchored Airfield Light Mats

3.15.1 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.

3.15.2 Materials

Airfield Light Matting

Table 1 – Airfield Light Matting Properties

Property		ASTM	Metric	English
Tensile Strength				
with grain, min.		D412	4.8 MPa	696.0 psi
across grain, min.		Die C	2.1 MPa	304.5 psi
Elongation (%)				
with grain, min.		D412	15	15
across grain, min.		Die C	40	40
Hardness, Shore A		D2240	75-85	75-85
Tear Resistance				
with grain, min.		D624	21 kN/m	119.7 pli
across grain, min.		Die B	44 kN/m	250.8 pli
Heat Aging	Tensile, % max.	D573	+/-25	
change in:	Elongation, % max.	70 hrs	+/-25	SAME
	Hardness, Pts max.	@ 70ºC	+ 10	
Ozone Resistance		80pphm		
Tear across grain, kN/m min.		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 postindustrial 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

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 sledgehammer. If anchor his concrete or impenetrable rock a hammer drill can be used to assist in setting the anchor. See Manufactures installation sheet.

The above specifications are those of Airfield Mat Systems, Inc. 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.

3.15.3 Weather Limitations

Do not install anchored airfield mats when ground temperature is below 40°F, water is present around the mat installation, or rain is imminent.

3.15.4 Construction Methods

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 condition 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 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 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 overlap 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 be 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 grated 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.

3.15.5 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.

3.15.6 Method of Measurement

Airfield Light Matting will be measured as the actual mats and anchors have been satisfactorily placed and accepted by the Engineer.

3.15.7 Basis of Payment

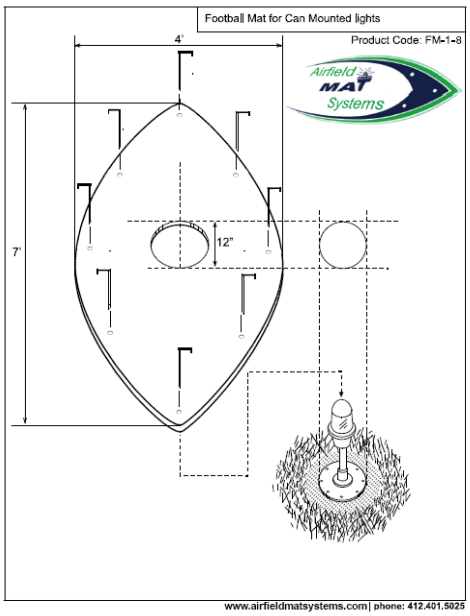
Payment will be made at the contract unit price per Each for airfield light matting installed in accordance with the Contract Documents. Payment for each item will be full compensation for furnishing all materials, preparation, and installation of mats, all labor, equipment, tools, and incidentals necessary to complete the work.

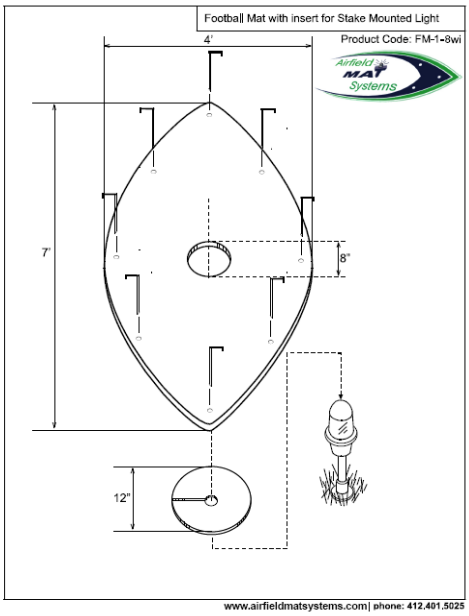
Payment will be made under:

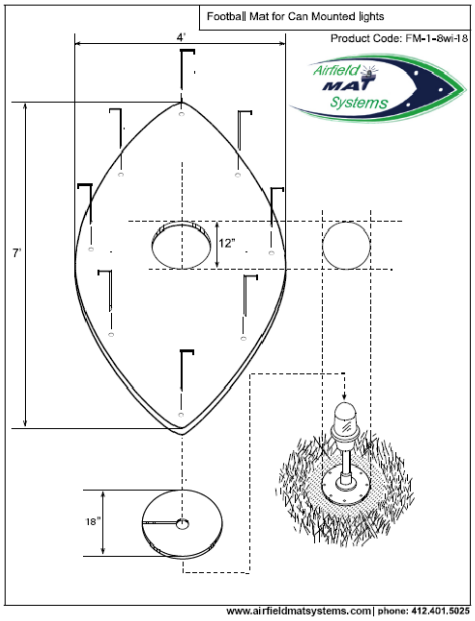
"Anchored Airfield Elliptical Light Mat with 12" Collar Insert..... Each"
"Anchored Airfield Elliptical Light Mat with 18" Collar Insert..... Each"
"Anchored Airfield Elliptical Light Mat without Collar Insert..... Each"
"Anchored Airfield 30' Strip Mat..... Each"
"Anchored Airfield 60' Strip Mat..... Each"

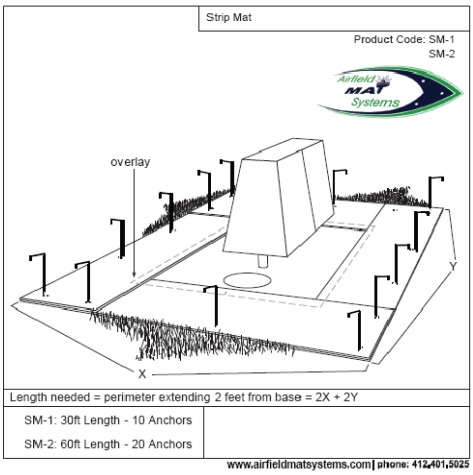
3.15.8 Example Manufacturer Installation Drawings

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

3.16 Pavement Marking and Surface Cleaning

3.16.1 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.

3.16.2 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.

3.16.3 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.

3.16.4 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.

3.16.5 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 its 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 because of cleaning operations shall be removed as the work progresses. Additional flushing and 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.

3.16.6 Compliance Testing

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.

3.16.7 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.

3.16.8 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"

3.17 Shoulder, Slope, and Eroded Section Reconstruction

3.17.1 Description

This item shall consist of reconstructing outside shoulders, slopes, and eroded sections to match existing typical sections, and upon completion, seeding and mulching.

3.17.2 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
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
Select Material shall be in accordance with section 1016, Class I, of the Standard Specifications for Roads and Structures.

3.17.3 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.

3.17.4 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.

3.17.5 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.

3.17.6 Method of Measurement

A. **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.

B. **Borrow Excavation** used on this project will be measured for payment by truck measurement as provided in Sub article 230-5 of the Standard Specifications for Roads and Structures.

C. **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.

D. **Seeding and Mulching** will be measured and paid for as shown elsewhere in the contract documents, which will be determined based on a project's eastern or western location.

3.17.7 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"

3.18 Seeding and Mulching

3.18.1 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.

3.18.2 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.

3.18.3 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. Cut and fill slopes 2:1 or steeper add 20# of Sericea Lespedeza from January 1 - December 31. Bahiagrass may 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
4000# Limestone

500# Fertilizer

Western Waste and Borrow Locations

March 1 – August 31

100# Tall Fescue
15# Kentucky Bluegrass
30# Hard Fescue
25# Rye Grain
500# Fertilizer
4000# Limestone

September 1 - February 28

100# Tall Fescue
15# Kentucky Bluegrass
30# Hard Fescue
10# German or Browntop Millet
500# Fertilizer
4000# Limestone

Eastern Waste and Borrow Locations

March 1 – August 31

75# Tall Fescue
25# Bermudagrass (hulled)
500# Fertilizer
4000# Limestone

September 1 - February 28

75# Tall Fescue
35# Bermudagrass (unhulled)
500# Fertilizer
4000# Limestone

Approved Tall Fescue Cultivars

2nd Millennium
Avenger
Barlexas
Barlexas II
Barrera
Barrington
Biltmore
Bingo
Bravo
Cayenne
Chapel Hill
Chesapeake
Constitution
Chipper
Coronado
Coyote
Davinci
Dynasty
Dominion
Duster
Endeavor
Escalade
Falcon II, III, IV & V
Fidelity
Finesse II
Firebird
Focus
Grande II
Greenkeeper
Greystone
Inferno
Justice
Jaguar 3
Kalahari
Kentucky 31
Kitty Hawk
Kitty Hawk 2000
Lexington
Magellan
Masterpiece
Matador
Matador GT
Millennium
Montauk
Mustang 3
Olympic Gold
Padre
Paraiso
Picasso
Piedmont
Pure Gold
Prospect
Quest
Rebel Exeda
Rebel Sentry
Regiment II
Rembrandt
Rendition
Scorpion
Shelby
Signia
Silverstar
Southern Choice II
Stetson
Tarheel
Titan Ltd
Titanium
Tomahawk
Tacer
Trooper
Turbo
Ultimate
Watchdog
Wolfpack

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 manufacturer's name, the net weight, and the specifications listed below.

Table 1 – Hydraulic Mulch 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.

3.18.4 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.

3.18.5 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 enough 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.

3.18.6 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.

3.18.7 Method 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.

3.18.8 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"

3.19 Refined Coal Tar Emulsion with Additives, Slurry Seal - Surface Treatment

3.19.1 Description

This item shall consist of 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.

3.19.2 References

FAA AC 150/5370-10G, Item P-631

3.19.3 Materials

Refined Coal Tar Emulsion
A refined coal tar emulsion prepared from a high temperature refined coal tar conforming to the requirements of ASTM D490 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 ASTM D5727.

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 C136.

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.			

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.

Water

Water for mixing shall be potable, free of harmful soluble salts and at least 50 º F (10 ºC).

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.

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.

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.

3.19.4 Composition and Application

Composition

The refined coal tar emulsion seal coat shall 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.

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 **seven (7) calendar days** prior to the start of operations. The mixed 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 five (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.

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.

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 square yards 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 in 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 3.19.9 "Basis of Payment".

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. While not required, the fuel resistance test may be specified at the discretion of the Engineer.

3.19.5 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.

3.19.6 Construction Methods

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 ensure 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.

Preparation of Asphalt Pavement Surfaces

Clean pavement surface immediately prior to placing the 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. 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. Any additional surface preparation, such as crack repair, shall be in accordance with paragraph 101-3.6 in AC 150/5370-10G.

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 always agitate the seal coating mixture in the mixing tank 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.

Application of Slurry Seal Coat

The aggregate filled slurry seal coat shall be applied at a uniform rate determined in paragraph. 3.19.4 “Application Rate”.

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 3.19.6 “Preparation of Asphalt Pavement Surfaces“.

Apply the first coat uniformly to obtain the rate determined in paragraph 3.19.4 “Application Rate”.

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.

Where striping is required, the striping paint used shall meet the requirements of P-620 FAA AC, shall be compatible with the seal coat and as recommended by the coal tar emulsion manufacturer.

3.19.7 Quality Control

Contractor’s Certification

The Contractor shall furnish the manufacturer’s certification that each consignment of emulsion shipped to the project meets the requirements of ASTM D5727, 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.

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.

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.

Engineering Records

The Engineer will keep an accurate record of each batch of materials used in the formulation of the seal coat.

3.19.8 Method of 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.

3.19.9 Basis of Payment

Payment shall be made at the contract unit price per **gallon** for the refined coal tar emulsion with additives and specified water. Specified water includes the portion of water required to complete the mix design. Additional water added for workability or to compensate for evaporation is considered incidental. 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"

3.19.10 Testing Requirements

29 CFR Part 1910.1200	Hazard Communication
ASTM C67	Standard Test Method for Sampling and Testing Brick and Structural Clay Tile
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM D5727	Standard Specification for Emulsified Refined Coal Tar (Mineral Colloid Type)

3.19.11 Material Requirements

ASTM D490	Standard Specification for Road Tar
ASTM D692	Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
ASTM C3699	Standard Specification for Kerosene
ASTM D4866	Standard Performance Specification for Coal Tar Pitch Emulsion Pavement Sealer Mix Formations Containing Mineral Aggregates and Optional Polymeric Admixtures

3.19.12 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

1. 2 6" X 6" square 16-gauge sheet metal masks with a 4" × 4" square center removed
2. 6" X 6" unglazed white ceramic tile with an absorption rate of 10-18 percent (determined in accordance with ASTM C 67
3. Brass ring, 2" diameter and 2" high
4. Kerosene meeting requirements of ASTM D 3699
5. 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 Apparatus 1 above, 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 ± 2 °F. and 50 ± 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 Procedure step 4 above.
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.

3.20 General Labor Crews

3.20.1 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.

3.20.2 References

RS Means 2023

3.20.3 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 with.

Light Equipment Crew B-63	Carpentry Crew K-1	Skilled Worker Crew L-4	Electrical Crew R-22
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

Above labor and equipment crews are based on descriptions taken from R.S. Means 2013

3.20.4 Materials

Contractor shall provide all necessary construction materials per specific job scope, and as required by the Engineer.

3.20.5 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

3.20.6 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.

3.20.7 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 (B-63)..... Day"
"Carpentry Crew (K-1)..... Day"
"Skilled Worker Crew (L-4)..... Day"
"Electrical Crew (R-22) ..... Day"
"Material ..... Each"

3.21 Pavement Texturing

3.21.1 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.

3.21.2 References

TxDOT Special Specification 7331 Pavement Texturing (2004)

FAA AC 150/5320-12C

3.21.3 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 High Velocity Impact Method (HVIM) 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 is approved.

3.21.4 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.

3.21.5 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-lapping 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.

3.21.6 Testing

Preproduction Testing

Friction tests shall be completed by the engineer on a 300' test application of the pavement prior to full production in accordance with AC 150/5320-12C, Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces. Additional test applications and friction testing may be required for changes in pavement type. Friction testing on each test application shall indicate a minimum friction level not less than the "Maintenance Planning" level as defined in AC 150/5320-12C when tested at speeds of 40 and 60 mph (65 and 95 km/h) with approved continuous friction measuring equipment (CFME).

Acceptance testing

Acceptance friction testing shall be completed within ten (10) calendar days of texturing. 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 150/5320-12, Measurement, Construction, and Maintenance of Skid-resistant Airport Pavement Surfaces, when tested at speeds of 40 and 60 mph (65 and 95 km/h) with approved continuous friction measuring equipment (CFME). Each test includes performing friction tests at 40 mph and 60 mph (65 or 95 km/h) both wet, 15 feet (4.5 m) to each side of runway centerline. Any 500' sections failing to meet the friction criteria shall be retextured until the criteria is met at the Contractor's expense or until the engineer is satisfied that level of effort has resulted in the most reasonable improvement attainable without further damaging the pavement.

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.

A. **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 wheel path locations. The minimum average macrotexture depth required for each lane mile using this test shall be shown on the plans or as directed by the Engineer. Surfaces not meeting this texture depth shall be retextured at the Contractor's expense.

B. **FHWA Type Outflow Meter.** When texturing first starts, a minimum of 1 outflow meter tests shall be taken per thousand (1000) 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 criterion shall be retextured at the Contractor's expense.

3.21.7 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.

3.21.8 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"

3.22 Emulsified Asphalt Seal Coat

3.22.1 Description

This item shall consist of the application of a emulsified asphalt surface treatment composed of an emulsion of natural and refined asphalt materials, water and, if specified, a polymer additive, for taxiways and runways with the application of a suitable aggregate to maintain adequate surface friction; and airfield secondary and tertiary pavements including low-speed taxiways, shoulders, overruns, roads, parking areas, and other general applications with or without aggregate applied. Emulsified Asphalt Seal Coat products assist in pavement

preservation through reducing the rate of pavement oxidation. The emulsified asphalt surface treatment shall be applied in accordance with these specifications, and as shown on the plans or as directed by the Engineer.

3.22.2 References

FAA AC 150/5370-10G, ITEM P-608

3.22.3 Material

Aggregate

The aggregate material shall be a dry, clean, dust and dirt free, sound, durable, angular shaped manufactured specialty sand, such as that used as an abrasive, with a Mohs hardness of 6 to 8. The Contractor shall submit manufacturer's technical data and a manufacturer's certification indicating that the specialty sand meets the requirements of the specification to the Engineer prior to start of construction. The sand must be approved for use by the Engineer and shall meet the following gradation limits when tested in accordance with ASTM C136 and ASTM C117:

Aggregate Material Graduation Requirement

Sieve Designation (square openings)	Percentage by Weight Retained Sieves
No. 8 (2.38mm)	0
No. 16 (1.19 mm)	0-8
No. 20 (0.84 mm)	0-28
No. 30 (0.60 mm)	20-50
No. 40 (0.42 mm)	10-55
No. 50 (0.30 mm)	0-30
No. 70 (0.21 mm)	0-5
No. 100 (0.15 mm)	0-2
No. 200 (0.07 mm)	0-2

The Contractor shall provide a certification showing particle size analysis and properties of the material delivered for use on the project. The Contractor's certification may be subject to verification by testing the material delivered for use on the project.

Asphalt Material

The Contractor shall furnish the vendor's certified test reports for the emulsified asphalt, in its concentrated form, to the Engineer, showing that the material meets the following properties

Concentrated Asphalt Material Properties

Properties	Specification	Limits
Saybol Furol Viscosity at 77°F (25°C)	ASTM D244	20 – 100 second
Residue by Distillation or Evaporation	ASTM D244	57% minimum
Sieve Test	ASTM D244	0.1% maximum
24-hour Stability	ASTM D244	1% maximum
5-day Settlement Test	ASTM D244	5.0% maximum
Particle Charge[1]	ASTM D244	Positive 6.5 maximum pH

[1] pH may be used in lieu of the particle charge test, which is sometimes inconclusive in slow setting, asphalt emulsions.

The asphalt material concentrate must be diluted with heated water prior to application. The asphalt material, when diluted in the volumetric proportion of one part concentrated asphalt material to one (1) part hot water or two parts concentrated asphalt material to one-part hot water, as directed by the Engineer, shall have the following properties:

One-to-One Emulsion Properties

In Ready-to-Apply Form, one-part concentrate to one-part water, by volume.

Properties	Specifications	Limits
Saybolt Furol Viscosity at 77°F (25°C)	ASTM D244	10 – 50 seconds
Residue by Distillation or Evaporation	ASTM D244	28.5% minimum
Pumping Stability[1]		Pass

[1] Pumping stability is tested by pumping one pint (475 ml) of seal coat diluted one (1) part concentrate to one (1) part water, at 77°F (25°C), through a 1/4-inch (6 mm) gear pump operating 1750 rpm for 10 minutes with no significant separation or coagulation.

One-to-One Emulsion Properties

In Ready-to-Apply Form, two parts concentrate to one-part water, by volume.

Properties	Specifications	Limits
Saybolt Furol Viscosity at 77°F (25°C)	ASTM D244	10 – 50 seconds
Residue by Distillation or Evaporation	ASTM D244	28.5% minimum
Pumping Stability[1]		Pass

[1] Pumping stability is tested by pumping one pint (475 ml) of seal coat diluted one (1) part concentrate to one (1) part water, at 77°F (25°C), through a 1/4-inch (6 mm) gear pump operating 1750 rpm for 10 minutes with no significant separation or coagulation.

The asphalt material base residue shall contain not less than 20% gilsonite, or uintaite and shall not contain any tall oil pitch or coal tar material. The material shall be compatible with asphaltic concrete and have a 5-year minimum proven performance record at airports with similar climatic conditions. Curing time, under recommended application conditions, shall not exceed eight (8) hours.

Emulsion Residue by Distillation or Evaporation Tests

Properties	Specifications	Limits
Viscosity at 275°F (135°C)	ASTM D4402	1750 cts maximum
Solubility in 1, 1, 1 trichloroethylene	ASTM D2042	97.5% minimum
Penetration	ASTM D5	50 dmm maximum
Asphaltenes	ASTM D2007	15% minimum
Saturates	ASTM D2007	15% maximum
Polar Compounds	ASTM D2007	25% minimum
Aromatics	ASTM D2007	15% minimum

The Contractor shall furnish vendor's certified test reports showing that the material is the type, grade and quality specified for each load of asphalt material delivered to the project. The certification shall also show the shipment number, refinery, consignee, destination, contract number and date of shipment. The test reports and certification shall be delivered to the Engineer before permission is granted to use the material. The furnishing of the vendor's certified test report for the asphalt material shall not be interpreted as a basis for final

acceptance. The manufacturer's material test report certification may be subject to verification by testing the material delivered for use on the project.

The asphalt material storage and handling temperature shall be between 50°F - 160°F (10°C - 70°C) and the material shall be protected from freezing, or whenever outside temperature drops below 40°F (4°C) for prolonged time periods.

Water

Water used in making the emulsion shall be potable, free from harmful soluble salts and chemicals, and at least 100°F (38°C).

Polymer

The polymer shall be a vinyl acrylic polymer approved for use by the asphalt material manufacturer. The Contractor shall submit manufacturer's technical data, the manufacturer's certification indicating that the polymer meets the requirements of the specification, and the asphalt material manufacturer's approval of its use to the Engineer. The polymer must be approved for use by the Engineer and shall meet the following properties:

Emulsion Residue by Distillation or Evaporation Tests

Properties	Limits
Solids Content	54 to 57%, Percent by Weight
Weight	8.9 to 9.8 pounds/gallon (1.07 to 1.17 kg/L)
pH	4.0 to 4.6
Particle Charge	Nonionic/Anionic
Mechanical Stability	Excellent
Film Forming Temperature, ^{o}C	+5 ^{o}C, minimum
Tg, ^{o}C	22 ^{o}C, maximum

3.22.4 Application Rate

Material Performance for Runway and High-Speed Taxiway Projects

The Contractor shall submit to the Engineer friction tests, from previous airport projects which used the seal coat materials in a similar environment, in accordance with AC 150/5320-12, at 40 or 60 mph (65 or 95 km/h) wet, showing, as a minimum; friction value of pavement surface prior to sealant application; two values, tested between 24 and 96 hours after application, with a minimum of 24 hours between tests; and one value tested at no less than 180 days or greater than 360 days after the application. The results of the two tests between 24 and 96 hours shall indicate friction is increasing at a rate to obtain similar friction value of the pavement surface

prior to application, and the long term test shall indicate no apparent adverse effect with time relative to friction values and existing pavement surface. The Contractor shall submit to the Engineer a list of airports which meet the above requirements, as well as technical details on application rates, aggregate rates, and point of contact at these airports to confirm use and success of sealer with aggregate. Friction tests shall be submitted from no less than one of the airports on the list and each set of tests described above must be from one project.

Seal coat material submittal without required friction performance will not be approved. Friction tests performed on this project cannot be used as a substitute for this requirement.

Test Areas and Test Sections

A qualified manufacturer's representative shall be present in the field to assist the Contractor in applying test areas and/or test sections to determine the appropriate application rate of both emulsion and sand to be approved by the Engineer.

A test area and/or section shall be applied for each differing HMA pavement surface identified in the project. The test area(s) and/or test section(s) shall be used to determine the material application rate(s) of both emulsion and sand prior to full production. The same equipment and method of operation shall be utilized on the test area(s) and/or test section(s) as will be utilized on the remainder of the work.

A. **For taxiway, taxilane and apron surfaces.** Prior to full application, the Contractor shall place test areas at varying application rates as advised by the manufacturer's representative and acceptable to the Engineer to determine appropriate application rate(s). The test areas will be located on representative section(s) of the pavement to receive the asphalt surface treatment designated by the Engineer.

B. **For runway and high speed exit taxiway surfaces**. Prior to full application, the Contractor shall place a series of test sections a minimum of 300 feet (90 m) long by 12 feet (3.6 m) wide, or width of anticipated application, whichever is greater, at varying application rates as recommended by the manufacturer's representative and acceptable to the Engineer to determine appropriate application rate(s). The area to be tested will be located on a representative section of the pavement to receive the asphalt surface treatment designated by the Engineer. Before beginning the test section(s), the skid resistance of the existing pavement shall be determined for each test section with a continuous friction measuring equipment (CFME). The skid resistance test after application shall be at approximately the same location as the test done on the existing pavement. The Contractor may begin testing the skid resistance of runway and high speed exit taxiway test sections after application of the asphalt surface treatment has fully cured. Aircraft shall not be permitted on the runway or high speed exit taxiway test sections for a minimum of 24 hours and until such time as the Contractor validates that its surface friction meets AC 150/5320-12. The results of the friction evaluation meet or exceed the Maintenance Planning levels provided in Table 3-2, "Friction Level Classification for Runway Pavement Surfaces," in AC 150/5320-12, Measurement, Construction, and Maintenance of Skid-resistant Airport Pavement Surfaces, when tested at speeds of 40 and 60 mph (65 and 95 km/h) wet with approved CFME.

If the test section should prove to be unsatisfactory, necessary adjustments to the application rate, placement operations, and equipment shall be made. Additional test sections shall be placed, and additional skid resistance tests performed and evaluated. Full production shall not begin without the Engineer's approval of an appropriate application rate(s). Acceptable test sections shall be paid for in accordance with paragraph 8.1.

3.22.5 Equipment

The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work.

Pressure distributor

The emulsion shall be applied with a manufacturer-approved computer rate controlled asphalt distributor. The equipment shall be in good working order and contain no contaminants or diluents in the tank. Spreader bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the emulsion. Any type of tip or pressure source is suitable that will maintain predetermined flow rates and constant pressure during the application process with application speeds under eight (8) miles per hour (13 km per hour) or seven (700) feet per minute (213 m per minute). Test the equipment under pressure for leaks and ensure it is in good working order before use.

The distributor truck shall be equipped with a 12.1-foot (3.7-m), minimum, spreader bar with individual nozzle control. The distributor truck shall be capable of specific application rates in the range of 0.05 to 0.25 gallons per square yard (0.22 to 1.13 liters per square meter). These rates shall be computer controlled rather than mechanical. The distributor truck shall have an easily accessible thermometer that constantly monitors the temperature of the emulsion and have an operable mechanical tank gauge that can be used to cross-check the computer accuracy.

A distributor truck shall be provided, if necessary, equipped to effectively heat and mix the material to the required temperature prior to application. Heating and mixing shall be done in accordance with the manufacturer's recommendations. Care shall be taken not to overheat or over mix the material.

Aggregate spreader

The asphalt distributor truck will be equipped with an aggregate spreader mounted to the distributor truck that can apply sand to the emulsion in a single pass operation without driving through wet emulsion. The aggregate spreader shall be equipped with a variable control system capable of uniformly distributing the sand at the specified rate at varying application widths and speeds. The sander shall have a minimum hopper capacity of at least 3,000 pounds (1361 kg) of sand. Push-type hand sanders will be allowed for use around lights, signs, and other obstructions.

Power broom/blower

A power broom and/or blower shall be provided for removing loose material from the surface to be treated.

Equipment calibration

The Contractor shall calibrate the equipment using either of the following procedures:

A. **First procedure.** The Contractor shall furnish a State Calibration Certification for the emulsified asphalt distributor, from any state providing that service, or other acceptable agency certification approved by the Engineer, and the calibration date shall have been within six (6) months of the contract award, or up to 12 months if supporting documents substantiate continuous work using the same distributor.

B. **Second procedure.** The Contractor shall furnish all equipment, materials, and labor necessary to calibrate the emulsified asphalt distributor and the aggregate spreader. Perform all calibrations with the approved job materials and prior to applying the specified coatings to the prepared surface. Perform calibration of the emulsified asphalt distributor in accordance with ASTM D2995. Perform work to calibrate the tank and measuring devices of the distributor. Perform inspection and calibration at the beginning of the work and at least once a day during construction.

3.22.6 Weather Limitations

The asphalt emulsion shall be applied only when the existing pavement surface is dry and when the weather is not foggy, rainy, or when the wind velocity will prevent the uniform application of the material. No material shall be applied when dust or sand is blowing or when rain is anticipated within eight (8) hours of application completion. The atmospheric temperature and the pavement surface temperature shall both be above 60°F (16°C) and rising. During application, account for wind drift. Cover existing buildings, structures, runway edge lights, taxiway edge lights, informational signs, retro-reflective marking, and in-pavement duct markers as necessary to protect against overspray before applying the emulsion. Should emulsion get on any light or marker fixture, promptly clean the fixture. If cleaning is not satisfactory to the Engineer, the Contractor shall replace any light, sign, or marker with equivalent equipment at no cost to the Owner.

3.22.7 Construction Methods

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.

Preparation of Asphalt Pavement Surfaces

Clean pavement surface immediately prior to placing the 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. 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. Any

additional surface preparation, such as crack repair, shall be in accordance with paragraph 101-3.6 in AC 150/5370-10G.

New Asphalt Pavement Surfaces

Allow new asphalt pavement surfaces to cure so that there is no concentration of oils on the surface. A period of at least thirty (30) calendar days at 70°F (21°C) daytime temperatures shall elapse between the placement of a hot mixed asphalt concrete surface course and the application of the surface treatment.

Perform a water-break-free test to confirm that the surface oils have degraded and dissipated. (Cast approximately one gallon (4 liters) of clean water out over the surface. The water should sheet out and wet the surface uniformly without crawling or showing oil rings.) If signs of crawling or oil rings are apparent on the pavement surface, additional time must be allowed for additional curing and retesting of the pavement surface prior to treatment.

Emulsion Mixing

The application emulsion shall be obtained by blending asphalt material concentrate, water, and polymer, if specified. Always add heated water to the asphalt material concentrate, never add asphalt material concentrate to heated water. Mix one-part heated water to one part or two parts, as directed by engineer, asphalt material concentrate, by volume.

If polymer is required, add 1% polymer, by volume, to the emulsion mix. If the polymer is added to the emulsion mix at the plant, submit weigh scale tickets to the Engineer. As an option, the polymer may be added to the emulsion mix at the job site provided the polymer is added slowly while the circulating pump is running. The mix must be agitated for a minimum of 15 minutes or until the polymer is mixed to the satisfaction of the Engineer.

Application of Asphalt Emulsion

The asphalt emulsion shall be applied using a pressure distributor upon the properly prepared, clean, and dry surface at the application rate recommended by the manufacturer's representative and approved by the Engineer from the test area/sections evaluation for each designated treatment area. The asphalt emulsion should be applied at a temperature between 130°F (54°C) and 160°F (70°C) or in accordance with the manufacturer's recommendation.

Pavement surfaces which have excessive runoff of seal coat due to excessive amount of material being applied or excessive surface grade shall be treated in two or more applications to the specified application rate at no additional cost to the Owner. Each additional application shall be performed after the prior application of material has penetrated the pavement.

If low spots and depressions greater than 1/2 inch (12 mm) in depth in the pavement surface cause ponding or puddling of the applied materials, the pavement surface shall be broomed with a broom drag. Brooming shall continue until the pavement surface is free of any pools of excess material. Ponding and/or puddling shall not cause excessive pavement softening and/or additional distress. The Engineer shall inspect and approve areas after brooming.

During all applications, the surfaces of adjacent structures shall be protected to prevent their being spattered or marred. Asphalt materials shall not be discharged into borrow pits or gutters or on the airport area.

Application of Aggregate Material

Immediately following the application of the asphalt emulsion or as directed by the Engineer, sand at the rate recommended by the manufacturer's representative and approved by the Engineer from the test area/sections evaluation for each designated application area, shall be spread uniformly over the asphalt emulsion. The aggregate shall be spread to the same width of application as the asphalt material and shall not be applied to such thickness as to cause blanketing.

Sprinkling of additional aggregate material and spraying additional asphalt material over areas that show up having insufficient cover or bitumen, shall be done by hand whenever necessary. In areas where hand work is necessitated, the sand shall be applied before the sealant begins to break.

Sanding shall be performed to prevent excessive amounts of sand from accumulating on the pavement prior to the emulsion being applied. The Contractor shall clean areas with excess or loose sand and dispose of off airport property.

3.22.8 Quality Control

Manufacturer Representation

The manufacturer's representative shall have knowledge of the material, procedures, and equipment described in the specification and shall be responsible for determining the application rates and shall oversee the preparation and application of the seal coat product. Documentation of the manufacturer representative's experience and knowledge for applying the seal coat product shall be furnished to the Engineer a minimum of 10 workdays prior to placement of the test sections. The cost of the manufacturer's representative shall be included in the bid price.

Contractor Qualifications

The Contractor shall provide the Engineer Contractor with qualifications for applicators, personnel, and equipment. The Contractor shall also provide documentation that the Contractor is qualified to apply for the seal coat and to have made at least three (3) applications like this project in the past two (2) years.

3.22.9 Material Acceptance

Friction Tests

Friction tests in accordance with AC 150/5320-12C, Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces, shall be accomplished on all runway and high-speed taxiways that have received a seal coat. The Contractor shall coordinate testing with the Engineer. Each test includes performing friction tests at 40 mph and 60 mph (65 or 95 km/h) both wet, 15 feet (4.5 m) to each side of runway centerline. Friction test shall be run

within thirty (30) calendar days prior to application of the seal coat to runway and/or high-speed taxiways and after application of the seal coat.

3.22.10 Method of Measurement

The quantity of asphalt surface treatment shall be measured by the square yards of material applied 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 asphalt material 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.

3.22.11 Basis of Payment

Payment shall be made at the contract unit price per square yard for the asphalt surface treatment applied for and accepted by the Engineer. This price shall be full compensation for all surface preparation, furnishing all materials, delivery, and application of these materials, for all labor, equipment, tools, and incidentals necessary to complete the item, and any costs associated with furnishing a qualified manufacturer's representative to assist with test strips.

Payment will be made under:

"Emulsified Asphalt Seal Coat ..... Square Yards"

3.22.12 Material Requirements

ASTM C117 Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing

ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

ASTM D5 Standard Test Method for Penetration of Bituminous Materials

ASTM D244 Standard Test Methods and Practices for Emulsified Asphalts

ASTM D2007 Standard Test Method for Characteristic Groups in Rubber Extender and Processing Oils and Other Petroleum-Derived Oils by the Clay-Gel Absorption Chromatographic Method

ASTM D2042 Standard Test Method for Solubility of Asphalt Materials in Trichloroethylene

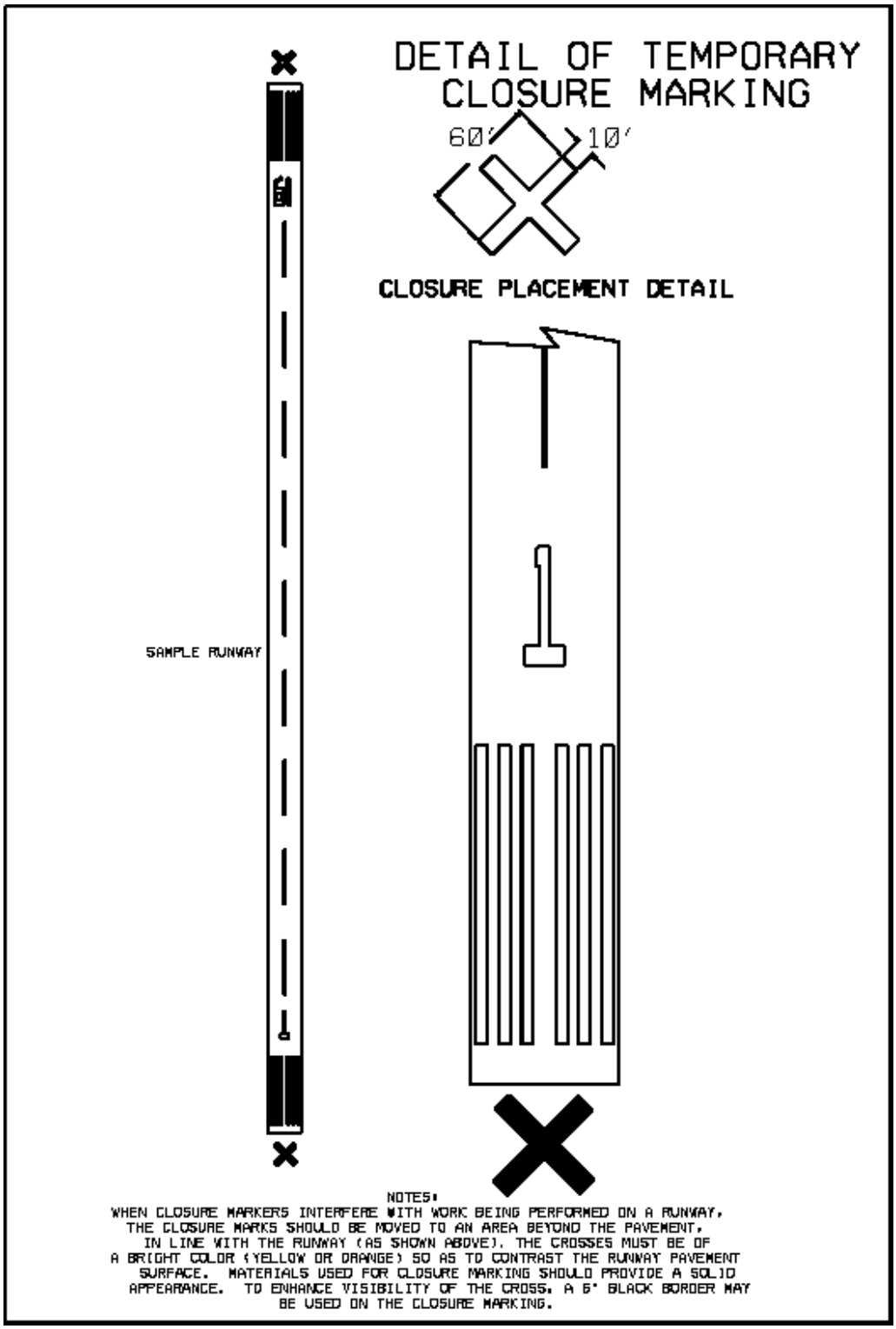
ASTM D2995 Standard Practice for Estimating Application Rate of Bituminous Distributors

ASTM D4402 Standard Test Method for Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer

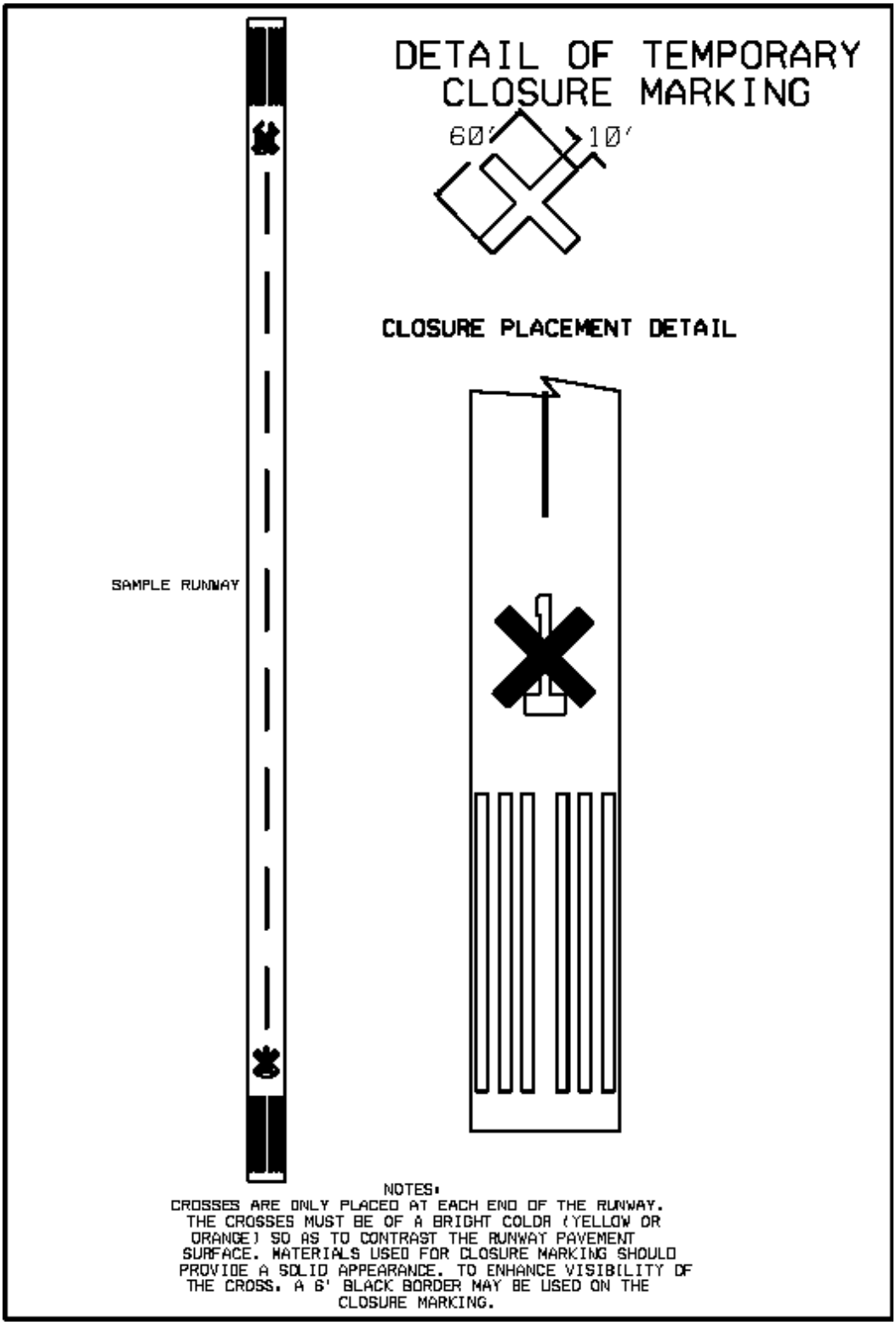
ASTM D5340 Standard Test Method for Airport Pavement Condition Index Surveys

4. Safety Details

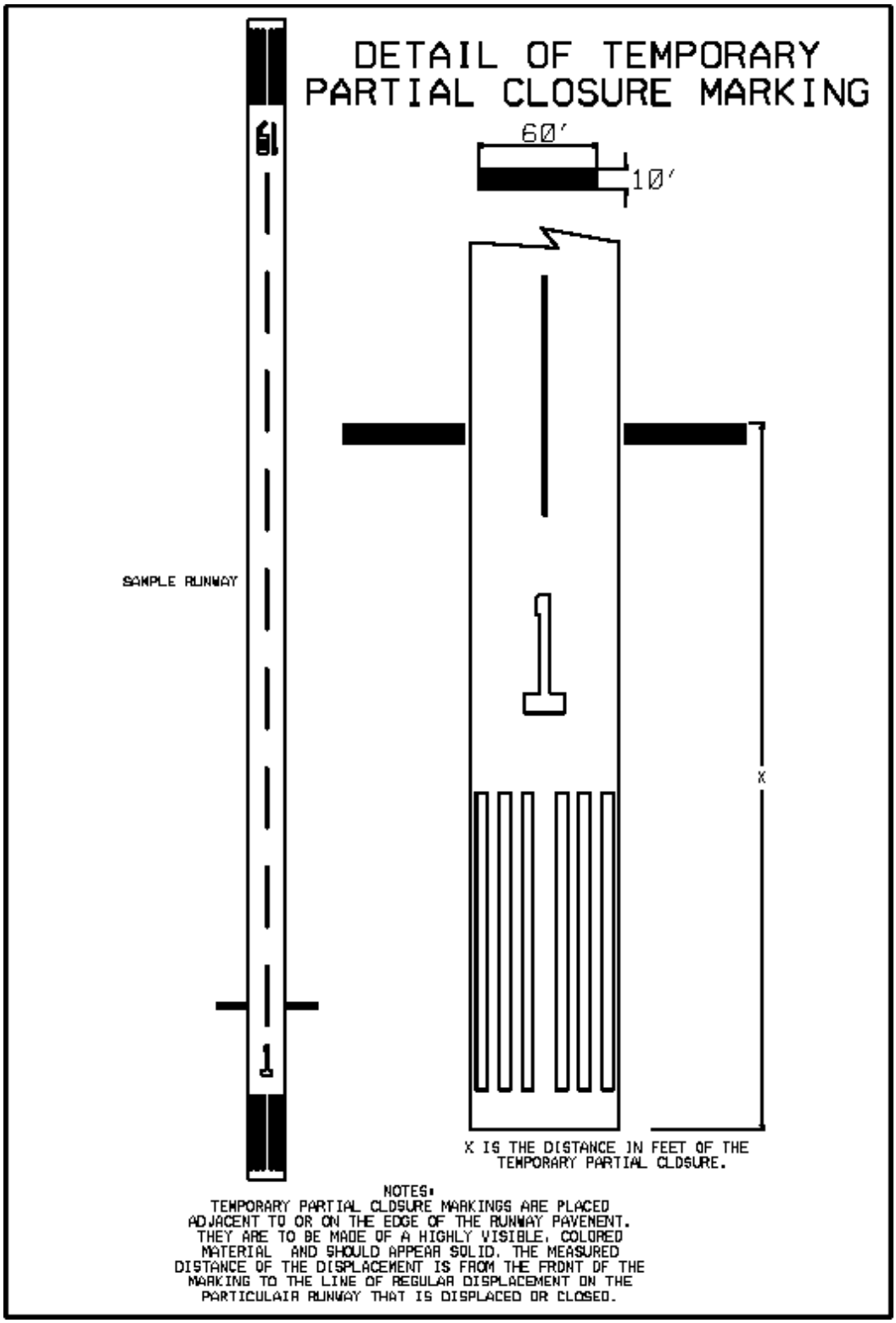
4.1 Detail of Temporary Closure Marking (Beyond Pavement)



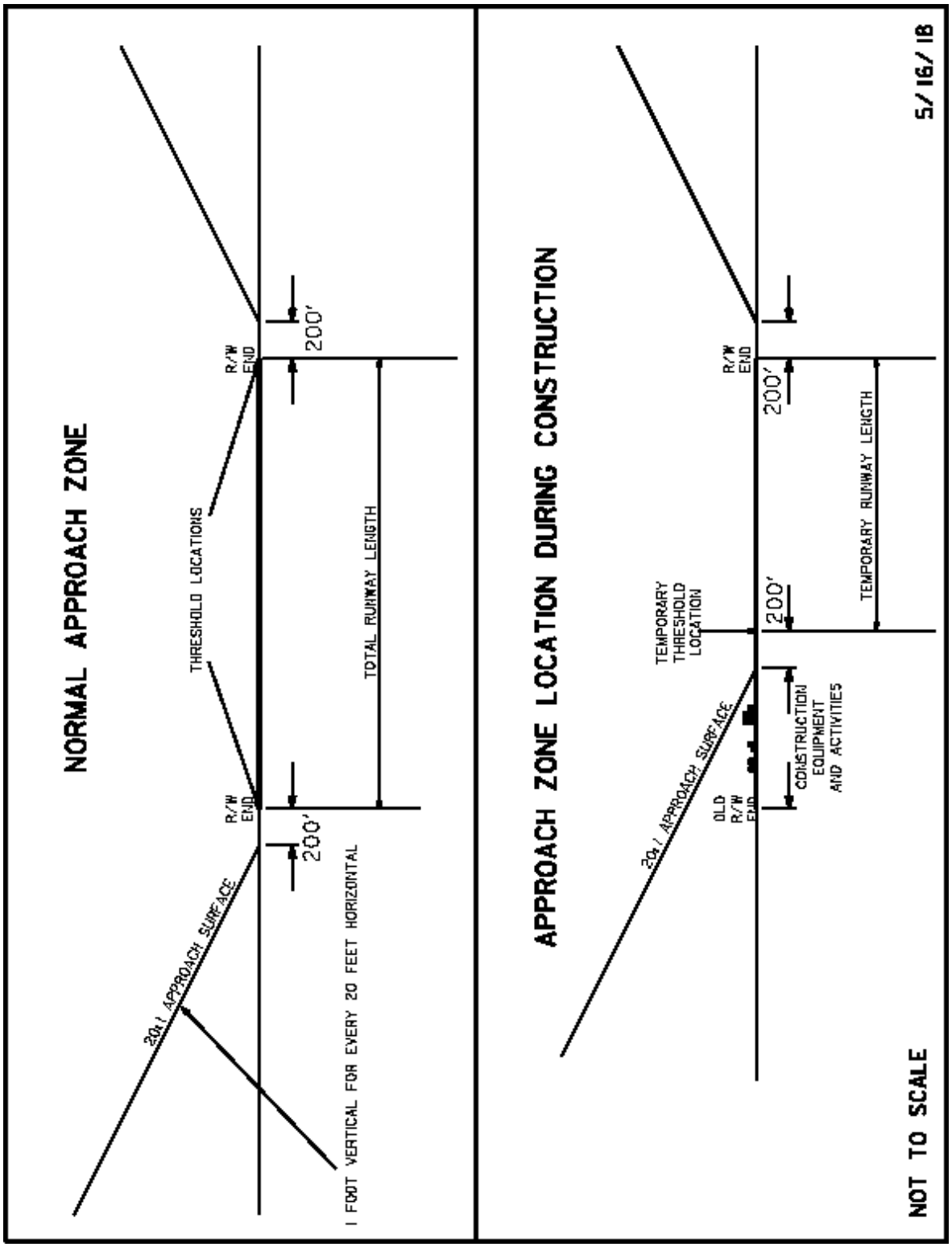
4.2 Detail of Temporary Closure Marking (On Pavement)



4.3 Detail of Temporary Partial Closure Marking

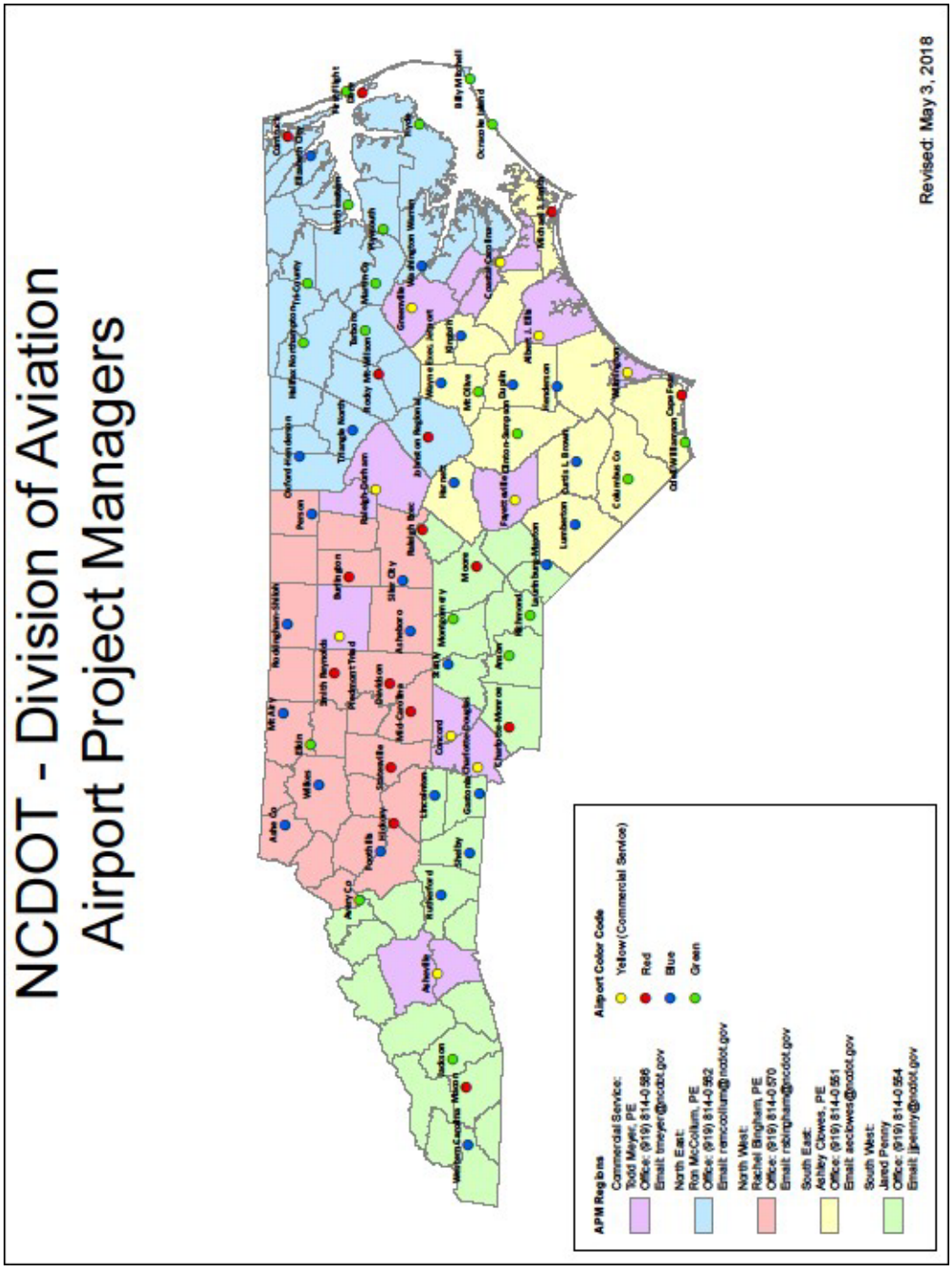


4.4 Approach Zone During Construction

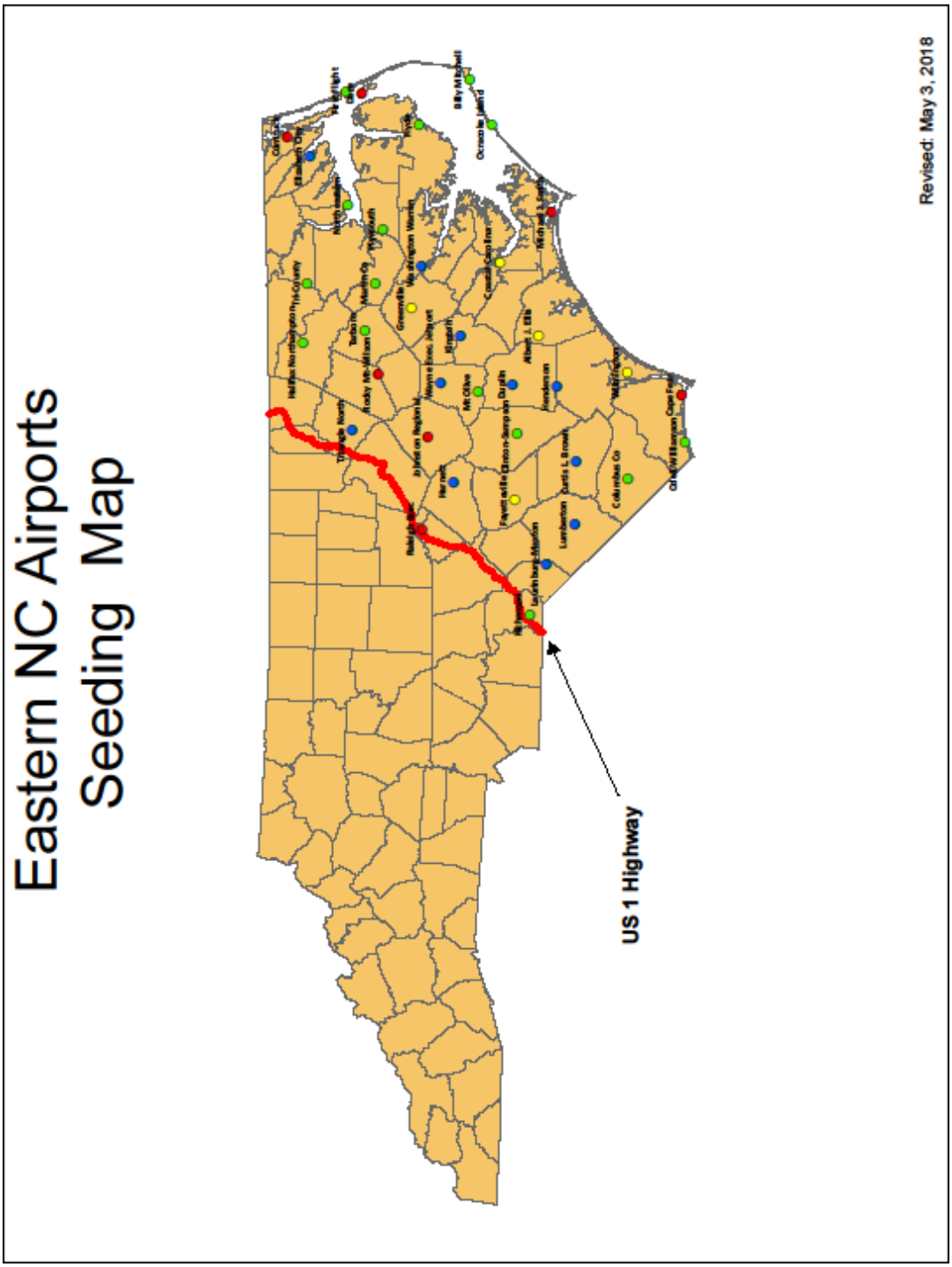


5. Airport Maps

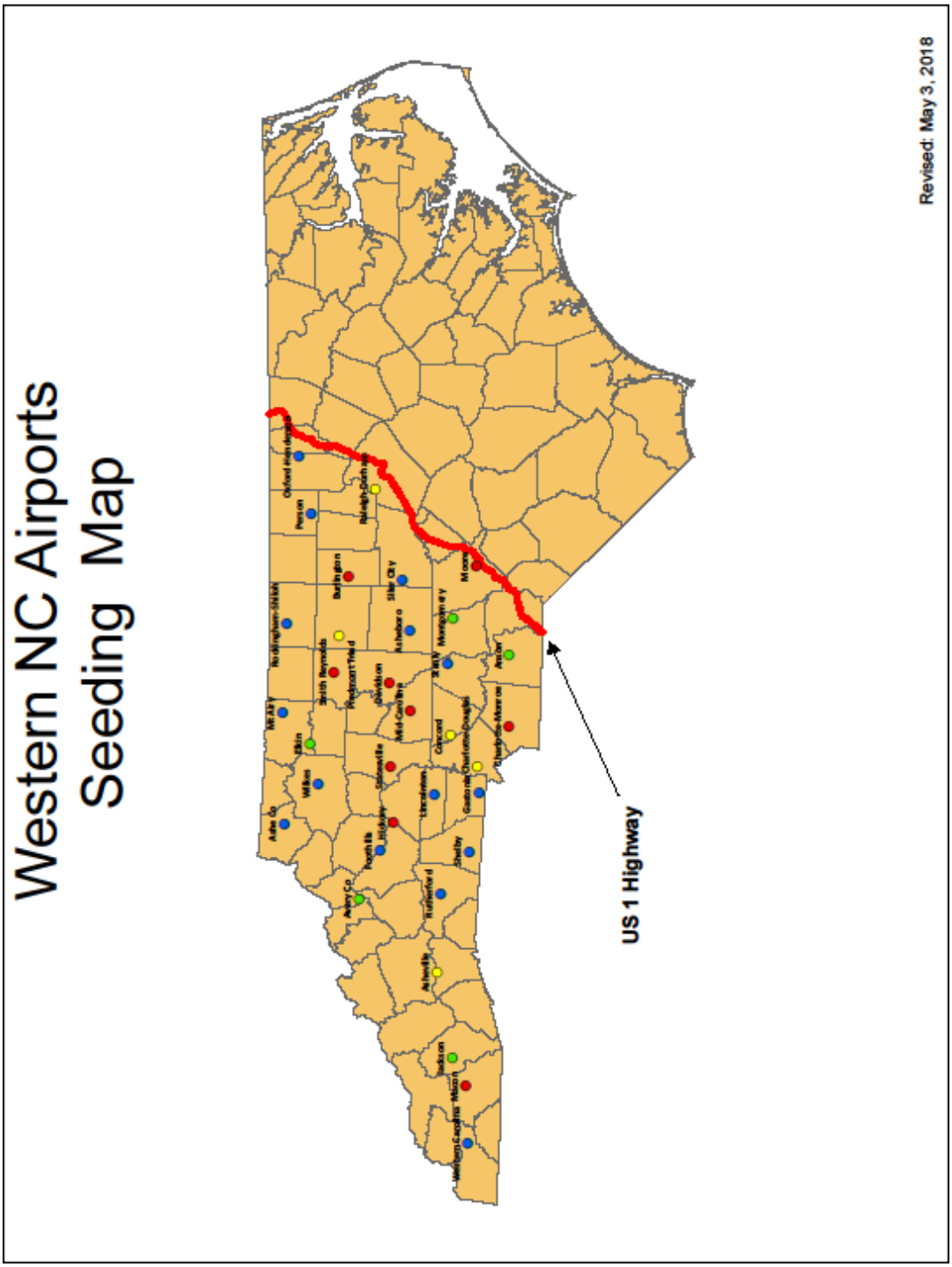
5.1 NCDOT Division of Aviation Airport Project Managers



5.2 Eastern NC Airports Seeding Map



5.3 Western NC Airports Seeding Map



6. Documents to be Completed with Bid Response

6.1 Listing of MB and WB Subcontractors Form

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.

6.2 Non-Collusion Affidavit

NON COLLUSION AFFIDAVIT

(To Be Executed and Returned with Offer)

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: _____.

6.3 Contract Pricing Form

North Carolina Department of Transportation

CONTRACT PRICING FORM

Airfield Maintenance Activities at North Carolina Airports

Item	Description	Quantity	Unit of Measure	Unit Price	Extended Price
1	Mobilization for Hot-Applied Crack and Joint Sealing	12	Ea		
2	Hot-Applied Asphalt Crack and Joint Sealing	60,000	Lbs		
3	Hot-Applied Concrete Crack and Joint Sealing	3,000	Lbs		
4	Mobilization for Full Depth Asphalt Pavement Patching	1	Ea		
5	Full Depth Asphalt Pavement Patching	50	Tons		
6	Mobilization for Flexible Repair of Concrete and Asphalt Pavement	1	Ea		
7	Flexible Repair of Asphalt Pavement	1,000	Lbs		
8	Flexible Repair of Concrete Pavement	3,000	Lbs		
9	Mobilization for Rigid Repair of Concrete Pavement	1	Ea		
10	Type 1 Rigid Repair of Concrete	15	Cu Yd		
11	Type 2A Rigid Repair of Concrete	5	Sq Ft		
12	Type 2B Rigid Repair of Concrete	5	Sq Ft		
13	Type 3 Rigid Repair of Concrete	5	Sq Ft		
14	Mobilization for Silicone Joint and Crack Sealing	1	Ea		

15	Silicone Joint and Crack Sealing, 3/8” – 5/8"	1,500	LF		
16	Silicone Joint and Crack Sealing, 3/4” – 1 and 1/2"	1,500	LF		
17	Mobilization for Asphalt Rejuvenation	12	Ea		
18	Asphalt Rejuvenation	225,000	Sq Yd		
19	Mobilization for Runway Rubber Removal	3	Ea		
20	Runway Rubber Removal - UHP Waterblasting	500	Sq Ft		
21	Runway Rubber Removal - Chemical	100,000	Sq Ft		
22	Mobilization for Airfield Marking	12	Ea		
23	Airfield Marking (Type II Paint, Quarter-Rate, No Beads)	200,000	Sq Ft		
24	Airfield Marking (Type II Paint, Half-Rate, No Beads)	200,000	Sq Ft		
25	Airfield Marking (Type II Paint, Full-Rate, Type I Beads)	500,000	Sq Ft		
26	Airfield Marking (Type II Paint, Full-Rate, Type III Beads)	10,000	Sq Ft		
27	Airfield Marking (Type III Paint, Full-Rate, Type IV Beads)	1,500	Sq Ft		
28	Airfield Marking (Surface Painted Hold Position Signs)	5,000	Sq Ft		
29	Mobilization for Pavement Marking Removal	10	Ea		
30	Pavement Marking Removal - UHP Waterblasting	5,000	Sq Ft		
31	Pavement Marking Removal - Grinding	20,000	Sq Ft		
32	Mobilization for Raised Pavement Markers	1	Ea		
33	Permanent Raised Pavement Markers	25	Ea		
34	Mobilization for Pipe Joint Sealing Backgrouting and Soil Stabilization	1	Ea		
35	Joint Sealing (36” to 48” diameter)	4	Ea		

36	Joint Sealing (54” to 72” diameter)	4	Ea		
37	Joint Sealing (> 72” diameter)	1	Ea		
38	Backgrouting	20	Gal		
39	Soil Stabilization	60	Gal		
40	CCTV Inspection	1	Day		
41	Mobilization for Concrete Pavement Leveling and Undersealing	1	Ea		
42	HDPF Concrete Pavement Leveling	500	Lbs		
43	Mobilization for Aircraft Tie Downs	3	Ea		
44	1,000 lb Aircraft Tie Down Anchor with Cover	1	Ea		
45	1,000 lb Aircraft Tie Down Anchor without Cover	1	Ea		
46	2,000 lb Aircraft Tie Down Anchor with Cover	1	Ea		
47	2,000 lb Aircraft Tie Down Anchor without Cover	1	Ea		
48	5,000 lb Aircraft Tie Down Anchor with Cover	1	Ea		
49	5,000 lb Aircraft Tie Down Anchor without Cover	1	Ea		
50	Aircraft Tie Down Rope	200	Ea		
51	Remove Failing Aircraft Anchor	1	Ea		
52	Mobilization for Anchored Airfield Light Mats	1	Ea		
53	Anchored Airfield Elliptical Light Mat with 12” Collar Insert	1	Ea		
54	Anchored Airfield Elliptical Light Mat with 18” Collar Insert	1	Ea		
55	Anchored Airfield Elliptical Light Mat without Collar Insert	1	Ea		
56	Anchored Airfield 30’ Strip Mat	1	Ea		

57	Anchored Airfield 60’ Strip Mat	1	Ea		
58	Mobilization for Pavement Marking and Pavement Surface Cleaning	12	Ea		
59	Pavement Marking Cleaning – LP Waterblasting	500,000	Sq Ft		
60	Pavement Marking Cleaning – UHP Waterblasting	200,000	Sq Ft		
61	Pavement Surface Cleaning – LP Waterblasting	50,000	Sq Ft		
62	Pavement Surface Cleaning – UHP Waterblasting	20,000	Sq Ft		
63	Mobilization for Shoulder, Slope, and Eroded Section Reconstruction	1	Ea		
64	Shoulder, Slope, and Eroded Area Reconstruction	1	Acre		
65	Borrow Excavation	1	Cu Yd		
66	Select Material	1	Cu Yd		
67	Mobilization for Seeding and Mulching	6	Ea		
68	Seeding and Mulching, Dry Application	1	Acre		
69	Seeding and Mulching, Wet Application	1	Acre		
70	Mowing	60	Acre		
71	Mobilization for Coal Tar Emulsion Slurry Seal	3	Ea		
72	Refined Coal Tar Emulsion Slurry Seal (Spray)	10,000	Gal		
73	Refined Coal Tar Emulsion Slurry Seal (Mechanical Squeegee)	15,000	Gal		
74	Mobilization for General Labor Crew	10	Ea		
75	Light Equipment Crew (B-63)	10	Day		
76	Carpentry Crew (K-1)	10	Day		
77	Skilled Worker Crew (L-4)	10	Day		

78	Electrical Crew (R-22)	10	Day		
79	Mobilization for Pavement Texturing	1	Ea		
80	Texturing Asphaltic Concrete Pavement	55,000	Sq Yd		
81	Texturing Portland Cement Concrete Pavement	55,000	Sq Yd		
82	Mobilization for Emulsified Asphalt Seal Coat	1	Ea		
83	Emulsified Asphalt Seal Coat	55,000	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 (2024 or newer adopted version)

Reviewed by_____Date_____

Accepted by NCDOT_____Date_____