OCTOBER 2023

Roanoke-Blacksburg Regional Airport (ROA)

Runway 16-34 EMAS Replacement

FAA Grant No.: AIP-x-xx-xxxx-xxx-xxxx (Blocks)
DOAV State Project No.: CFxxxx-xx (Installation)

Project Manual – Bid Submittal

Bid No.: 24-007

RS&H

Project Manual – Bid Submittal Bid No.: 24-007

October 2023
Roanoke, Virginia

FAA Grant No.:	AIP-x-xx-xxxx-xxx-xxxx (Blocks)
DOAV State No.:	CFxxxx-xx (Installation)

Prepared by RS&H, Inc. at the direction of the Roanoke Regional Airport Commission

RS&H

Roanoke Regional Airport Commission

5202 Aviation Drive, N.W.
Roanoke, VA 24012
Phone: (540) 362-1999

Issue Date: October 17, 2023

Invitation for Bid # 24-007

FOR

Runway 16-34 EMAS Replacement

Sealed Bids Due:

November 30, 2023

on or before

3:00 p.m. (Local Time)

All Information and Clarification Inquiries must be submitted in writing to: Troy Philpott, Procurement and Contracts Manager at Procurement@flyroa.com by 5:00 p.m. on, November 14, 2023

RUNWAY 16-34 EMAS REPLACEMENT PROJECT
BID NO: 24-007

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BID INFORMATION

SECTION A

INVITATION FOR BIDS
Bid No. 24-007

The Roanoke Regional Airport Commission will accept sealed bids for furnishing all labor, materials, and equipment and performing all work for:

RUNWAY 16-34 EMAS REPLACEMENT
AT
ROANOKE BLACKSBURG REGIONAL AIRPORT

The work involves the replacement of the existing EMAS bed on the Runway 16 Departure End (north end of the runway). Bids shall be received until 3:00 P.M. local time on November 16, 2023 in the Office of Roanoke Regional Airport Commission, 5202 Aviation Drive, Roanoke, Virginia 24012. Bids will be publicly opened and read aloud at that time in Conference Room A on the Second Floor of the Airport Terminal Building.

Contract Documents will be will be posted on eVA, Virginia Department of General Services' central electronic procurement website, at https://eva.virgina.gov, and on the Roanoke Blacksburg Regional Airport Current Bids and Proposals website, at https://www.flyroa.com/current-bids-and-proposals. Electronic copies of the Contract Documents can also be obtained by emailing Troy Philpott, Procurement and Contracts Manager, Roanoke Regional Airport, at Troy.Philpott@flyroa.com.

Bidders are invited to submit bids for this work on the bid forms provided in the package; other bid forms will not be accepted. The successful bidder shall be required to have and maintain a Class "A" Virginia Contractor's License and not less than $5,000,000 in general liability, $5,000,000.00 in motor vehicle insurance, and $5,000,000.00 umbrella insurance. Contractor, its employees and any subcontractors' employees will be required to submit to federal security threat assessments, may be subject to fingerprint-based criminal records checks, and must be and remain approved by the Commission for access to airport secure areas.

Each bid must be accompanied by a bid security in a form acceptable to the Commission in an amount equal to at least five percent (5%) of the amount of the bid by the Contractor, payable to the Roanoke Regional Airport Commission, as a guaranty that if the bid is accepted, the bidder will execute the Contract and file required Performance and Payment Bonds within the time provided in the Instructions to Bidders.

Minority business enterprises will be afforded full opportunity to submit bids in response to this Invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

A Pre-bid Meeting will be held on-site and on Teams at 10:00 A.M. on November 1, 2023. No other escorted reviews of the site will be provided.

The Roanoke Regional Airport Commission reserves the right to waive any informalities, technicalities, or irregularities in a Bid, or to reject any or all bids, or to re-advertise for bids and to award or refrain from awarding the Contract for the project specified, should any such action be deemed to be in the best interest of the Commission.

If the bid by the lowest responsible bidder exceeds funds allocated for the project, the Commission reserves the right to negotiate with the apparent low bidder pursuant to the terms set out in the

Instructions to Bidders. The Commission additionally reserves the right to reject any and all bids, and to accept any part of or combination of bids, to waive any informalities or irregularities in any bid, and to award the Contract to other than the lowest bidder, should it be deemed to be in the best interest of the Commission. If a contract is awarded to other than the low bidder, it will be awarded to the lowest responsible and responsive bidder.

The Roanoke Regional Airport Commission in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §2000d-2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award. All bidders shall endeavor to afford Disadvantaged Business Enterprises (DBE's) a reasonable opportunity to participate in this project. The Commission's goal for DBE participation is 10%. All bidders wishing to remain in competition for the contract shall submit documentation of their DBE goal accomplishments or good faith efforts in accordance with the bid documents.

ROANOKE REGIONAL AIRPORT COMMISSION

INSTRUCTIONS TO BIDDERS

I. GENERAL

A. The Contractor covenants and agrees that it and its agents and employees shall comply with and shall be solely responsible for compliance with all applicable municipal, state and federal laws, national and local codes, and Roanoke Regional Airport Commission rules and regulations applicable to the removal, preparation, and installation of materials and other associated products and services to be provided pursuant to the Contract Documents.

B. As used herein, the terms "Owner," "Commission," "Airport Commission," or "Sponsor," or shall refer to the Roanoke Regional Airport Commission.

C. As used herein, the terms "Work," or "Project" shall refer to all construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations.

D. As used herein, the terms "Contractor" and "successful bidder" shall refer to the person or entity selected to enter a contract with the Commission for the above referenced Work.

E. As used herein, the term “Contract” or "Contract Documents" shall mean and include the Invitation to Bid, Instruction to Bidders, Bid Forms, the Performance Bond, Labor and Material Payment Bond, Contract Form, General Conditions, Drawings, Technical Specifications, Supplementary Drawings, any addenda issued to bidders, and any other documents specifically incorporated by reference in the Contract Form.

F. Attention of all prospective bidders is directed to the fact that the Airport Commission is a governmental body, and in accordance with Virginia law is not subject to state sales tax; however, such exclusion does not extend to Contractor in its purchase of goods and services for the Project.

G. The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incidental to the due and lawful prosecution of the Work.

H. LIQUIDATED DAMAGES. Time is of the essence in the completion of the Work. Bidders are advised that the Contract Documents do contain provisions for liquidated damages, including without limitation, liquidated damages for failure to complete the Work in a timely manner. **By submitting a bid, a bidder acknowledges and agrees that the bidder has been advised of**

such liquidated damages and has reviewed and agreed to all liquidated damages provision in the Contract Documents, including, without limitation, Contractor's waiver of any defenses as to the validity of such liquated damages based on such liquidated damages being void as penalties or not being reasonably related to actual damages.

I. All proposals or bids and any accompanying or related information submitted to the Commission will become the property of the Commission and will not be returned. Trade secrets or proprietary information submitted by a proposer or bidder may not be subject to the Virginia Freedom of Information Act (Section 2.2-3700 et seq.), provided that the proposer or bidder: (i) properly invokes the protections of the applicable sections of the Virginia Code, as amended, including, without limitation, Virginia Public Procurement Code Section 2.2-4342 for trade secrets or proprietary information prior to or upon submission of the data or other materials to be protected; (ii) clearly identifies the data or other materials in the proposal to be protected; and, (iii) states in writing the reasons why protection is necessary.

By submitting a proposal or bid, the submitting entity consents and agrees that, notwithstanding any express or implied claim of copyright, any and all documents submitted to the Commission are not subject to copyright and, as such, may be copied; however, the release of such documents shall be governed by applicable law, including, without limitation, the Virginia Freedom of Information Act.

J. Note: This public body does not discriminate against faith-based organizations in accordance with the Code of Virginia 2.2-4343.1 or against a bidder or offeror because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment.

II. GENERAL BOND REQUIREMENTS

A. Bid Bond

Each separate Bid shall be accompanied by a Certified or Cashier's Check or a Bid Bond on the form provided herein in the amount of not less than five percent (5%) of the total amount bid, including all alternates, made payable to the Roanoke Regional Airport Commission. If a Bid Bond is provided in lieu of a Certified or Cashier's Check, it must be signed by the bidder as principal and by a corporate surety authorized to transact business in Virginia, be substantially on the form included with the Bid Forms herein, include an executed surety bond affidavit and be accompanied by a valid power of attorney indicating that the person signing the bond on behalf of the Surety has full legal authority to do so.

B. Performance and Labor and Material Payment Bonds

Good and sufficient Performance and Labor and Material Payment Bonds in substantially the forms contained in these specifications and in the sum of not less than 100 percent of the contract amount, with a surety Company satisfactory to the Owner and licensed to conduct business in the Commonwealth of Virginia, will be required of the Contractor guaranteeing that the contract, including the various guarantee periods hereunder, will be faithfully performed and that labor and material suppliers shall be paid. The fully executed Bonds, along with appropriate Power of Attorney and the executed Contract shall be delivered to Owner, no later than fifteen (15) calendar days from the date of receipt of Owner's Notice of Award. If, at any time after the execution of the agreement, Owner shall deem the surety or sureties upon such bond or bonds to be unsatisfactory, or if, for any reasons, such bond or bonds ceases to be adequate to cover the performance of the work as above specified, Contractor shall, at its expense within five (5) days of receipt of Owner's written notice to do so, furnish additional bond or bonds in such form and amount and with such surety or sureties as shall be satisfactory to the Owner. In such event, no payment to the Contractor shall be deemed due under the agreement until such new or additional bond or bonds are furnished in a manner and form satisfactory to the Owner.

Only the Performance and Labor and Material Payment Bond Forms in substantially the form as are bound as within these documents are acceptable.

III. PREPARATION AND SUBMISSION OF BIDS

A. The Bidder must submit its Bid on the Bid Forms contained herein; no other form is acceptable. Any bid received after the time specified in the Invitation to Bid for receipt shall be returned to the bidder unopened.

B. All blank spaces in the Bid Forms must be correctly and completely filled in, where indicated, in ink or type written, except that all signatures shall be signed in ink by an official of the firm who is authorized to submit the bid.

C. The Bidder must state the price(s) (typewritten or in ink) both in words and numerals. Where a discrepancy occurs between the prices quoted in words and/or in numbers, the figure quoted in words shall take precedence and govern in the determining final costs or award of the contract.

D. Erasures or other changes in a Bid shall be made on the bid form and be explained or noted and dated over the signature of the Bidder prior to the bid submittal time and the sealing of the bid envelope. No alterations to the bid figures by notations on the outside of the envelope will be considered.

E. Bids containing reservations, exceptions, conditions, omissions, unexplained erasures or alterations, items not required in the bid or irregularities of any kind may be rejected by the Owner.

F. When requested by the Owner, a Power of Attorney or other satisfactory evidence of the authority of the official signing in behalf of the firm shall be furnished for the Owner's records.

G. The cost of any item whatsoever, not listed in the Bid Form, yet which is mentioned in the Specifications or shown on the Plans, shall be considered to be included in the cost of some other item of bid in the Bid Form or as part of the total bid price.

H. Information Required

1. The bidder must supply all information required by the bid **and fully complete each page of the Bid Form in Section C, and shall provide with its Bid the additional information and documents listed in this Section H. and Section I. below.**

2. Each bidder shall present evidence of its experience, qualifications and financial ability, upon the form enclosed herein, to perform the work and to satisfactorily complete the project. Qualifications information shall include the identification of the proposed on-site superintendent with relevant project experience on similar work at the same level of responsibility (complete Part III of the Section C Bid Form).

3. No bid will be received and tabulated or considered, nor any contract awarded, unless the bidder has demonstrated in the bid form that it is properly licensed as a Class A Contractor, as required under the Code of Virginia (1950), as amended (complete Part II of the Section C Bid Form).

4. Each Bidder shall complete and submit with its bid the Worker's Compensation Certificate of Coverage appearing as Part V of the of the Section C Bid Form of these contract documents. No award shall be made to any Bidder who fails to show such evidence of required Worker's Compensation coverage.

5. Every bidder shall include in its bid the identification number issued to it by the State Corporation Commission confirming that it is organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50. If the bidder is not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 or as otherwise required by law, the bidder or shall include in its bid a statement describing why the bidder is not required to be so authorized. Any bidder that fails to provide the required information shall not receive an award unless a waiver of this requirement is granted by the

Commission's Executive Director. (Complete Part VI of the Section C Bid Form.)

6. Each bidder shall provide the bid bond or security specified in Section II.A. above. (Complete Bid Bond Form found in Section C Bid Form of these bid documents)

I. Bid Package

1. Each Bidder shall present its Bid in a sealed, opaque 9 x 12 inch envelope. The outside of the envelope shall be plainly marked on the bottom left hand corner with:

Bid For: Runway 16-34 EMAS Replacement
Bid No. 24-007
Roanoke Blacksburg Regional Airport
Roanoke, Virginia
Class "A" Virginia Contractor No. _____

with the name and address of the Bidder in the upper left-hand corner. The Owner shall not be responsible for premature opening of bids not properly addressed and identified, as required herein.

2. The envelope shall contain the signed original of:

Bid Form — Fully completed with all blanks filled in and all requested information provided (see Section III.H. 1-5) and including the signature of an authorized official of Bidder and the Bidder's Class "A" Virginia Contractor's License Number;

Bid Bond — Bid Bond or Guarantee (see Section II.A.), fully completed and signed by Bidder and, if applicable, its Surety.

J. All bids shall be delivered to the Roanoke Regional Airport Commission, Administrative Offices, 5202 Aviation Drive, Roanoke, VA 24012, no later than 3:00 P.M. local time, on November 30, 2023.

K. When sent by mail, the sealed Bid, marked as indicated in I.1. above, shall be sent by certified mail with return receipt requested or by overnight express carrier. No bid will be considered unless received by the Commission on or before the time and at the place designated in the Invitation to Bid. The Commission will in no way be responsible for delays caused by the U. S. Postal Service or any other deliverer of the bid, or for delay caused by any other occurrence. Any bid received after the time specified in the Invitation to Bid for receipt of bids, shall be returned to the Bidder unopened.

L. A pre-bid meeting and site review will be provided by Commission's representatives on November 1, 2023, at 10:00 A.M. in order to assist Bidders in preparing their bid packages. Any interested bidder should arrive at the Commission Office, 5202 Aviation Dr, Roanoke, VA 24012, by the specified time in order to discuss the project and be escorted to view the site. As certain areas of work are in non-public, secure locations, all perspective bidders are strongly encouraged to attend the pre-bid meeting. No additional meetings or site reviews will be provided or allowed.

IV. INTERPRETATIONS

A. Each Bidder shall carefully examine the Contract Documents and all addenda or other revisions and thoroughly familiarize itself with the detailed requirements prior to submitting a Bid. Should a Bidder find discrepancies or ambiguities in, or omission from the Contract Documents, or should it be in doubt as to their meaning, it shall at once, and in any event, not later than 5:00 P.M. on November 14, 2023 notify Troy Philpott, the Owner's Procurement and Contracts Manager in writing of the nature of the problem or question. Said Manager will send or arrange for the sending of written Addenda and/or answers to questions to all Bidders of record who have requested a bid package. Bidders shall not seek nor be entitled to rely upon any oral instructions, statements, or interpretations by Owner or Owner's Consultant. All Addenda sent to Bidders will become a part of the Contract Documents.

B. Acknowledgment or receipt of all Addenda shall be made by each bidder in the space provided in the Bid Form.

V. MODIFICATIONS AND/OR WITHDRAWAL OF PROPOSALS

A. Prior to Bid Opening:

A Bidder may withdraw or revise (by withdrawal of one bid and submission of another) a bid, provided that Bidder's request for withdrawal is received by the Owner in writing or by telegram or fax before the time specified for opening bids. Revised bids must be received at the place specified in the Invitation to Bid before the time specified for opening all bids.

B. Withdrawal After Bid Opening:

1. A Bidder may withdraw its bid from consideration if the price bid is substantially lower than the other bids due solely to a mistake therein, provided the bid was submitted in good faith, and the mistake was a clerical mistake as opposed to a judgment mistake, and was actually due to an unintentional arithmetic error or an unintentional omission of a quantity of work, labor or material made directly in the compilation of a bid,

which unintentional arithmetic error or unintentional omission can be clearly shown by objective evidence drawn from inspection of original work papers, documents and materials used in the preparation of the bid sought to be withdrawn. The Bidder shall give notice in writing of its claim of right to withdraw its bid within two (2) business days after the conclusion of the bid opening procedure, and shall submit original work papers, documents and materials used in preparation of such bid with the written notice. The work papers, documents and materials submitted by the bidder shall, at the bidder's request, be considered trade secrets or proprietary information. The mistake shall be proved only from the original work papers, documents and materials delivered as required herein.

2. No bid may be withdrawn under this section when the result would be the awarding of the contract on another bid of the same Bidder or of another bidder in which the ownership of the withdrawing bidder is more than five (5) percent.

3. If a bid is withdrawn under the authority of this section, the lowest remaining responsive and responsible bid shall be deemed to be the low bid.

4. No Bidder who is permitted to withdraw a bid shall, for compensation, supply any material or labor to or perform any subcontract or other work agreement for the person or firm to whom the contract is awarded or otherwise benefit, directly or indirectly, from the performance of the project for which the withdrawn bid was submitted.

5. The Executive Director shall notify the bidder in writing within five business days of the decision regarding the bidder's request to withdraw its bid. If the Commission's Executive Director denies the withdrawal of a bid under the provisions of this Section, the Executive Director shall notify the Bidder and Commission in writing shall state in such notice the reasons for the decision and shall recommend award of the Contract by Commission to such Bidder at the bid price, provided such Bidder is a responsible and responsive bidder. At the same time that the notice is provided, the Commission shall return all work papers and copies thereof that have been submitted by the bidder.

VI. REJECTION OF BIDS

A. Bids containing any omission, alterations of form, additions, exceptions or conditions not called for, conditional or alternate bids unless called for, or incomplete bids may be considered nonresponsive, irregular, or informal and may be rejected.

B. If the bid from the lowest responsible and responsive bidder exceeds funds budgeted and tentatively allocated for this specific project, the Executive Director may negotiate with the apparent low bidder to obtain a contract price

within available funds. The Executive Director shall determine that the lowest responsible and responsive bid exceeds funds available for this project and notify such bidder in writing of the Commission's desire to negotiate. Thereafter, negotiations with the apparent low bidder may be held to obtain a contract within available funds involving discussions of reduction of quantities, or other cost saving mechanisms. Any such negotiated contract shall be subject to the Commission's final approval.

C. The Commission reserves the right to award the Contract to a Bidder other than the apparent low Bidder if such bidder is not the lowest responsible and responsive bidder. Should a contract be awarded to a Bidder other than the apparent low Bidder, it will be awarded to the lowest responsive and responsible Bidder meeting all requirements of these Contract Documents.

D. The Commission reserves the right to accept or reject alternates in any order or combination, to waive any informalities or irregularities in any bid, to accept any part of or combination of bids, to reject any or all bids, and to re-advertise and rebid, should any said action be deemed to be in the best interest of the Commission.

VII. AWARD AND EXECUTION OF CONTRACT

A. Consideration of Bids and Award of Contract

The Commission reserves the absolute right to consider all bids and to determine, after such consideration, whether to award a contract for the Project. If a contract is awarded, the award will be to the lowest responsive and responsible bidder selected by the Commission; as such award may be evaluated to be in the best interest of the Commission. No award will be made until the Commission has concluded such investigations as it deems necessary to establish the responsibility, qualifications and financial ability of the bidders and their products to perform in accordance with the contract documents to the satisfaction of the Commission within the time prescribed. The Commission reserves the right to reject the bid of any bidder who does not pass such investigation to the Commission's satisfaction. If the Contract is awarded, the Commission will give the successful bidder written notice of the award within ninety (90) calendar days after the opening of the bids. Until the final execution and delivery of the Contract back to the successful bidder, the Commission reserves the right to reject any or all bids, to waive informalities, technicalities or non-material defects or to advertise for new bids, or to proceed to do the work otherwise should any such action be deemed to be in the best interests of the Commission.

B. Acceptance of Bid

As soon as the bids have been reviewed and compared, which shall occur within ninety (90) consecutive calendar days after the Bid Opening date, the

Roanoke Regional Airport Commission may give written "Notice of Bid Acceptance." The successful bidder shall be required, within fifteen (15) consecutive calendar days after the receipt of the "Notice of Bid Acceptance" to execute the Contract and return the Contract to the Commission.

C. Execution of Contract

The successful Bidder shall sign (execute) the Contract and return such signed Contract to the Owner, along with required insurance certificates and completed bond forms within fifteen (15) calendar days from the date of receipt of the Notice of Award by Owner. If the successful Bidder shall fail to execute the Contract within such fifteen (15) day period, the Commission may require forfeiture of the Bid Security, pursue any other remedies available at law or in equity, rescind the contract award and/or the Commission may then proceed to accept the Bid of the next lowest responsive and responsible Bidder. If the Contract is mailed, special handling is recommended.

D. Approval of Contract

Upon receipt from the successful bidder of required insurance documents, the executed Contract, the Performance and Payment Bonds, the construction schedule and any other required documents, the Owner may complete the execution of the Contract in accordance with applicable laws, and return a copy of the fully executed Contract to the Contractor. No contract is binding upon the Owner until it has been executed by the Owner and delivered to the Contractor. Work shall commence only upon Contractor's receipt of a written notice to proceed from Owner.

E. Failure to Execute Contract

Failure of the successful bidder to execute the Contract and furnish the required insurance documents and bonds within the 15 calendar days period after receiving Notice of Award shall be just cause for cancellation of the award. An award may then be made to the next lowest responsive and responsible bidder, or the work re-advertised, or handled as the Owner may determine in its sole and exclusive discretion.

F. Failure to Accept Bids

Should no "Notice of Bid Acceptance" be issued by Owner within ninety (90) consecutive calendar days after the opening of bids, each Bidder may have its bid security returned from Owner.

GENERAL CONDITIONS

SECTION B

B. GENERAL CONDITIONS

1. Contract Documents

Contract Documents ("Contract") shall include: the Invitation to Bid, Instructions to Bidders, Completed Bid Forms, Addenda issued to Bidders, Completed Contract Form, General Conditions, Performance Bond, Labor and Material Payment Bond, Technical Specifications, Drawings, Supplementary Drawings, Appendices, and any Supplemental Agreements between the parties.

2. Time of Completion (Contract Time), Notice to Proceed and Liquidated Damages

A. Contract Time. The work under this Contract shall be completed and final acceptance issued by the Owner in accordance with Subparagraph B below.

B. Administrative Notice to Proceed. The Contractor will be issued two Notices to Proceed for the work under this Contract. The first Notice to Proceed for **Administrative Services** will be issued upon the return of the executed Contract to Contractor. During this time, Contractor will attend a preconstruction conference, prepare, submit and have approved work and phasing schedules, safety plans, color samples, other required submittals, etc.; arrange for its employees and/or subcontractors to be background checked, trained and badged for access to and work within the airport secured areas; and order supplies and other equipment needed for the project. All work preliminary to the actual start of labor at the Airport must commence within ten (10) calendar days and completed within seventy-five (75) calendar days of the effective date of the first Notice to Proceed. Review time by the Owner and/or Engineer during which Contractor can undertake none of the administrative tasks shall not be counted as part of this time period.

The second Notice to Proceed will be for **Construction Notice to Proceed and Mobilization Period**. This will be issued immediately following the Administrative Notice to Proceed. All work shall commence within ten (10) calendar days and shall be Substantially Complete within thirty (30) calendar days of the effective date of the Notice to Proceed.

The third Notice to Proceed will be for **Performance of the Work Phase 1 - Runway 16-34 Closure**, which will be issued by Owner at the expiration of the administrative phases. All work on site shall commence within two (2) calendar days and shall be Substantially Complete within thirty-five (35) calendar days of the effective date of the Notice to Proceed, including all inspections and testing procedures required by these contract documents. Note that the 35 calendar days includes five (5) weather/delay days.

The fourth Notice to Proceed will be for **Performance of the Work Phase 2 – Runway 16-34 Nightly Closures/Construction Completion**, which will be issued

by Owner at the expiration of the previous phase. All work on site shall commence within ten (10) calendar days and shall be Substantially Complete within thirty (30) calendar days of the effective date of the Notice to Proceed, including all inspections and testing procedures required by these contract documents.

In the event that Contractor fails to complete the Administrative work within the time allowed, Owner may still issue the second notice to proceed; however, Contractor may not enter the work site or begin work at the airport prior to the obtaining of all required permits and receipt of security badges and the approval of all required submittals, nor shall the following phases calendar days be tolled while the contractor is unable to work. In such case, Owner would also have a basis for canceling the Contract for cause in accordance with the Contract Documents.

The Contractor shall notify the Owner and the Consultant at least 48 hours in advance of the time any operations will begin at the Airport.

C. Liquidated Damages. Time is of the essence in the completion of this Contract. The Contract Documents contain provisions for liquidated damages, including without limitation, liquidated damages for failure to complete each phase of the Work in a timely manner and a waiver by Contractor of any defenses as to the validity of such liquidated damages. Contractor acknowledges and agrees that the Contractor has been advised of such liquidated damages and has reviewed and agreed to all liquidated damages provisions in the Contract Documents, including, without limitation, Contractor's waiver of any defenses as to the validity of such liquated damages based on such liquidated damages being void as penalties or not being reasonably related to actual damages.

3. **Owner's Representative**

In addition to Owners employees, Owner has contracted for the services of a Consultant to draft and interpret technical specifications and to provide oversight for the Project.

Whenever in these Contract Documents reference is made to "Consultant", "Architect" or "Engineer," it is intended to mean RS&H, Inc. and any other consultant contracted by the Owner to assist on this project.

4. **Authority of the Consultant**

The Consultant shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, and as to the manner of performance and rate of progress of the Work. It shall decide all questions which may arise as to the interpretation of the specifications or plans relating to the Work and the fulfillment of the contract on the part of the Contractor. The Consultant

shall determine the amount and quality of the several kinds of work performed and materials furnished which are to be paid for the under contract.

5. **Conformity with Drawings and Specifications**

If the Consultant finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the Contract Documents, but that the portion of the Work affected will, in its opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, it will advise the Owner of its determination that the affected work be accepted and remain in place. In this event, the Consultant will document its determination and recommend to the Owner a basis of acceptance which will provide for an adjustment in the contract price for the affected portion of the work. The Consultant's determination and recommended Contract price adjustments will be based on good consulting judgment and such tests or retests of the affected work as are, in its opinion, needed. Changes in the contract price shall be covered by contract modifications (change order or supplemental agreement) as applicable.

If the Consultant finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the drawings and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the Owner's and/or Consultant's written orders.

For the purpose of this subsection, the term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the Work in accordance with the contract, drawings, and specifications. The term shall not be construed as waiving the Consultant's right to insist on strict compliance with the requirements of the Contract Documents, during the Contractor's prosecution of the Work, when, in the Consultant's opinion, such compliance is essential to provide an acceptable finished portion of the Work or for the Project.

For the purpose of this subsection, the term "reasonably close conformity" is also intended to provide the Consultant with the authority to use good professional judgment in its determinations as to acceptance of work that is not in strict conformity but will provide a finished product equal to or better than that intended by the requirements of the Contract Documents.

6. **Coordination of Contract, Drawings, and Specifications**

The Contractor shall not take advantage of any apparent error or omission on the Contract Documents. In the event the Contractor discovers any apparent error or discrepancy, it shall immediately call upon the Consultant for its interpretation and decision, and such decision shall be final.

7. **All Costs Included**

The Contractor shall provide and pay for all permits, materials, equipment, labor, demolition, transportation, inspections, disposal costs, delivery charges, fuel, telephone, room and board expenses, and all other facilities and incidentals necessary for the execution and completion of the work as described in the Contract Documents. No amount in addition to the bid price will be paid Contractor for any of the work or services specified in the Contract Documents.

All materials and equipment added and incorporated in the work shall be new, unless otherwise specified. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

8. **Laws to Be Observed**

Contractor expressly warrants that in the performance of the Work it shall comply with all applicable laws, codes, regulations, standards, etc., which may be required of it by all applicable local, state and federal jurisdictions and their respective agencies, offices, bureaus, and other administrative/regulatory entities, including, but not limited to, all local, state and federal ordinances, laws and regulations, concerning building and fire codes, solid waste and environmental matters, FAA, TSA and airport security regulations, and all applicable sections of the Occupational Safety and Health Act (OSHA), the Virginia Uniform Statewide Building Code.

The Contractor shall be responsible for arranging all inspections by local authorities for compliance with all building code requirements, ordinances and regulations.

9. **Permits, Licenses, and Taxes**

The Contractor shall be solely responsible for providing and shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the Work.

The Contractor shall obtain or possess a valid Contractor's Business License in accordance with any applicable City of Roanoke Ordinances.

A City of Roanoke Building permit is required for this project.

10. **Airport Security**

A. <u>Work Area and Badges</u>

This project shall be located outside the Airport Air Operations Area (AOA), Secured Area, SIDA and Sterile Area; therefore, no identification badges

shall be required. However, Contractor acknowledges that the areas within the airport fence line are parts of a highly restricted access area. Contractor agrees to be responsible for, and to ensure that, none of its employees, agents, subcontractors or representatives gains access, enters or moves about the area inside the fence line, the baggage claim area, or the terminal concourse. Contractor, its employees, agents, subcontractors and representatives shall comply with the requirements of Owner's federally mandated security program at Contractor's sole cost and shall be subject to the penalties of such program.

B. Remaining within Work Site

Contractor shall delineate limits of construction and access with its employees daily. None of Contractor's employees or those of its subcontractors should move beyond or outside such limits without authorization of the Owner. Violators are subject to removal from the jobsite.

11. **Prosecution and Progress**

The Contractor shall bring to the Preconstruction Conference its progress schedule for the Consultant's approval. The Contractor's progress schedule, when approved by the Consultant, may be used to establish major construction operations and to check on the progress of the Work. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the drawings and specifications within the time set forth in the Contract Documents.

If the Contractor falls behind the submitted schedule, the Contractor shall, upon the Consultant's request, submit a revised schedule for completion of the Work within the contract time and modify its operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the prosecution of the Work be discontinued for any reason, the Contractor shall notify the Consultant at least 48 hours in advance of resuming operations.

The Contractor shall not commence any work prior to the effective date on which the notice to proceed is issued by the Owner. Once begun, the Contractor shall perform the work continuously until completion.

12. **Character of Workers, Methods, and Equipment**

The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the Contract Documents.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily. Neither Contractor nor its employees, agents,

invitees or subcontractors shall bring any firearms or other weapons onto airport property; nor shall any person come onto or remain upon airport property while under the influence of alcohol or illegal drugs.

Any person employed by the Contractor or by any subcontractor who, including the project superintendent, in the opinion of the Consultant, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Consultant or Owner, be removed forthwith by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the Work without the consent of the Consultant or Owner.

Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient personnel for the proper prosecution of the Work, the Consultant may suspend the Work by written notice until compliance with such orders.

All equipment which is proposed to be used on the Work shall be of sufficient size and in such mechanical condition as is necessary to meet requirements of the Work and to produce a satisfactory quality of Work. Equipment used on any portion of the Work shall be such that no injury to previously completed Work, adjacent property, existing airport facilities or persons will result from its use.

No gunpowder-activated equipment shall be utilized on this project.

When the methods and equipment to be used by the Contractor in accomplishing the Work are not prescribed in the Contract, the Contractor is free to use any methods or equipment that will accomplish the Work in conformity with the requirements of the Contract Documents.

When the Contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Consultant. If the Contractor desires to use a method or type of equipment other than specified in the Contract, it may request authority from the Consultant to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with Contract requirements. If, after trial use of the substituted methods or equipment, the Consultant determines that the work produced does not meet Contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the Consultant may direct. No change will be made in basis of payment for the Contract items involved or in Contract time as a result of authorizing a change in methods or equipment under this subsection.

13. **Cooperation of Contractor**

The Contractor will be supplied with four copies each of the Drawings and Technical Specifications. It shall have available at the work site at all times one copy each of the drawings and specifications, along with a record of all field deviations and revisions. Additional copies of drawings and specifications may be obtained by the Contractor for the cost of reproduction.

The Consultant shall notify the Contractor as to the location, date, and time of a Preconstruction Conference to confirm and discuss matters pertaining to scheduling and execution of the Work. The Contractor shall bring to the Preconstruction Conference a detailed progress and phasing schedule for the project. Once the Contractor's plan is approved, any deviations must receive the Consultant's approval.

The Contractor shall give constant attention to the Work to facilitate the progress thereof, and it shall cooperate with the Owner and Consultant and any inspectors and with other contractors in every way possible. The Contractor shall have a competent superintendent or foreman on the Work at all times who is fully authorized as its agent on the work, and who will be available to contact on a 24-hour basis throughout the duration of the Contract. The superintendent or foreman shall be capable of reading and thoroughly understanding the drawings and specifications and shall receive and fulfill instructions from the Consultant or its authorized representative.

As part of its bid, the Contractor shall provide the resume of and work references for the proposed job superintendent, who shall have similar and relevant project experience with the same level of responsibility prior to award of the contract. The Owner specifically retains the right to reject such project superintendent if the level and type of prior experience, or the references from prior projects, are not considered by the Owner to be good and adequate. If the Owner rejects the proposed Superintendent, or should a replacement superintendent be required prior to completion of the project, Contractor shall provide information regarding a replacement and Owner shall have the right of approval of replacement superintendent.

The Contractor shall meet with a representative of Owner at the beginning of each work day to discuss and coordinate the anticipated work tasks, deliveries, and tenant operational issues.

Should the Contractor encounter conditions differing from those shown on the Drawings or mentioned in the Specifications, or encounter work not covered by the contract to be in need of repair, it shall immediately give notice to the Consultant. The Consultant will promptly investigate the conditions and direct the Contractor as to the changes or repairs that will be required to correct the conditions.

14. **Alteration of Work and Quantities**

A. Change Orders. The Owner reserves and shall have the right to make such alterations in the Work as may be necessary or desirable to complete the Work originally intended in an acceptable manner. All changes in the Work shall be effectuated by prior written change orders issued by the Consultant and approved and signed by the Consultant, Owner, and the Contractor or subsequent to a Construction Change Directive as described herein. Change orders for altered work shall include extensions of Contract time where, in the Consultant's opinion, such extensions are commensurate with the amount and difficulty of added work and/or they affect the critical path for the Project.

If the Owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a change, the Owner reserves the right to terminate the Contract with respect to the item and make other arrangements for its completion.

The Contractor's performance and payment bond surety shall waive notice of, and in the bond shall consent to, any subsequent additions, deletions, alterations, extensions, or forbearances relative to the Project and the Contractor's obligations under the Contract Documents, including without limitation the amount of Work to be done, the amount of payment for such Work, or the time allocated to complete such Work. The Surety shall agree to be bound to the full extent of the bond amount for any such additions, deletions, alterations, extensions, or forbearances concerning the Project and the Contractor's obligations under the Contract Documents.

Except as specified in Section B. Construction Change Directives below, no change, alteration, addition or deletion with respect to the Work shall be made by the Contractor unless authorized by prior written change order issued by the Consultant and endorsed in writing by the Owner. The Contractor shall submit requests for changes in the Contract price and/or completion time in writing to the Consultant within ten (10) calendar days of any occurrence claimed as the basis for the need for a change. The Contractor shall be required to certify the cause of the change order and, if appropriate, length of time involved. Contractor's failure to give such 10-day written notice of such occurrence giving rise to the need for a change order shall be deemed a waiver by the Contractor of any claim for additional compensation and/or contract time relative to the occurrence. Should the Consultant deny Contractor's request for the desired change order for additional compensation or completion time, any claim by Contractor with Owner shall be filed in accordance with the requirements of Subsection 37 below.

B. Construction Change Directives. A construction change directive is a written order prepared by the Consultant and signed by the Owner and Consultant, directing a change in the Work prior to agreement on adjustment, if any, in

the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

1. A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

2. If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

    a. Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
    b. Unit prices stated in the Contract Documents or subsequently agreed upon;
    c. Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
    d. As provided in Section 6 below.

3. If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

4. Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Consultant of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

5. A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

6. If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Consultant shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is

set forth in the Agreement, a reasonable amount. In such case, and also under Section 2.c. above, the Contractor shall keep and present, in such form as the Consultant may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section. shall be limited to the following:

a. Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
b. Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
c. Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
d. Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
e. Additional costs of supervision and field office personnel directly attributable to the change.

7. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that result in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Consultant. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

8. Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Consultant will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Consultant determines, in the Consultant's professional judgment, to be reasonably justified. The Consultant's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of Contractor to disagree and assert a Claim in accordance with Section 37 herein.

9. When the Owner and Contractor agree with a determination made by the Consultant concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Consultant will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

C. In determining the cost to the Owner resulting from either an increase or a decrease in the Work, by either Change Order or Construction Change Directive, when no unit price has been bid or agreed upon, the allowances

for overhead and profit combined, included in the total cost to the Owner, shall not exceed the percentages as follows:

1. For the Prime Contractor, for any Work performed by its own forces, 15% of the cost;
2. For the Prime Contractor, for Work performed by his Subcontractors, 7% of the amount due the Subcontractor;
3. For each Subcontractor involved, for Work performed by its own forces, 15% of the cost;
4. For each Subcontractor, for Work performed by its lower tier Subcontractors, 7% of the amount due the lower tier Subcontractor.

15. **Public Convenience and Safety**

The Contractor shall control its operations and those of its subcontractors and all suppliers, to assure the least inconvenience to the airport tenants and the traveling public. Under all circumstances, safety shall be the most important consideration.

16. **Barricades, Warning and Notification Signs, and Hazard Markings**

The Contractor shall furnish, erect, and maintain all barricades, warning and notification signs, and markings for hazards necessary to protect airport employees, airport tenants, the public and the Work. During any work on or around the Terminal or elsewhere as appropriate, the Contractor shall install the proper barricades and signage to isolate half of the tug driveway at a time as the designated work area. Contractor shall coordinate placement of signs and other requirements for signs with the Owner. Signs shall be metal with wording, lettering size and type of stands determined by the Owner. Cost of signs and stands to be included in the price bid for other items.

17. **Opening Sections of the Work**

Should it be necessary for the Contractor to complete portions of the Contract Work for the beneficial occupancy of the Owner prior to completion of the entire Contract, such "phasing" of the Work shall be specified herein and indicated on the Drawings. When so specified, the Contractor shall complete such portions of the Work on or before the contract time of completion specified or as otherwise specified. The Contractor shall make its own estimate of the difficulties involved in arranging its work to permit such beneficial occupancy by the Owner.

The Contract phasing will be as described in the contract documents and as presented by Contractor and specifically approved by Owner. Upon completion of any portion of the Work to satisfy the phasing requirements, such portion may be accepted by the Owner in accordance with the subsection titled PARTIAL ACCEPTANCE, Subsection 30 of Section B.

No portion of the Work may be opened by the Contractor for public use until authorized by the Consultant in writing. Should it become necessary to open a portion of the Work to public traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the Consultant, such portion of the Work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the Contract. Any damage to the portion of the Work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at its expense.

The Contractor shall make its own estimate of the inherent difficulties involved in completing the Work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the Contract Work.

18. **Maintenance During Construction**

The Contractor shall maintain the Work during construction and until the Work is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

All costs of maintenance work during construction and before the project is accepted shall be included in the price bid for the Work, and the Contractor will not be paid an additional amount for such work.

19. **Contractor's Responsibility for Work**

Until the Consultant's final written acceptance of the entire completed Work, excepting only those portions of the work accepted in accordance with the subsection titled PARTIAL ACCEPTANCE, Subsection 30 of these General Conditions, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to any cause, whether arising from the execution or from the no execution of the Work. The Contractor shall repair, restore, and make good all injuries or damages to any portion of the Work occasioned by any of the above causes before final acceptance and shall bear the expense thereof.

If the Work is suspended for any cause whatever, the Contractor shall be responsible for the Work and shall take such precautions necessary to prevent damage to the Work.

20. **Failure to Maintain the Work**

Should the Contractor at any time fail to maintain the Work as provided in the subsection titled MAINTENANCE DURING CONSTRUCTION, Subsection 18 of these General Conditions, the Consultant shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within

which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the Consultant's notification, the Consultant may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be deducted from monies due or to become due the Contractor.

21. **Risk of Loss**

Risk of loss or damage from any source shall not pass to the Owner until final acceptance.

The Contractor shall immediately replace missing or damaged equipment or materials and will be responsible for making any and all claims against carriers.

22. **Maintenance of Traffic**

It is the explicit intention of the Contract that the safety of the public, airport employees, airport tenants, and the Contractor's equipment and personnel is the most important consideration. It is understood and agreed that the Contractor shall provide for the free, unobstructed and safe movement of members of the public in the public areas of the airport with respect to its own operations and the operations of all its subcontractors.

With respect to its own operations and the operations of all its subcontractors, the Contractor shall provide markings, lighting, signing, flagging, barricades and other acceptable means of identifying: personnel, equipment, storage areas, and any work area or condition that may be hazardous to the passage of the public and airport employees and tenants and/or required by the Owner.

23. **Maintenance of Work Site and Daily/Nightly Return of Work Area to Operational Condition**

At the completion of each work day or night work session, any and all areas of construction activities shall be left in a condition whereby normal passenger operations can be conducted without subjecting passengers, employees and tenants to hazardous or unsafe conditions.

- All public areas shall be open and safely accessible to the public, unless otherwise noted herein.

- All material storage, removal and installation operations shall not obstruct safe entrances and/or exits to the Terminal Building, except as required by the Work and approved by the Owner. All materials, equipment and vehicles shall be removed from the work area at the end of each day’s work, with the possible exception of the work area barricade, marking and lighting systems.

- **All debris shall be removed, and all work area demolition removal routes cleaned; waste and loose material capable of causing damage to aircraft landing gears, propellers or being ingested in jet engine, shall not be placed, permitted to drop or be blown by the wind or jet blast onto the aircraft ramp at any time. Material tracked on or near this area shall be removed continuously during the Work. All debris must be containerized; no open-topped debris containers or dumpsters will be allowed. Use magnetic broom equipment continuously to control metallic materials on the aircraft parking ramp and the entrances onto the ramp.**

- All material and stock shall be secured and barricaded at locations determined by the Owner and shall not unduly obstruct Airport operations.

24. **HAZARDOUS AND OTHER WASTES, MATERIAL AND SUBSTANCES**

A. Contractor shall not dispose of or release any wastes of any kind, whether hazardous or not, on Owner's premises.

B. Contractor shall remove from the airport all waste and debris arising from its work at the airport and shall dispose of it properly, in accordance with all applicable laws. In particular, Contractor shall remove all new, used and empty paint containers; all new and used lubricants, sealants, solvents and cleaners; and rags, cloths, etc. used in conjunction with the Work.

C. Contractor shall not bring or allow or permit to be brought onto the Premises any hazardous, toxic or petroleum material substance not required for the Work. Contractor shall not dispose of or release onto or from the Premises any hazardous, toxic or petroleum material, substance, or waste. Compliance with all environmental laws shall be Contractor's sole responsibility at its sole cost. Contractor shall immediately furnish to the Executive Director written notice of any and all releases of hazardous wastes, materials or substances whenever such releases are required to be reported to any federal, state or local authority, and pay for all clean up and removal costs. Such written notice shall identify the substance released, the amount released, and the measures undertaken to clean up and remove the released material and any contaminated soil or water, and shall further certify that no contamination remains. Contractor shall also provide Commission with copies of any and all reports resulting from tests on Airport Property or made to any governmental agency, which relate to Airport property.

D. Regardless of Commission's acquiescence and in addition to indemnification provisions contained elsewhere in this Agreement, Contractor shall defend, indemnify, and hold Commission its officers, officials, board members, agents, and employees, harmless from all costs, liabilities, fines or penalties, including attorney's fees, resulting from or arising out of

violation of this section and agrees to reimburse said parties for any and all costs and expenses incurred in eliminating or remedying such violations. Contractor further covenants and agrees to reimburse Commission and hold Commission its officers, agents and employees harmless from any and all costs, expenses, attorney's fees and all penalties or civil judgments obtained against the Commission as a result of Contractor's use, release or disposal of any petroleum product, hazardous substance, material, or waste onto the ground or into the water or air. Contractor agrees to waive any and all statutes of limitations applicable to any controversy or dispute arising under this section and Contractor further agrees that it will not raise or plead a statute of limitations defense in any action arising out of Contractor's failure to comply with the provisions contained in this section.

25. **Source of Supply and Quality Requirements**

The materials used on the Work shall conform to the requirements of the Contract Documents.

Unless otherwise indicated, it is understood and agreed that any item offered or shipped by the Contractor shall be in NEW AND FIRST-CLASS CONDITION, that all containers shall be new and suitable for storage or shipment, and that prices include standard commercial packaging or preparation and delivery costs for the items shipped.

All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, or fabricator, except as otherwise specifically provided in the Contract Documents.

26. **Inspection of the Work**

All materials and each part or detail of the Work shall be subject to inspection by the Consultant. The Consultant shall be allowed access to all parts of the Work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the Consultant requests it, the Contractor, at any time before acceptance of the Work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the Work to the standard required by the specifications. Should the Work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as Extra Work; but should the Work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

27. **Tests and Inspections**

Tests, inspections, and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations, or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Consultant timely notice of when and where tests and inspections are to be made so that the Consultant may be present for such procedures.

If the Consultant, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not required by the preceding paragraph, the Consultant will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Consultant of when and where tests and inspections are to be made so that the Consultant may be present for such procedures. Such costs, except as provided in the following paragraph, shall be at the Owner's expense.

If tests, inspections, or approvals reveal failure of portions of the Work to comply with requirements of the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Consultant's services and expenses shall be at the Contractor's expense.

28. **Unacceptable Materials**

Any material or assembly or method of removal or installation that does not conform to the requirements of the Contract Documents shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the Work, unless otherwise instructed by the Consultant.

No rejected material or assembly, the defects of which have been corrected by the Contractor, shall be returned to the site of the work until such time as the Consultant has approved its use in the work.

29. **Removal of Unacceptable and Unauthorized Work**

All Work which does not conform to the requirements of the Contract Documents will be considered unacceptable, unless otherwise determined acceptable by the Consultant as provided in the subsection titled CONFORMITY WITH DRAWINGS AND SPECIFICATIONS, Subsection 5 of these General Conditions.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of the Subsection 19 titled CONTRACTOR'S RESPONSIBILITY FOR WORK of these General Conditions.

Work done contrary to the instructions of the Consultant, work done beyond the lines shown on the Plans or as given, except as herein specified, or any extra work done without an executed change order, will be considered as unauthorized and will not be paid for under the provisions of the Contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply forthwith with any order of the Consultant made under the provisions of this subsection, the Consultant will have authority to cause unacceptable work to be remedied or removed and replaced and unauthorized work to be removed and to deduct and/or offset the costs (incurred by the Owner) from any monies due or to become due the Contractor.

30. **Partial Acceptance**

If at any time during the prosecution of the project the Contractor fully completes a usable unit or portion of the Work, the occupancy of which will benefit, or is required by, the Owner, it shall request the Consultant to make final inspection of that unit. If the Consultant finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, he may accept it as being completed; provided that such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract, nor shall it start any warranty period prior to the entire Project being accepted.

Reference is made to Subsection 2, TIME OF COMPLETION, NOTICE TO PROCEED AND LIQUIDATED DAMAGES, in these General Conditions and to Sections 3, TERM, and 4, CONTRACT SUM AND LIQUIDATED DAMAGES, of the Contract.

31. **Final Acceptance**

Upon due notice from the Contractor of presumptive completion of the entire project, commonly referred to as Substantial Completion, the Consultant and Owner will make an inspection.

If all construction provided for and contemplated by the Contract is found to be completed in accordance with the Contract Documents, including, without limitation, drawings, supplementary drawings, and specifications, such inspection shall constitute the final inspection, and the Owner shall notify the Contractor in writing of Final Acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Contractor shall proceed to correct the unsatisfactory work, commonly referred to as the "punch list", within fourteen (14) consecutive calendar days. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the Consultant will make the Final Acceptance and notify the Contractor in writing of this acceptance as of the date of the final inspection. **Final Acceptance shall be achieved within the Contract Time (refer to Subsection 19 and Subsection 38 of these General Conditions).**

If the Consultant is required to conduct more than the two (2) final inspections outlined above, the charges for the Consultant's services associated with such additional inspections shall be deducted and/or offset by the Owner from the Contractor's final payment for the project.

32. **Contractor's Warranties**

The Contractor expressly warrants that all aspects of the Work shall be of good and merchantable quality and fit for the particular purpose for which intended. In addition to and not in lieu of any other warranties, express or implied, the Contractor expressly warrants and guarantees the Work against defects or deficiencies in all material and workmanship and shall maintain, repair or replace, solely at its own cost and expense including, without limitation, any cost of labor, materials or travel, any work that is found by the Owner to be defective, within a period of one (1) years from the date of Final Acceptance of the Work.

The establishment of the time period of one (1) years after Final Acceptance relates only to the specific Contractual obligation of the Contractor to correct the Work, and has no relationship to and is in addition to and not in lieu of any manufacturer's warranty, the time within which Contractor's obligations to comply with the Contract Documents may be sought to be enforced, nor the time within which proceedings may be commenced to establish the Contractor's liability with the respect to any of its obligations other than specifically to correct the Work.

If the Contractor, after notice, fails to proceed promptly to comply with the terms of the express warranty contained in these General Conditions, the Owner may have the defects corrected and the Contractor and its Surety shall be liable for all expense incurred.

This warranty shall be in addition to and not in lieu of any and all other applicable and required warranties, as specified in these contract documents, including, without limitation, manufacturer’s, special, express or implied warranties.

33. **Subletting of Contract**

Contractor shall not assign this Contract or any of its rights or duties hereunder, nor shall Contractor subcontract any of the Work hereunder, without the prior written consent of the Owner's Executive Director or designee. In the event of

authorized assignment or subcontracting, the Contractor shall file copies of all assignments and subcontracts with the Owner.

The Owner will not recognize any subcontractor on the Work. The Contractor shall at all times, when work is in progress, be represented either in person or by a qualified superintendent or foreman from its staff. The qualified representative shall be duly authorized to receive and execute orders of the Owner and/or Consultant.

The Contractor may only replace or add subcontractors with the prior written consent of the Owner.

Upon Owner's request(s), Contractor shall provide a listing of all subcontractors for the projects, including name, contact, address, phone, work to be performed, contract price, and amount actually paid.

34. **Certificate for Payment**

A. Before submittal of the first partial payment request under the Contract, the Contractor shall prepare for review and approval of the Consultant and the Owner, a schedule of the estimated values listed by trades or by specification sections of the Work, totaling the Contract Price. Where the total project has multiple parts or phases, the Contractor shall prepare appropriate schedules of values to facilitate reviews and justifications for payments.

B. The "Value of Work Completed" portion of the form shall be completed, the Contractor's certification completed and signed, and the appropriate substantiating material attached to each Certificate for Payment.

C. The labor progress for any task or activity shall be calculated upon the percentage of Work complete up to fifty percent (50%) of the completion of the task or activity. Thereafter, the evaluation of labor progress will be based upon the effort required to complete that task or activity. The material progress shall be calculated as the invoiced dollar cost of materials used in relationship to the amount estimated as necessary to complete a particular element of Work. When calculating material progress, credit shall be given for installed material which has been certified by the Engineer.

D. Should Work included in previous submittals, and for which payment has been made, subsequently be identified, by tests, inspection, or other means, as not acceptable or not conforming to Contract requirements, the "Value of Work Completed" portion of the first form submitted after such identification shall be modified to reduce the "completed" value of that work by deleting the value of that which has been identified as not acceptable or nonconforming.

35. **Payment to Contractor**

PROGRESS PAYMENTS: Unless otherwise provided by the Contract Documents and based upon Certificate for Payment form approved by and submitted to the Consultant by the Contractor and upon a Recommendation for Payment issued by the Consultant, the Owner shall make Progress Payments to the Contractor on account of the Contract Sum not later than the last day of the succeeding calendar month for all Work satisfactorily performed under and in accordance with the requirements of this Contract during the preceding monthly period ending on the 25th day of the preceding month. The Contractor's Certificate for Payment shall be submitted to the Consultant not later than the first day of each month, who shall, if it approves the same, issue to the Owner, with copy to the Contractor, a Recommendation of Payment thereon. To insure the proper performance of this Contract, the Owner shall retain five percent (5%) of the amount of each approved Certificate for Payment until all of the Work provided for in the Contract Documents is fully completed, as determined by Consultant and Owner, and Owner has issued final acceptance of the Work.

The preparation, submission and approval of all Certificates for Payment and Recommendation for Payment shall be in accordance with the provision of the Contract Documents.

FINAL PAYMENT. Final payment, constituting the entire unpaid balance of the Contract Sum, but less such sum to which the Owner is entitled pursuant to the Contract Documents as liquidated damage for delay in timely completion of the work or damages/costs pursuant to Section 5 of the Contract, shall be paid by the Owner to the Contractor within thirty (30) days after completion of the Work, provided the Work has been fully and satisfactorily completed, the Contract duly performed, Final Acceptance has occurred, the Lien and Claims Release and the Warranty of Construction forms have been completed and submitted by Contractor, a Certificate for Payment marked "Final," has been issued by the Consultant, and the Owner's Executive Director has accepted in writing all said work.

A separate request for payment of all sums retained by the Owner is required upon approval of Final Payment.

Prior to receiving any payments under this Contract, if the Contractor is an individual, the Contractor shall provide their social security number to the Owner and if the Contractor is a proprietorship, partnership, or corporation, the Contractor shall provide its federal employer identification number to the Owner.

36. **Payments to Subcontractors**

If Contractor has used any subcontractor to perform work required under the Contract Documents, Contractor must take one of the following actions within seven (7) days after receipt of the amount paid to Contractor by Owner for work performed by the subcontractor:

A. Pay the subcontractor for the proportionate share of the total payment received from the Owner attributable to the work performed by the subcontractor under that contract; or

B. Notify the Owner and subcontractor, in writing, of Contractor's intention to withhold all or part of the subcontractor's payment with the reason for nonpayment.

Contractor agrees to pay interest to subcontractor on all amounts owed by Contractor that remain unpaid after seven (7) days following receipt by Contractor of payment for Owner for work performed by subcontractor, except for amounts withheld pursuant to subparagraph (b) above. Interest on the unpaid amount will accrue at the legal rate.

Contractor agrees to include in each of its subcontracts a provision requiring each subcontractor to be subject to the same payment and interest requirements with respect to each lower-tier subcontractor.

The Contractor agrees that it shall defend, indemnify, and hold the Owner harmless for any lawful claims caused by failure of the Contractor to make prompt payments to all persons supplying it equipment, labor, tools or materials in prosecution and completion of the Work provided for in the Contract. In the event of such claims, the Owner may, after providing written notice to the Contractor, withhold from any progress and/or Final Payment the unpaid sum of money deemed sufficient to pay all lawful claims and associated costs in connection with the Contract.

37. **Claims by Contractor**

A. CONTRACTOR CLAIMS TO ENGINEER FOR CHANGE ORDERS. If for any reason the Contractor deems that additional compensation or other relief is due it, including, without limitation, work or materials not clearly provided for in the Contract, drawings, or specifications, or not previously authorized as extra work, or inadequate time for additional work, it shall notify the Engineer in writing, attaching all supporting documentation/date, of its intention to request such change order for additional compensation or time, within ten (10) calendar days of notice of the occurrence giving rise to the claimed change. Any and all such claims by Contractor for additional compensation or other relief shall be submitted first to Engineer in accordance with the provisions of this Section. The Contractor shall not begin such work or incur the expense for such materials until it receives a prior written change order executed by the Owner. If such notification is not given, or the Engineer is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional relief or compensation. Such notice by the Contractor and the fact that the Engineer has kept account of the cost of the work shall not in any way be construed as proving

or substantiating the validity of the claim. If Contractor submits its request for the claimed change order within ten (10) calendar days of notice of the occurrence giving rise to the need for the claimed change, and if Engineer should deny Contractor's request for the claimed change order or additional compensation or completion time, any claim by Contractor with Owner shall be filed in accordance with the requirements of Section B below. Nothing in this subsection shall be construed as granting Contractor a right to dispute final payment based on actual differences from Contractor's original estimates of measurements or computations.

B. CONTRACTOR CLAIMS TO OWNER. Contractual claims, disputes and other matters relating to the acceptability of the work, the interpretation or the requirements of the Agreement, or the performance or furnishing or the work, including without limitation, Engineer's denial of Contractor's request for a change order for additional money and/or an increase in time, shall be submitted in writing together with all supporting documentation/data and a request for a formal decision to the Owner's Executive Director. Contractor shall deliver the written notice with supporting data for each such claim, dispute or other matter promptly, but in no event later than ten (10) calendar days after the start of the occurrence of the event giving rise to the claim. Contractor's failure to submit written notice of such claim, dispute or other matter with the supporting data to Owner's Executive Director within the time specified shall be deemed to be and shall constitute a waiver by Contractor of any and all claims for such matters and shall be an absolute bar to any future claim or suit against Owner for damages or relief of any kind based upon such occurrence or event.. In reviewing any such claim or dispute, Executive Director may request any additional information or documentation from Contractor or other parties and may utilize appropriate assistance from other sources. Any final decision in writing by the Executive Director shall be issued to Contractor within ninety (90) calendar days from the later of: i.) receipt of the written claim; or ii.) receipt of any additional information requested from the Contractor. Failure of the Executive Director to render a decision within ninety (90) calendar days shall be deemed a final decision by the Roanoke Regional Airport Commission denying the claim, and shall not result in the Contractor being awarded the relief claimed or in any other relief or penalty.

38. **Acceptance and Final Payment**

When the Contract Work has been accepted in accordance with the requirements of Subsection 31 FINAL ACCEPTANCE of these General Conditions, and the required documents (e.g. Release of Liens and Claims, Warranties, marked up drawings and/or record drawings, etc.) have been received by Consultant, the Consultant will approve Contractor's invoice for payment and submit it to Owner for processing and payment.

If the Contractor has filed a claim for additional compensation under the provisions of Subsection 37 CLAIMS BY CONTRACTOR of these General Conditions, such claims will be considered by the Owner in accordance with local laws or ordinances and the provisions of this Contract. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

39. **Determination and Extension of Contract Time**

The number of calendar days allowed for completion of each Phase of the Work shall be stated in the Contract Documents and shall be known as the CONTRACT TIME. CONTRACT TIME based on CALENDAR DAYS shall consist of the number of calendar days stated in the Contract counting from the effective date of the Notice to Proceed and including all Saturdays, Sundays, holidays, and non-work days.

Should the Contract Time require extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

A. Weather Related: The number of calendar days specified in the Contract for performance of the Construction Work – Phase 1 includes an allowance for 86 percent of the thirty-five (35) calendar days being available for productive work, or thirty (30) calendar days.

The Contractor may request an extension in contract time, if the available days for productive work (including all Saturdays, Sundays, and holidays) are less than 86 percent, or 30 calendar days of the established Phase 1 contract time. The contract time will be extended until the allowed number of available productive days (30) is achieved.

A day will be considered available for productive work, irrespective of whether the Contractor actually worked or not, if, in the Consultant's opinion, the Contractor could have been able to proceed with a principal work item for at least a 4-hour work period. The Contractor shall notify the Consultant within five calendar days, in writing or by fax, if it considers a particular day not available for productive work in at least a 4-hour work period.

The Contractor shall keep a daily record of weather conditions noting days and hours which are not available for work in accordance with the above criteria. Such records shall be provided to the Engineer on a weekly basis. Failure to provide such records will void any potential claims for Contract Time extensions due to weather.

B. Other Causes: If the Contractor finds it impossible for reasons beyond its control to complete the Work within the Contract Time as specified, or as extended in accordance with the provisions of a written change order, it shall within five (5) calendar days of any occurrence claimed as the basis for the need for a change, make a written request to the Consultant for a change order with an extension of time setting forth the reasons which it believes will justify the granting of its request. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the Consultant finds that the work was delayed because of conditions beyond the control and without the fault of the Contractor, it may recommend that the Owner extend the time for completion in such amount as the conditions justify. Upon the Owner's concurrence and authorization as evidenced by a written change order, the extended time for completion shall be in full force and effect, the same as though it were the original time for completion.

Failure to provide written notice at the inception of the event giving rise to the need for a time extension within the time limits imposed in this Subsection will be deemed a waiver of any claim for time extension.

All calendar days elapsing between the effective dates of the Consultant's order to suspend and resume all work, due to causes not the fault of the Contractor, shall not be counted against the Contract Time. Charges against the Contract Time will cease as of the date of final acceptance as determined by the Consultant and Owner.

40. **Failure to Complete on Time**

It is mutually agreed between Contractor and Owner that time is of the essence in the performance of the Contract, and that in the event all Work required under the Contract is not fully and satisfactorily completed within the times specified, (including all extensions and adjustments as provided in Subsection 39 DETERMINATION AND EXTENSION OF CONTRACT TIME of these General Conditions, it is agreed that the Contractor and its Surety shall owe Owner and Owner may retain, deduct, and\or offset from money to be paid Contractor, the sum set forth in the Contract for each calendar day that the Work remains incomplete, not as a penalty, but as the parties' reasonable agreement of liquidation of a reasonable portion of damages that will be incurred by Owner by failure of Contractor to complete the Work with the time stipulated. Contractor covenants and agrees that the actual damages that may result from failure to complete the Work within the time required under the Contract are uncertain and difficult to determine with exactness and that the amount fixed in the Contract is not out of proportion to the probable loss. Contractor further covenants and agrees that: (a) the actual damages that may result from failure to complete the work within the time specified are uncertain and difficult to determine with exactness and that the amounts fixed as liquidated damages herein are not out of proportion to the probable loss; (b) Owner retains the right to make such retentions, deductions and/or offsets for liquidated damages at any time and that Owner's imposition and

the retention, deduction and/or offset of any liquidated damages hereunder shall not be subject to any prior notice or claim requirements; and, (c) **Contractor waives any defenses as to the validity of any liquidated damages provisions in this Contract based on such liquidated damages being void as penalties or not being reasonably related to actual damages**. It is further agreed, however, that application of liquidated damages hereunder shall not be Owner's exclusive remedy and shall not bar any other claim, cause of action, or remedy that Owner may have against Contractor under applicable law in the performance of this Contract.

Permitting the Contractor to continue and finish the Work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, shall in no way operate as a waiver on the part of the Owner of any of its rights under the Contract. It is understood that the foregoing provisions shall not limit the right of the Owner to declare a breach of Contract, and in such event, the liability of the Contractor, including liability for such liquidated damages, shall continue.

41. **Default and Termination of Contract**

The Contractor shall be considered in default of its Contract and such default will be considered as cause for the Owner to terminate the Contract for any of the following reasons. If the Contractor:

A. Fails to begin the Work under the Contract within the time specified in the "Notice to Proceed";

B. Fails to perform the Work or fails to provide sufficient workers, equipment or materials to assure completion of work in accordance with the terms of the Contract;

C. Performs the Work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable;

D. Discontinues the prosecution of the Work;

E. Fails to resume work which has been discontinued within a reasonable time after notice to do so;

F. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency;

G. Allows any final judgment to stand against it unsatisfied for a period of 10 days;

H. Makes an assignment for the benefit of creditors; or

I. For any other cause whatsoever, fails to carry on the Work in an acceptable manner, or comply with any Contract term.

Should the Owner consider the Contractor in default of the Contract for any reason stated hereinbefore, including, without limitation, delay, neglect or improper prosecution of the Work, then the Owner shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the Contract.

If the Contractor or Contractor's surety, within a period of 10 days after such notice, does not proceed to correct the cause for such notice, then the Owner shall, upon written notification from the Consultant of the facts giving rise to such notice and/or the Contractor's failure to comply with such notice, have full power and authority without violating the Contract, to declare the Contractor in default and to take the prosecution of the Work out of the hands of the Contractor. However, in the event that that Contractor's failure is a violation of law, or an act or condition that poses a risk of harm to people or their property, then Contractor shall immediately take action to cure such failure and shall complete such cure within 24 hours or risk being declared to be in default of the Contract. The Owner may appropriate or use any or all materials and equipment that have been mobilized for use in the Work and are acceptable and may enter into an agreement for the completion of the Contract according to the terms and provisions thereof, or use such other methods as in the opinion of the Consultant will be required for the completion of the Contract in an acceptable manner.

In the event that Contractor defaults in the performance of any of the terms, conditions or agreements contained in this Contract, and Owner places the enforcement of all or part of this Contract in the hands of an attorney, including the filing of a suit upon the same, Contractor agrees to pay all of Owner's reasonable attorney's fees and any costs related to any such proceeding. *All costs and charges incurred by the Owner, together with the cost of completing the Work under Contract, may be deducted, retained, and/or offset from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the Contract, then the Contractor and the surety shall continue to be liable and shall pay to the Owner the amount of such excess.*

42. SPECIAL CONDITIONS

A. COOPERATION BETWEEN CONTRACTORS

The Owner reserves the right to contract for and perform other or additional work on or near the Work covered by this contract. Separate contracts involving multiple Contractors may be underway simultaneously in, around and/or near several portions of the Work area. Contractor will be required to attend daily coordination meetings with other Contractors and Owner at the direction of the Owner's representative.

When separate contracts are let within the limits of any one project, each Contractor shall conduct its work so as not to interfere with or hinder the progress of completion of the Work being performed by other Contractors. Contractors working on the same project shall cooperate with each other to the maximum extent feasible to avoid conflicts and all conflicts shall be brought to the Engineer's attention as soon as possible.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with its contract and shall protect and save harmless the owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced by him because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange its work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project. It shall join its work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

B. DAILY COORDINATION MEETINGS – CONTRACTOR DUTIES

1. Participate in brief daily coordination meetings with Owner and any on-site representative of Consultant to advise Owner of that day's intended construction activities.

2. Time: Conduct meeting at beginning of each work day, at time mutually agreed upon by Owner and Contractor.

3. Location: As mutually agreed upon by Owner and Contractor.

4. Required Attendees:

    1. Owner's Project Coordinator or designated representative.
    2. Contractor's superintendent.
    3. Appropriate subcontractors.
    4. Representatives of other contractors working on terminal projects.
    5. Tenant Representatives affected by the current day's work.

5. Agenda: Discuss and coordinate the following:

    1. Areas in which the (next) day's work will be conducted.
    2. Nature of work to be conducted.
    3. Scheduled deliveries.
    4. Access and Security issues.
    5. Tenant operational issues.

6. Work/Projects being undertaken in the terminal by other contractors and coordination of all projects.

6. Do not work outside areas approved at daily meeting without prior notification to and approval by Owner's representative.

CONTINUOUS USE OF AIRPORT FACILITIES

The Owner will maintain continuous, normal use of the Terminal Building and all surrounding areas during any construction operations. Aircraft and passenger operations shall continue in the area surrounding the Terminal Building. All existing Owner and tenant facilities, aircraft, passengers and personnel in surrounding areas shall be protected.

Damage resulting from Contractor's operations shall be immediately repaired by Contractor or, at Owner's discretion, repaired by the Owner. The Contractor shall be responsible for the cost of such repairs. Cost will be deducted from payments made to the Contractor.

Contractor shall take every precaution to prevent fumes, noxious odors, preparation materials, and debris from entering the building and affecting or harming persons, aircraft and/or vehicles. Contractor shall also take action to prevent excessive noise. Should odors or noise be deemed excessive by the Owner, the Contractor shall be ordered to cease work immediately until the problem can be corrected to the Owner's satisfaction.

C. ON-SITE SAFETY

The Contractor is responsible for all aspects of onsite safety while performing the Work.

AIRPORT SAFETY REQUIREMENTS DURING CONSTRUCTION

1. GENERAL SAFETY REQUIREMENTS.
During performance of this Contract, the Airport runways, taxiways, and aircraft parking aprons shall remain in use by aircraft to the maximum extent possible. Aircraft use of areas near the Contractor's work will be controlled to minimize disturbance to the Contractor's operations. The Contractor shall not allow employees, subcontractors, suppliers, or any other unauthorized person to enter or remain in any airport area that would be hazardous to persons or to aircraft operations.

All work which is too close to an active runway, taxiway or apron to be

performed under operational conditions shall be performed when the runway, taxiway or apron is not in use and the proper coordination with Air Traffic Control has been established. Such work shall not be accomplished without prior permission from the Director of Facilities and Grounds.

2. CONSTRUCTION AND FACILITIES MAINTENANCE.

The Contractor shall be aware of and take all precautions necessary to avoid the following types of airport safety problems and hazards during construction:

(1) Trenches, holes, or excavations on or adjacent to any open runway or in safety areas.

(2) Unmarked/unlighted holes or excavation in any apron, open taxiway, open taxi-lane, or related safety area.

(3) Mounds or piles of earth, construction materials, temporary structures, or other objects in the vicinity of any open runway, taxiway, taxi-lane, or in a related safety, approach, or departure area.

(4) Pavement drop-offs or pavement-turf lips (either permanent or temporary) which could cause, if crossed at normal operating speeds, damage to aircraft that normally use the airport. (The normal maximum is 3 inches for either.)

(5) Vehicles or equipment (whether operating or idle) on any open runway, taxiway, taxi-lane, or in any related safety, approach, or departure area.

(6) Vehicles, equipment, excavations, stockpiles, or other materials which could degrade or otherwise interfere with electronic signals from radios or electronic navigational aids.

(7) Unmarked utility, navaid, weather service, runway lighting, or other power or signal cables that could be damaged during construction.

(8) Objects (whether marked or flagged or not) or activities anywhere on or in the vicinity of the airport which could be distracting, confusing, or alarming to pilots during aircraft operations.

(9) Unflagged/unlighted low visibility items (such as tall cranes, drills, and the like) anywhere in the vicinity of active runways, or in any approach or departure area.

(10) Misleading or malfunctioning obstruction lights.

(11) Unlighted/unmarked obstructions in the approach to any open

runway.

(12) Inadequate approach/departure surfaces (needed to provide adequate landing/takeoff clearance over obstructions or work or storage areas).

(13) Inadequate, confusing, or misleading (to user pilots) marking/lighting of runways, taxiways, taxi-lanes (including displaced or relocated thresholds).

(14) Water, snow, dirt, debris, or other transient accumulation which temporarily obscures pavement marking, pavement edges, or derogates visibility of runway/taxiway marking or lighting, or of construction and maintenance areas.

(15) Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of airport operations area.

(16) Trash or other materials with foreign object damage (FOD) potential, whether on runways, taxiways, or aprons, or in related safety areas.

(17) Inadequate fencing or other marking to separate construction or maintenance areas from open aircraft operating areas.

(18) Failure to control vehicle, human, and large animal access to, and nonessential non-aeronautical activities in, open aircraft operating areas.

(19) Failure to maintain radio communication between construction/maintenance vehicles and air traffic control tower or other on-field communications facility, e.g., FAA Flight Service Station (FSS) or Unicom radio.

(20) Construction activities or materials which could hamper crash-fire-rescue (CFR) vehicle access from the Aircraft Rescue and Firefighting (ARFF) station to all parts of the runway/taxiway system, to runway approach and departure areas, and to aircraft parking locations.

(21) Bird attractants such as edibles (food scraps, etc.) or other miscellaneous garbage, other trash, or ponded water on airport.

(22) See other sections of these contract documents for additional related safety, security and operational requirements.

The Contractor shall also conduct activities so as not to violate any safety standards herein and shall inspect all construction and storage areas as often as

necessary to be aware of conditions, and promptly take all steps needed to prevent/remedy any unsafe or potentially unsafe conditions/activities discovered.

Before actual commencement of construction activity, Contractor shall (through the Office of the Director of Facilities and Grounds, and the Engineer) give notice using the Notice to Airmen (NOTAM system) of proposed time and date of commencement of construction in such areas.

Upon completion of work and return of all such areas to standard conditions, Contractor shall (through the office of the Director of Facilities and Grounds and the Engineer) issue notice (using the NOTAM system) of completion of construction.

3. TRENCHES, EXCAVATIONS AND STOCKPILED MATERIAL.
Open trenches or excavations exceeding 6" in depth and 6" in width or stockpiled material will not be permitted within the limits of safety areas of operational runways or taxiways. Coverings for open trenches or excavations shall be of sufficient strength to support the weight of the heaviest aircraft operating on the runway or taxiway.

4. CONSTRUCTION IN PROXIMITY TO RUNWAYS.

(1). RUNWAY SIDES. If appropriate construction NOTAM has been issued, construction (using equipment under 10' tall) is permissible as close as 200-feet from the centerline of a runway.

(2). If the foregoing clearance is not available or cannot be maintained, the runway segment involved (or the entire runway) must be closed.

5. CONSTRUCTION IN PROXIMITY TO TAXIWAYS/TAXILANES. If an appropriate construction/maintenance NOTAM has been issued, construction and/or maintenance activities are permissible up to pavement edge of active taxiways/taxilane provided:

(1). Adequate wingtip/propeller/engine pod clearance exists at all points along taxiway/taxilane; and

(2). Construction/maintenance areas are adequately marked and lighted for visibility to user pilots. If such clearance is not available, but aircraft could with guidance pass through, construction/maintenance is still permissible up to pavement edges provided wing walkers/aircraft directors are used to guide aircraft through. Otherwise the taxiway/taxilane must be closed for construction/maintenance.

6. CLOSED RUNWAY MARKING.

(1) MARKING. If closed runway markings are required, they shall

conform to standards in AC 150/5340-1 and as required by the contract documents.

(2) LIGHTING. Approach and visual navaid lighting on a closed runway shall be turned off and kept off during closure.

If barricades, flagging and flashers are required, they shall conform to FAA Standards and details as may be shown on the plans.

7. CONSTRUCTION AREA MARKING. Flaglines, traffic cones, flashers, and/or signs shall be used as necessary:

(1) To clearly separate all construction/maintenance from other parts of air operations area,

(2) To identify isolated hazards, such as open manholes, excavations, areas under repair, stockpiled material, waste areas, etc., and

(3) To identify FAA, airport, and National Weather Service facilities, cables, power lines, ILS critical and other sensitive areas.

All barricades, temporary markers, flagline supports, and other objects placed/left in safety area of any open runway, taxiway, or taxilane shall be:

(1) As low as feasible;

(2) Of low mass;

(3) Easily collapsible if impacted by an aircraft or component thereof;

(4) Weighted down or attached to surface to reduce chance of movement by prop wash/jet blast/wing vortex or other wind currents; and

(5) If affixed to the surface, frangible at ground level.

8. OTHER MARKING AND LIGHTING. Objects (whether fixed or mobile) above runway elevation that penetrate the applicable runway approach surface described in FAA Part 77.25, Paragraph (d), may be hazardous to aircraft operations. Construction/maintenance-related objects such as stockpiled materials or equipment within these distances may need airspacing and shall be marked with orange and white flags or paint and, if nearest runway is used at night, be well illuminated and/or obstruction lighted.

9. MOTORIZED VEHICLES.

(1) When any vehicle other than those approved for use in the aircraft movement area and runway approach area is required to travel over any portion of that

area, it shall be escorted by a vehicle properly identified to operate in the area and be provided with a flag on a staff attached to the vehicle. A flag or escort vehicle is not required for vehicles that have been painted, marked and lighted for routine use on aircraft movement areas. Any vehicle operating on the movement area during the hours of darkness shall be equipped with a flashing dome-type light. See AC 150/5210-5, "Painting, Marking and Lighting Vehicles used on Airports", current edition. Vehicle operation safety training may be required of any operator and shall be required of any operator driving without escort in the aircraft movement area.

(2) Vehicular traffic crossing active movement areas shall be controlled by two-way radio with the control tower, and be escorted by properly authorized Contractor's or Owner's personnel. The clearance should be confirmed by the driver's personal observations that no aircraft is approaching his position.

(3) It may be desirable to clearly identify the vehicles for control purposes by either assigned initials or numbers prominently displayed on each side. The identifying symbols should be of 8-inch minimum, block-type characters of a color easily read. They may be applied by use of tape or water-soluble paint to facilitate removal. In addition, all vehicles must display the identification media as specified in the approved security plan, if applicable.

(4) Employee parking shall be as designated by the Engineer or as shown on the Plans.

(5) CONSTRUCTION SITE ACCESS AND HAUL ROADS. Access to the job site shall be via the specific route(s) as designated by the Engineer.

10. CONTRACTOR'S RESPONSIBILITY FOR NAVIGATIONAL AIDES. The following statements concerning FAA cables and FAA NAVAID equipment shall apply to this project.

(1) The local FAA Airway Facilities Sector Field Office (AFSFO) personnel will, upon notification, mark all FAA cables in the vicinity of construction once, prior to the start of work. The Contractor shall be responsible for any damage to cables within three feet of the marked cable route. Should it damage any cables, it shall immediately notify the Air Operations Office and take all steps necessary for the repair of the cable. If the repair necessitates any work on the part of the local FAA personnel, the Contractor will be billed for all costs incurred.

(2) The Contractor shall minimize, as much as possible, locations where haul routes will cross earth buried FAA cable. At such crossing points, the cable must be protected with steel boiler-plate or a similar structural device.

(3) At times when either a runway threshold is displaced or equipment is operating in an ILS clear zone, then the affected ILS must be taken off the

air. Also, when equipment is operating between a localizer antenna and its associated landing threshold, the localizer must be taken off the air. The work must be closely coordinated with the local AFSFO to eliminate unnecessary shutdowns.

(4) When work is to be done in the vicinity of FAA cables, said cables shall be physically located by hand-digging and exposing the cables thru the full length of the construction zone. FAA cables shall be protected. No work shall be performed over direct earth buried FAA cable without first protecting the cable with steel boiler-plate or similar structural devices.

The Contractor shall not conduct any construction activity within the navigational aids (i.e., ILS components, VOR, ASR, ATCT) restricted areas shown on the plans without prior approval from the local FAA Airway Facilities Sector and the Engineer.

11. LIMITATION ON CONSTRUCTION.

(1) Open-flame welding or torch-cutting operations are prohibited unless adequate fire and safety precautions are provided and have been approved by the Airport Owner. All vehicles are to be parked and serviced behind the building restriction line and/or in an area designated by the airport operator.

(2) Open trenches, excavations and stockpiled material at the construction site shall be prominently marked with red flags and lighted by light units (acceptable to the Airport Owner and the FAA) during hours of restricted visibility and/or darkness. Under no circumstances are flare pots to be used for airport lighting.

(3) Stockpiled material shall be constrained in a manner to prevent movement resulting from aircraft blast or wind conditions. Material shall not be stored near aircraft turning areas.

12. MARKING AND LIGHTING OF CLOSED HAZARDOUS AREAS ON AIRPORTS. When areas on the Airport are closed or present hazards due to construction activities, they shall be marked and lighted according to paragraph 10 of AC 150/5340-1, "Marking of Paved Areas on Airports., current edition.

13. COORDINATION AND COMMUNICATIONS. The Contractor shall keep the Engineer apprised of its scheduled construction activities in order to allow proper notification of the Owner, its airport management and airport operators. Daily meetings to discuss construction progress and location shall be required.

The Contractor shall have a functioning two-way radio at the job site at all times work is in progress to monitor ground control frequency 121.9 when in operation. Contractor’s superintendent shall also have a cellular phone on him and at the site. In the event that the air traffic control tower should be closed during a portion of the nighttime hours, during such closure the Contractor shall keep in radio

communication with the Common Traffic Advisory frequency (118.3 MHZ). In addition, Contactor shall comply with all communication requirements specified in this Section.

14. DEBRIS. Waste and loose material capable of causing damage to aircraft landing gears/ propellers or being ingested in jet engine, shall not be placed or permitted on active aircraft movement areas. Material tracked pr blown on these areas shall be removed continuously during the work project.

15. TRASH RECEPTACLES. In accordance with Virginia's Anti-litter Law and the safety of aircraft operations, receptacles sufficient to contain worker's litter and construction wastes capable of being spread by wind or water shall be located on the construction site. The number and size of receptacles required shall be determined by the Contractor, subject to the additional requirements of the Engineer.

16. DUST CONTROL. The CONTRACTOR is advised that aircraft storage and aircraft maintenance operations are conducted adjacent to the project. Special attention to dust control will be required during the course of the project. The use of water and calcium chloride shall be anticipated. The Engineer reserves the right to halt work or hauling in non-conforming areas, if corrective actions are not promptly taken by the CONTRACTOR to control dust.

17. AIRCRAFT OPERATIONS.

    (1) It is the intent of the Owner to minimize interference with aircraft operations. The Contractor shall coordinate its activities while working near the aircraft operational area, so as to create minimal interference with aircraft operations. Before starting its operations at any location on the airport, the Contractor shall assure proper safety precautions and separations in accordance with the Plans, this Section and other applicable sections of these bid documents. Construction-related activities must maintain adequate horizontal and vertical clearance from active operational aircraft areas.

    (2) When working on the airfield, safety is of paramount importance. Vehicles and personnel must give way to emergency equipment and moving or parked Aircraft at all times.

    (3) Prior clearance must be obtained from the Director of Facilities and Grounds for any movement in the AOA (secured portion of the airport). For isolated or temporary AOA entries, a minimum of twenty-four (24) hour notice is required.

    (4) All vehicle movements within the AOA shall be controlled and/or escorted by personnel assigned by the Contractor who have been trained and specifically authorized to drive within the AOA and who are equipped with

two-way radio capable of communicating with the FAA Control Tower.

(5) A Runway, Taxiway, Apron, or any portion thereof, can be closed to aircraft movements if weather conditions and/or safe aircraft operations permit re-routing operational aircraft to other areas. During such periods, all ground personnel and equipment may move freely within the "closed" area; however, clearances to "active" areas must be strictly observed. An airfield area "closed" to aircraft operations must be NOTAMed, marked and lighted in accordance with specific standards.

(6) A change of weather conditions, an emergency, or a change in the overall safe operational status of the airfield may be cause for the Director of Facilities and Grounds to order any or all personnel and equipment to immediately vacate any designated airfield area, including "closed" areas, without liability to the Commission.

(7) Prior to closing or restricting, either horizontally or vertically, the use of any portion of the airfield to operational aircraft, all airfield users will be briefed of the proposed action, sufficiently far in advance to adjust schedules and maintain uninterrupted, near normal airfield operations. All such proposed actions will be coordinated through the Engineer and approved by the Airport Director of Facilities and Grounds.

(8) At the completion of each work day or night work session, any and all areas of construction activity within the Air Operations Area (AOA) shall be left in an "Operational Condition" as defined in Sections 24 of the General Provisions.

18. AIRPORT SECURITY.

(1) Timing of Access: The Contractor shall coordinate access to secure areas with the Owner. All work in the secure area shall be under escort by Owner personnel.

(2) Itinerant Workers or Suppliers: Personnel and/or suppliers requiring only occasional access to the site may be exempt from the safety/security/driver training requirements provided they are under the direct supervision (within approximately 100 feet) of an appropriately badged escort. Vehicle convoys of no more than two vehicles shall be permitted. Escorted vehicles are not exempt from the marking requirements.

(3) Maintaining Perimeter Fence Line: The CONTRACTOR shall maintain the perimeter fence on a continuous basis with any temporary opening being continuously observed by the CONTRACTOR'S badged and trained access guard. All temporary openings shall be secured at the completion of each day's work.

(4) Delineation of Project Safety/Security Area: The CONTRACTOR shall delineate limits of construction with safety fence prior to beginning work each day. None of the CONTRACTOR'S personnel should be beyond the limits of construction without authorization from airport personnel. Violators are subject to removal from the jobsite and loss of the identification badge and/or working privileges inside the airfield area.

(5) Security Plan: The Contractor shall submit a security plan two weeks prior to the pre-construction conference. The security plan shall outline the methods and means that the CONTRACTOR intends to apply in order to maintain airport security.

(6) Additional Security Information: Additional information regarding security items is available through the Chief of Safety and Security at (540) 362-1999.

19. VEHICULAR ACCESS. All of vehicles of Contractor and subcontractors entering AOA shall have the company name on both sides of the vehicles using letters eight inches or greater in height. Contractor may also be required to affix a Commission issued vehicle decal to each such vehicle.

All persons driving such vehicles shall be trained and specifically authorized/badged to drive inside the security fence in an area where aircraft are operating, or be escorted by an employee of Contractor who has been so trained.

20. CONSTRUCTION FLAGS. The Contractor shall furnish aircraft warning flags in aeronautical areas, colored orange and white, three feet (3') by three feet (3') in a checkerboard pattern for equipment and flagmen use. Flags on equipment shall be mounted on a staff not less than eight feet (8') in length. Each truck or other piece of equipment of the Contractors shall have attached to it, in a vertical and clearly visible position, a warning flag.

21. RESIDENCE ON AIRPORT. No CONTRACTOR employee(s) will be permitted to reside at any location on the project site or airport property, including the Contractor’s project trailer(s) or other temporary facilities.

BID FORM

SECTION C

BID FORM

(Name of Bidder)

For

RUNWAY 16-34 EMAS REPLACEMENT PROJECT

AT

ROANOKE REGIONAL AIRPORT
ROANOKE, VIRGINIA

SUBMITTED TO THE

ROANOKE REGIONAL AIRPORT COMMISSION
ROANOKE, VIRGINIA

BID NO. 24-007

THE BIDDER SHALL COMPLETE ALL ITEMS AND FILL IN ALL BLANKS IN THESE BID FORM PAGES

I. BID CONDITIONS AND PRICE:

In compliance with the Invitation for Bids, the undersigned hereby proposes to furnish the materials and labor and to perform the work for the completion of the Runway 16-34 EMAS Replacement Project in strict accordance with the Invitation to Bid, Instructions to Bidders, the General Conditions, Special Provisions, Technical Specifications, Drawings, Supplementary Drawings, and all other contract documents for the consideration of the price quoted in the following bid form, and agrees, upon receipt of written notice of award, that it will execute a contract in accordance with the bid as accepted and give the required contract bonds with good and sufficient surety, within fifteen (15) calendar days after receipt of notice of formal award of contract and presentation of the prescribed forms.

It is agreed that the undersigned has informed itself fully in regard to all conditions pertaining to the place where the work is to be done; that it has examined the drawings and specifications for the work and contractual documents thereto, including the special provisions, prior to the opening of bids, and that it has satisfied itself relative to the work to be performed.

It is agreed that the description of each item, being stated, implies although it does not mention, all incidentals and that the price stated is intended to cover all such work, materials, labor, equipment, and incidentals as constitute the bidder's obligations as described in the specifications, and any details not specifically mentioned, but evidently included in the contract, shall be compensated for in the total base price bid.

It is understood that this bid is submitted for the purpose of obtaining the work included in subject project at the Roanoke Regional Airport.

Said work is described in the project contract documents which also include the place, date, and time of opening bids.

Except to the extent extended by manufacturer's warranties required by the specifications and drawings, it is understood that all workmanship and materials under all items of work are guaranteed for two years from the date of final acceptance.

It is understood that the Owner reserves the right to accept or reject any or all bids and waive informalities.

It is understood that the quantities of work to be done are approximate only and are intended principally to serve as a guide in evaluation of bids, with the right reserved by the Owner to delete all or any portion of minor bid items.

The undersigned agrees that if awarded the contract, it will commence and complete the work in accordance with the provisions, requirements and deadlines of Section 2 of the General Conditions.

It is understood and agreed that for each calendar day that the work remains incomplete after the contract time and/or the milestone times (including all extensions and adjustments as provided in the Contract Documents), the amount per day as specified in Section 4, Contract Sum and Liquidated Damages of the form Contract (see Section B of these Specifications) shall be liquidated damages and may be retained, deducted and/or offset from any amounts due or to become due to the Contractor or its Surety. Such liquidated damages shall not be a penalty, but shall be considered as an agreed liquidation of a reasonable portion of damages that will be incurred by Owner as a result of the Contractor failing to complete the Work in the time provided in the Contract Documents. It is understood and agreed that: (a) the actual damages that may result from failure to complete the Work within the required time are uncertain and difficult to determine with exactness and that the fixed amount is not out of proportion to the probable loss; (b) Owner retains the right to make such retentions, deductions and/or offsets for liquidated damages at any time and that Owner's imposition and the retention, deduction and/or offset of any liquidated damages hereunder shall not be subject to any prior notice or claim requirements; and, (c) **by submitting this Bid, Contractor acknowledges and agrees that Contractor waives any defenses as to the validity of any liquidated damages provisions in this Contract based on such liquidated damages being void as penalties or not being reasonably related to actual damages.** It is further agreed, however, that application of liquidated damages hereunder shall not be Owner's exclusive

remedy and shall not bar any other claim, cause of action, or remedy that Owner may have against Contractor under applicable law in the performance of this Contract.

It is understood that this project is funded by local and state government funds and the Contractor shall be subject to all laws and regulations applicable to recipients of such funds.

Enclosed is security as required, consisting of _____(cash, certified check, or bid bond) payable to the Roanoke Regional Airport Commission, in the amount of $_____ _____.

This amount equals five percent of the total amount bid submitted by the Contractor.

The Contractor shall be a licensed Class A Contractor registered with the Commonwealth of Virginia, shall list its registration number at the end of the bid in the designated location and shall enclose a copy of its licensing certificate.

This bid will remain valid and binding on Bidder for a period of sixty (60) days from date of bid opening.

Total Lump Sum Price Bid for all associated services on the Project in accordance with Contract Documents:

_____ ($_____)
(use words) (dollar figures)

Contract Time: Seventy-five (75) consecutive calendar days from Administrative Services Notice to Proceed. Thirty (30) consecutive calendar days from Construction Notice to Proceed and Mobilization Period. Thirty-five (35) consecutive calendar days from Phase 1 – Runway 16-34 Closure Notice to Proceed. Thirty (30) non-consecutive calendar days from Phase 2 – Runway 16-34 Nightly Closures/Construction Completion Notice to Proceed.

II. BIDDER CERTIFICATION OF LICENSURE AND LICENSURE OF SUBCONTRACTORS

The undersigned Bidder hereby covenants and agrees to comply with Title 54.1, Chapter 11, Code of Virginia (1950), as amended, with respect to licensure of Bidder and all subcontractors who may be employed to perform the Work for the Roanoke Regional Airport Commission.

Bidder further represents and covenants: (i) that Bidder has verified that all subcontractors, currently identified in the Bid to perform a portion of the Work hold, or prior to performing any work at the airport, will hold required Commonwealth of Virginia and local licenses, including, without limitation, Contractor and business licenses; and, (ii) that if it is the Successful Bidder, Bidder shall verify that any additional subcontractors employed to perform the Work, subsequent to the date of this certification, shall hold all required Commonwealth of Virginia and local licenses, including, without limitation, Contractor and business licenses.

Bidder acknowledges and agrees that if it is awarded a contract for the Work, this Certification shall constitute a material part of Bidder's contract with the Commission and violation of the terms of this Certification shall constitute a breach of such Contract.

All persons signing this Bid, and thereby executing this Certification, on behalf of Bidder hereby warrant and represent that they have been duly authorized by proper action of Bidder to execute this Certification, and that upon such execution, this Certification shall be binding upon and enforceable against Bidder.

III. QUALIFICATION OF BIDDERS

Each bidder shall fully complete the information below, which may be used in determining Bidder's competency and responsibility in accordance with the General Conditions.

FIRM: _____

ADDRESS: _____

_____

PHONE: _____ FAX: _____

Contact in your firm for inquiries: _____

Years of business under present name: _____

Date of Incorporation: _____

Place of Incorporation: _____

Contracting Specialties: _____

Years performing work specialties: _____

Maximum Bonding Limits of firm: _____

List equipment available for project: _____

_____

Name of proposed on-site Superintendent and relevant project experience during last five (5) years: _____

(Complete next page for relevant project experience of proposed on-site project superintendent)

Relevant Project Experience for Proposed Superintendent

Type of Project and Date	Responsibilities	Contact Name/Phone No.

Bidder acknowledges and agrees that the Commission retains the absolute right to reject the above designated individual as the project superintendent for this work if it determines that the persons job experience and/or references are not adequate or good, and to require bidder to provide one or more alternative proposed superintendents, along with their relevant job experience and references, until the parties are in agreement as to the superintendent for the job.

Has Firm:

Failed to complete a contract? _____

Been involved in a bankruptcy or reorganization? _____

Pending judgment claims or suits against Firm? _____

(If answer is "yes" to any of the preceding, submit details on separate sheet).

Contractor and all proposed subcontractors are prequalified by VDOT to perform the work required by this contract Yes ____ No ____

List three (3) most recent contracts or subcontracts completed in the last five (5) years which included work similar to that required in this project.

Type of Project	Contract With Contact Person/ Phone No.	Contract Amount	Date Completed

List of key subcontractors to be utilized on this project and their responsibilities:

_____

_____

_____

IV. CERTIFICATION OF NON-COLLUSION

The undersigned bidder hereby certifies that the accompanying bid is not the result of or affected by, any act of collusion with another person or company engaged in the same line of business or commerce, or any act of fraud punishable under Title 18.2, Chapter 12, Article 1.1 of the Code of Virginia, 1950, as amended. Furthermore, I understand that fraudulent and collusive bidding is a crime under the Virginia Governmental Frauds Act, the Virginia Government Bid Rigging Act, the Virginia Antitrust Act, and Federal Law and can result in fines, prison sentences, and civil damage awards.

The undersigned bidder agrees to abide by all conditions of this bid and the person signing this bid on behalf of bidder hereby certifies that (s)he is authorized to sign this bid for the bidder.

V. COMMONWEALTH OF VIRGINIA WORKERS' COMPENSATION CERTIFICATE OF COVERAGE (Revised 04/05/12)

Section 2.2-4332, Code of Virginia, requires construction contractors and subcontractors to obtain and maintain workers' compensation insurance for the duration of the Work on behalf of the Commonwealth of Virginia, its departments, institutions or agencies, or local governmental entities.

Satisfactory evidence of coverage on this form must be provided to the Commission prior to commencement of work.

The undersigned organization stipulates that it:

A. Has workers' compensation insurance and is in compliance with the Workers' Compensation statues of the Commonwealth of Virginia ___ Yes ___ No

Insurance Company _____

Policy expiration date _____, or

B. Is self insured for workers' compensation _____ Yes.

VI. COMPLIANCE WITH STATE LAW; FOREIGN AND DOMESTIC BUSINESSES AUTHORIZED TO TRANSACT BUSINESS IN THE COMMONWEALTH

Pursuant to Virginia Code Section 2.2-4311.2 (effective July 1, 2010), each bidder or offeror organized or authorized to transact business in the Commonwealth of Virginia pursuant to Title 13.1 or Title 50 of the Code of Virginia, (1950), as amended, or as otherwise required by law, is required to include in its bid or proposal its Virginia State Corporation Commission (SCC) Identification Number. Any bidder or offeror that is not required to be authorized to transact business in the Commonwealth of Virginia as a domestic or foreign business entity under title Title 13.1 or Title 50 or as otherwise required by law is required to include in its bid or proposal a statement describing why the bidder or offeror is not required to be so authorized.

Please complete the following:

A._____ Bidder/Offeror is a Virginia business entity organized and authorized to transact business in Virginia and such bidder's/offeror's SCC Identification

Number is:

_____.

B._____ Bidder/Offeror is an out-of-state (foreign) business entity authorized to transact business in Virginia and such bidder's/offeror's SCC Identification Number is:

_____.

C._____ Bidder/Offeror does not have an Identification Number issued to it by the SCC and such bidder/offeror is not required to be authorized to transact business in Virginia by the SCC for the following reason(s):

_____.

_____.

Please attach additional sheets of paper if more space is needed to explain why such bidder/offeror is not required to be authorized to transact business in Virginia.

The undersigned hereby acknowledges the receipt of the following Addenda to the Contract Documents.

Addendum No. One Issued _____(DATE)
Addendum No. Two Issued _____(DATE)
Addendum No. Three Issued _____ (DATE)
Addendum No. Four Issued _____(DATE)
Addendum No. Five Issued _____(DATE)

EACH BIDDER MUST COMPLETE AND SIGN THE INFORMATION BLOCK BELOW OR ELSE ITS BID SHALL BE DETERMINED TO BE NON-RESPONSIVE.

_____
Complete Firm Name of Bidder

_____
Signature of Authorized Official

_____
Name & Title of Signing Official

Business Address: _____

_____

_____

Telephone: (____)_____

Area Code

Telefax: (____)_____

Area Code

CONTRACTOR'S VIRGINIA "CLASS A" CONTRACTOR NO:_____

** END OF BID **

ROANOKE REGIONAL AIRPORT COMMISSION
BID BOND FOR CONSTRUCTION PROJECT

KNOW ALL MEN BY THESE PRESENTS: that

_____
Insert full name or legal title and address of Principal)

as Principal (hereinafter referred to as "Contractor"), and

_____
(Insert full name or legal title and address of Surety),

as Surety (hereinafter referred to as "Surety"),

a corporation duly organized under the laws of the State of _____ and legally authorized to do business in the Commonwealth of Virginia, are held and firmly bound unto the ROANOKE REGIONAL AIRPORT COMMISSION, 5202 Aviation Drive, Roanoke, Virginia 24012, as obligee (hereinafter referred to as "Commission"), in the amount of _____ DOLLARS ($ 00.00), for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein.

WHEREAS, Contractor has submitted to Commission a certain bid dated _____ (Bid. No._____), to enter into a contract ("Contract") for the following construction project: **Runway 16-34 EMAS Replacement** Project at the Roanoke Regional Airport ("Bid"), including, without limitation and as may be applicable, the Invitation To Bid, Instructions to Bidders, General Conditions, completed Bid Forms, Specifications, Plans and Drawings, if any, which documents are referred to collectively as "Bid Documents" and are expressly incorporated herein by reference and made a part of this bond.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION are as follows:

a. If the Contractor's Bid shall be rejected, or if said Bid shall be accepted and the Contractor shall timely deliver to Commission the Contract and all required documentation fully completed and properly executed in the form required in the Bid and Contract Documents, including all documents necessary to form a valid and binding contract, as determined by Commission, and, if Contractor shall in all other respects perform the obligations created by the acceptance of said Bid, then this obligation shall be null and void, otherwise this obligation and all provisions of this bond shall remain in full force and effect, it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event,

exceed the penalty amount of this bond.

b. If Contractor's bid shall be accepted but Contractor shall fail to timely deliver to Commission all required documentation fully completed and properly executed in the form and as required in the Bid and Contract documents, or in any other respect fail to perform the obligations created by the acceptance of said Bid, as determined by Commission, Contractor and Surety shall defend, indemnify, and hold Commission harmless from and against any and all liability, loss, cost, damage, or expense, including reasonable attorney's fees and\or the cost of any other professional services, which Commission may incur or which may result from or be imposed upon Commission by reason of such failure.

c. The Surety, for value received, hereby stipulates and agrees that the obligations of the Surety and this bond shall be in no way impaired or affected by any extension by Commission of the time within which Commission may accept such Bid, and the Surety does hereby expressly waive any notice of any such extension.

d. The provisions of this bond shall be governed by and are intended to be consistent with the laws of the Commonwealth of Virginia. In light of this express choice of law provision, Virginia law for determining governing law shall not apply to the provisions of this bond. Contractor, for itself and its successors and assigns, and the Surety, for itself and its successors and assigns, do hereby expressly waive any objection that might be interposed as to the right of Commission to require a bond containing the provisions contained herein and they hereby further expressly waive any defense which they or either of them might interpose to any action brought hereon upon the ground that there is no law authorizing the Commission to require the provisions herein.

e. This bond shall continue in full force and effect and shall not be deemed canceled or to have expired unless and until written notice of cancellation or expiration from Surety is received by Commission at least 90 calendar days prior to the effective date of such cancellation or expiration.

f. Wherever possible, each provision of this bond shall be interpreted in such manner as to be effective and valid under applicable law. If any provision of this bond is held illegal or unenforceable in a judicial proceeding, such provision shall be severed and shall be inoperative, and all remaining provisions of this bond shall remain operative and binding on the parties.

g. Any suit or action hereunder shall be brought in a Virginia court of competent jurisdiction in and for the City of Roanoke, or in the United States District Court for the Western District of Virginia, Roanoke Division, and not elsewhere.

h. This bond shall be construed and interpreted without regard to the identity of the party which drafted its various provisions. Every provision of this bond shall be construed as if all parties participated equally in the drafting of that provision. Any legal principle or rule of construction that a document is to be construed or interpreted against the drafting party shall not be applicable in any legal or other proceeding involving the provisions of this bond, and such principle or rule is expressly waived by the parties to this bond.

i. Each party to this bond represents and covenants that the individual executing this bond on its behalf has full, unconditional authority to execute this bond and that, upon the signing of the bond by the authorized individual for each party, this bond shall become binding upon all parties

SIGNED and SEALED this _____ day of _____, 20____, in the presence of:

_____
Contractor

WITNESS:

By: _____ (Seal)

_____ _____
(Type Name and Title)

_____
Surety

WITNESS:

By: _____ (Seal)
Attorney-In-Fact

_____ _____
(Type Name and Title)

(SURETY: Affix seal and attach current power of attorney)

CONTRACT FORMS

SECTION D

CONTRACT
FOR
RUNWAY 16-34 EMAS REPLACEMENT
AT THE ROANOKE REGIONAL AIRPORT

THIS CONTRACT, is made and entered into this ____ day of _____, 202__, between the Roanoke Regional Airport Commission, a body corporate, (hereinafter referred to as "Commission" or "Owner") and _____, (hereinafter referred to as "Contractor"), pursuant to Resolution No._____ adopted by the Commission on , _____, 202__,whereby for good and valuable consideration, including the promises set forth herein, the parties agree as follows:

1. **WORK**

Contractor hereby agrees to provide all labor, equipment, materials, services, incidentals and warranties necessary to complete the **Runway 16-34 EMAS Replacement** Project ("the Work") at the Roanoke Regional Airport.

A more detailed description of the Work and its requirements is contained in other sections of the Contract Documents.

2. **CONTRACT DOCUMENTS**

This Contract shall consist of the following Contract Documents: this executed Contract form; the Invitation to Bid; the Instructions to Bidders; General Conditions; Special Provisions, and the Technical Specifications; Drawings; Supplementary Drawings; Appendices; Addenda; and Contractor's completed Bid Forms, which are attached hereto and incorporated herein by reference. In the event of any conflict or inconsistency between this executed Contract Form and the Contractor's completed Bid Form, the terms and conditions of this Contract shall control and prevail. Contractor has entered into Performance and Labor and Material Payment Bonds, with surety, each in the penal sum of One Hundred Percent (100%) of the Contract Sum, payable to the Roanoke Regional Airport Commission, conditioned upon the faithful performance and upon the payment for labor and material, respectively, pursuant to this Contract and the Contract Documents hereinafter set out, upon which the bid of said Contractor was offered.

3. **TERM (CONTRACT TIME)**

Contractor agrees that time is of the essence for completion of this Contract. All preliminary and administrative work shall be completed within seventy-five (75) consecutive calendar days after the effective date of the written Administrative Services Notice to Proceed. The Construction Notice to Proceed and Mobilization Period shall be completed within thirty (30) consecutive calendar days after the effective date of the written Notice to Proceed. The Phase 1 – Runway 16-34 Closure shall be completed within thirty-five (35) consecutive calendar days after the effective date of the written Notice to Proceed. The Phase 2 – Runway 16-34 Nightly Closures/Construction Completion shall be completed within thirty (30) non-

consecutive calendar days after the effective date of the written Notice to Proceed. Contractor shall notify the Owner in writing received at least 48 hours in advance of the date it desires to begin the Work at the site. The work, once begun in any area, must continue uninterrupted until completion.

4. **CONTRACT SUM AND LIQUIDATED DAMAGES**

A. Owner agrees to pay Contractor the Contract Price sum of _____ dollars ($_____.00) upon satisfactory completion of the Work as provided for in this Contract and as solely determined by Commission. Contractor acknowledges and agrees that the Contract payment amount may be increased or decreased by additions to and/or reductions in the Work only as effected by prior written change orders or amendments signed by both parties. Contractor agrees not to initiate any additional work, not called for in the Contract Documents, for which Contractor intends to seek additional compensation without first notifying Engineer in writing and obtaining Owner's prior approval by properly executed written change order or Contract Amendment unless pursuant to a Construction Change Directive.

The Contract sum specified above shall be the full and only sum paid to Contractor for all Work, materials, expenses and costs specified herein or incidental thereto.

B. It is understood that for each calendar day that the work remains incomplete after the contract time for the Performance of Work – Phase 1, including all extensions and adjustments as provided by written Change Order, the sum of five thousand dollars ($5,000.00) per day may be claimed as liquidated damages and retained, offset or deducted from any money due or to become due to the Contractor or its Surety. It is understood that for each calendar day that the work remains incomplete after the contract time for the Performance of Work – Phase 2, including all extensions and adjustments as provided by written Change Order, the sum of two thousand five hundred dollars ($2,500.00) per day may be claimed as liquidated damages and retained, offset or deducted from any money due or to become due to the Contractor or its Surety. It is understood that for each 15 minute period after the Phase 2 nightly closure period is scheduled to conclude at 7:00am, that Runway 16-34 is not open, the sum of five hundred dollars ($500.00) per fifteen (15) minutes may be claimed as liquidated damages and retained, offset or deducted from any money due or to become due to the Contractor or its Surety. Such deducted sums may be assessed cumulatively, and such deducted sums shall not be considered to be a penalty but shall be considered as liquidation of a reasonable portion of damages that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in its contract. It is understood and agreed that: (a) the actual damages that may result from failure to complete the work within the required time are uncertain and difficult to determine with exactness and that the fixed amount is not out of proportion to the probable loss; (b) Owner retains the right to make such retentions, deductions and/or offsets for liquidated

damages at any time and that Owner's imposition and the retention, deduction and/or offset of any liquidated damages hereunder shall not be subject to any prior notice or claim requirements; and, (c) Contractor waives any defenses as to the validity of any liquidated damages provisions in this Contract based on such liquidated damages being void as penalties or not being reasonably related to actual damages. It is further agreed, however, that application of liquidated damages hereunder shall not be Owner's exclusive remedy and shall not bar any other claim, cause of action, or remedy that Owner may have against Contractor under applicable law in the performance of this Contract.

Reference is made to Subsection 39 DETERMINATION AND EXTENSION OF CONTRACT TIME of the General Conditions.

5. **PAYMENTS**

A. Payment will be made in accordance with Contractor's bid for the Work, plus the cost of any additional services agreed to in advance, in writing by Commission, within thirty (30) days after the satisfactory completion of the Work, as determined by Commission, and Contractor's presentation of a proper invoice.

A detailed invoice, including the dates, on which the services were performed, shall be sent to the:

Roanoke Regional Airport Commission
Department of Finance
5202 Aviation Drive
Roanoke, VA 24012

B. Contractor shall pay all applicable taxes, including sales tax on materials supplied. Contractor agrees that the Commission may withhold and/or offset payment to Contractor when property of the Commission, Commission's tenant/subtenant or adjoining private property is damaged or destroyed by poor performance or defective equipment or materials employed by Contractor, or for unsatisfactory performance under this Contract. Contractor also agrees that it shall be liable to the Commission for actual damages for replacement or repair of property, materials, or services caused by this damage or destruction to the Commission or Tenant's property, or for unsatisfactory performance.

C. Prior to receiving any payments under this Contract, if the Contractor is an individual, the Contractor shall provide its social security number to the Commission and if the Contractor is a proprietorship, partnership, or corporation, the Contractor shall provide its federal employer identification number ("EIN") to the Commission.

6. **COMPLIANCE WITH LAWS AND LICENSING REQUIREMENTS**

Contractor confirms that it and all of its subcontractors have all licenses and permits necessary to perform the Work and that they shall maintain all such licenses and permits as may be required by Federal, State, and local agencies during the term of this Contract.

The Contractor shall be solely responsible for paying all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the Work. The Contractor shall be responsible for arranging all inspections by local authorities for compliance with all building code requirements, ordinances and regulations.

No unnecessary delay shall be permissible in the completion of the Work due to the failure or delay in obtaining permits required for the Work.

Contractor expressly warrants that in the performance of the Work it shall comply with all applicable laws, codes, regulations, standards, etc., which may be required of it by all applicable local, state and federal jurisdictions and their respective agencies, offices, bureaus, and other administrative/regulatory entities, including, but not limited to, all local, state and federal ordinances, laws and regulations, concerning building and fire codes, solid waste and environmental matters, FAA, TSA and airport security regulations, and all applicable sections of the Occupational Safety and Health Act (OSHA), the Virginia Uniform Statewide Building Code.

7. INDEMNIFICATION

Contractor shall defend, indemnify and hold harmless the Commission, its officials, officers, board members, agents, and employees, against any and all loss, cost, or expense, including reasonable attorney's fees, resulting from any claim, whether or not reduced to judgment, and for any liability of any nature whatsoever, that may arise out of or result from the Work or its performance by Contractor or its subcontractor(s) or the violation of any of the terms and conditions of this Contract, including, without limitation, fines and penalties, violations of federal, state or local laws or regulations promulgated hereunder, personal injury, wrongful death or property damage claims, or damage to or vandalism of the Contractor's equipment or personal property used to perform the Work. Should Contractor inadequately remedy or fail to remedy a violation of this Contract after notification by Commission, Commission shall be authorized to take whatever corrective action Commission deems necessary to eliminate the violation, at the sole expense of Contractor.

Contractor's obligation to indemnify shall not be affected, waived or diminished by the negligence of any party indemnified hereunder that in part contributes to the loss, cost, or expense, nor shall it be limited by any limitation on the amount or types of damages, compensation or benefits payable by or for Contractor or any subcontractor under worker compensation acts, disability benefit acts or other employee benefit acts.

8. **INSURANCE**

A. Liability Coverage

Prior to execution of this Contract by Commission, Contractor shall provide Owner's Executive Director suitable evidence of commercial general liability occurrence-type insurance that includes contractual liability and products and completed operations insurance, and automobile liability with “any auto” coverage, naming Contractor as insured and its employees, subcontractors, the Commission and its officials, officers, board members, agents, employees, and volunteers as additional insureds, providing coverage against any and all claims and demands made by any person or persons or any other entity whomsoever for injuries or death or property damage incurred in connection with or arising out of the Work, services, items and/or other matters to be performed hereunder and including contractual liability coverage for the terms and conditions of this contract, which policies shall provide limits of not less than **$5,000,000.00.**

B. Workers Compensation

Prior to execution of this Contract by Commission, the Contractor shall obtain and provide evidence of statutory Worker's Compensation and Employer's Liability Insurance for all of its employees engaged in the Work, and maintain such coverage during the term of the Contract. In case any such work is subcontracted, the Contractor shall require the Subcontractor to provide such insurance for all of its employees engaged in the Work.

C. Notice to Commission

Contractor shall immediately notify the Commission in writing of any changes, modifications, expiration and/or termination of any insurance coverages and/or policies required by this Contract.

D. Umbrella Policy

The required limits of insurance for this Contract may be achieved by combining underlying primary coverage with an umbrella liability coverage to apply in excess of the general and automobile liability policies, provided that such umbrella liability policy follows the form of the underlying primary coverage.

E. Insurance Company

Insurance coverage shall be in a form and with an insurance company approved by the Commission, which approval shall not be unreasonably

withheld. Any insurance company providing coverage under this contract shall be authorized to do business in the Commonwealth of Virginia.

F. No Exclusions

The contractor's insurance policies and/or coverages shall not contain any exclusions for the Contractor's subcontractors.

G. Maintenance of Insurance

The continued maintenance of the insurance policies and coverages required by this Contract during the time that the Contractor is working for the Commission is a continuing obligation, and the lapse and/or termination of any such policies or coverages without approved replacement policies and/or coverages being obtained shall be grounds for termination of the Contractor for default.

H. Insurance Not To Be Limit On Liability

Nothing contained in the insurance requirements is to be construed as limiting the liability of the Contractor, and/or its subcontractors, or their insurance carriers may have under this Contract, including without limitation the indemnification provision contained herein. The Commission does not in any way represent that the coverages or limits of insurance specified are sufficient or adequate to protect the Contractor's interest or liabilities, but are merely minimums. The obligation of the contractor, and its subcontractors, to purchase insurance shall not in any way limit the obligations of the Contractor in the event that the Commission or any of those named above should suffer any injury or loss in excess of the amount actually recoverable through insurance. Furthermore, there is no requirement or obligation for the Commission to seek any recovery against the Contractor's insurance company before seeking recovery directly from the Contractor.

9. **CANCELLATION**

A. For Cause

The Owner's Executive Director may cancel the Contract upon written notice received by Contractor whenever Contractor's services fall below the quality of services generally provided by others for similar types of services, or Contractor has failed to perform in accordance with this Contract. Prior to any such cancellation, Contractor shall be given written notice and ten (10) calendar days to cure such failures. However, in the event that that Contractor's failure is a violation of law, and/or an act or condition that poses a risk of harm to people or their property, then Contractor shall immediately take action to cure such failure and shall complete such cure within 24 hours. Default by Contractor hereunder shall constitute a basis for determining for future contracts that Contractor is not a responsible bidder and for Commission to refuse to award such future contracts to Contractor.

In the event that Contractor defaults in the performance of any of the terms, conditions or agreements contained in this Contract, and Owner places the

enforcement of all or part of this Contract in the hands of an attorney for enforcement, including the filing of a suit upon the same, Contractor agrees to pay all of Owner's reasonable attorney's fees and costs related to any such proceeding.

B. Without Cause

The Executive Director of the Commission may cancel the contract without cause at any time upon ten (10) days advance written notice, and may stop the work at any time during the ten day period, provided that Contractor shall be paid for all work satisfactorily completed, as determined by Commission in its sole and exclusive discretion, on or before the effective date of the cancellation or stop work order, whichever is sooner.

10. ENTIRE AGREEMENT

This Contract embodies the entire understanding between the parties. There are no oral agreements or representations in connection herewith.

11. SPECIAL CONTRACT TERMS

A. Performance and Warranty

1. The Work shall be performed in a good, workmanlike and safe manner, consistent with industry standards and any applicable manufacturer's or vendor's warranty or product manufacturer's recommended guidelines.
2. Contractor shall protect the property of the Owner and tenants from any and all damage caused by the Contractor's operations.
3. Contractor shall maintain the work area in a neat, clean and safe condition at all times. Recognizing the Foreign Object Debris (FOD) could severely damage aircraft and jeopardize the lives of passengers, Contractor shall vigilantly comply with the requirements in the Contract Documents related to the clean up and removal of demolition/removal debris and waste materials.
4. Specific Warranty requirements for this Contract are contained in Section 33 of the General Conditions for the Contractor and in pertinent sections of the Technical Specifications, both of which are incorporated herein by reference. Nothing contained in this paragraph will be construed to establish a period of limitations with respect to any liability Contractor may have for breach of this Contract.

B. Inspection

A representative of the Owner shall have the right at all times to examine the supplies, materials and equipment used by Contractor, to observe the operations of the Contractor and its employees, to verify the Work being performed, and to do any act or thing which the Owner may be obligated or have the right to do under this contract.

C. Scheduling and Notification of Work

1. Prior to Contractor beginning any work at the airport, it shall participate in the pre-construction meeting which shall include representatives of the Commission and the Consultant and shall address many of the issues identified in Item 3. below. Such meeting should take place at least two weeks prior to the beginning of the Work.

2. The Work shall be scheduled at least 48 hours in advance with the Commission's Project Coordinator. Unless other arrangements have been made, any employee or representative of Contractor, prior to performing any work on Commission premises and before leaving Commission premises, shall notify Commission's designated representative who may desire to undertake a walk through inspection prior to Contractor's leaving the premises.

3. Issues of parking, access, dumpsters, storage of equipment and supplies, use of sanitary facilities, schedules for security badging and training and other related procedures shall be governed generally by the contract documents, however, specific issues or problems will be coordinated by Contractor with the Commission's Project Coordinator in order to minimize inconvenience to Contractor, airport businesses and the general public.

4. The Contractor shall schedule the work to suit the Owner's requirements. As indicated on the technical specifications, scheduling shall require restricted work time for some areas of the work.

5. Existing buildings will be occupied by the Owner and/or its tenants, and in full operation during construction. If at any time Contractor's activities create such noise, dust, fumes or noxious odors so as to substantially curtail or affect the operations of Owner, its tenants or passengers, then Contractor may be required to cease its operations until the affected activities cease for that work period or for the day.

6. Work necessary to be performed in, or otherwise affecting the use or comfort of, the existing buildings shall be coordinated with the occupants' schedules.

7. Under no circumstances shall any emergency or required means of ingress or egress be blocked, during hours the public is expected to be in the terminal.

12. DETAILED DESCRIPTION AND REQUIREMENTS OF THE WORK

The specific details of the Work are contained in the Technical Specifications which are incorporated herein by reference.

13. NON-DISCRIMINATION

A. During the performance of this contract, the Contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of the Contractor.

   The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

2. The Contractor, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, will state that such Contractor is an equal opportunity employer.

3. Notices, advertisements and solicitations places in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

B. The Contractor will include the provisions of the foregoing paragraphs 1. 2. and 3. in every subcontract or purchase order of over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

C. The Roanoke Regional Airport Commission does not discriminate against faith based organizations.

14. **IMMIGRATION REFORM AND CONTROL ACT OF 1986**

The Contractor does not, and shall not during the performance of the Contract for goods and services in the Commonwealth knowingly employ an unauthorized alien as defined in the Federal Immigration Reform and Control Act of 1986.

15. The new regulations require that the EEO clause be made part of the Contract by Citation 41CFR 60-300.5(a) and 41CFR 60-741(a).

"This Contractor and subcontractor shall abide by the requirements of 41CFR 60-300.5(a) and 41CFR 60-741(a). These regulations prohibit discrimination against qualified individuals and protected veterans on the basis of disability or veteran status and requires affirmative action by covered prime Contractors and subcontractors to employ and advance in employment qualified individuals with disabilities and protected veterans."

16. **GENERAL CIVIL RIGHTS PROVISIONS**

The contractor agrees that it will comply with pertinent statutes, Executive Orders and such rules as are promulgated to ensure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or handicap be excluded

from participating in any activity conducted with or benefiting from Federal assistance.

Title VI Clauses for Compliance with Nondiscrimination Requirements
(Source: Appendix A of Appendix 4 of FAA Order 1400.11, Nondiscrimination in Federally-Assisted Programs at the Federal Aviation Administration)

Compliance with Nondiscrimination Requirements

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. Compliance with Regulations: The contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Statutes and Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. Non-discrimination: The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.

3. Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. Information and Reports: The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. Sanctions for Noncompliance: In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:

a. Withholding payments to the contractor under the contract until the contractor complies; and/or

b. Cancelling, terminating, or suspending a contract, in whole or in part.

6. Incorporation of Provisions: The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the sponsor to enter into any litigation to protect the interests of the sponsor. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

Title VI List of Pertinent Nondiscrimination Authorities
(Source: Appendix E of Appendix 4 of FAA Order 1400.11, Nondiscrimination in Federally-Assisted Programs at the Federal Aviation Administration)

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq*., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);

- 49 CFR part 21 (Non-discrimination In Federally-Assisted Programs of The Department of Transportation—Effectuation of Title VI of The Civil Rights Act of 1964);

- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);

- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq*.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR part 27;

- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq*.), (prohibits discrimination on the basis of age);

- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);

- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);

- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;

- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);

- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;

- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);

- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

17. FEDERAL FAIR LABOR STANDARDS ACT

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR Part 201, the Federal Fair Labor Standards ct (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping and child labor standards for full and part time workers.

The [contractor | consultant] has full responsibility to monitor compliance to the referenced statute or regulation. The [contractor | consultant] must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor-Wage and Hour Division.

18. **OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970**

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. Contractor must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The Contractor retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20CFR Part 1910). Contractor may address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor-Occupational Safety and Health Administration.

19. **DRUG FREE WORKPLACE**

During the performance of this Contract, the Contractor agrees to (i) provide a drug-free workplace for the Contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the Contractor that the Contractor maintains a drug-free workplace; and, (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over $10,000.00 so that the provisions will be binding upon each such subcontractor or vendor**.** For purposes of this section, "drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a contractor in accordance with the Roanoke Regional Airport Commission's Procurement Regulations and applicable Virginia procurement laws, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.

20. **EVIDENCE OF AUTHORITY TO TRANSACT BUSINESS IN VIRGINIA**

Pursuant to 2.2-4311.2 (A) of the Code of Virginia (1950), as amended, if the Contractor is organized as a stock or non-stock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership, the Contractor shall provide documentation acceptable to Commission establishing that the contractor is authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Title 13.1 or Title 50 of the Code of Virginia (1950), as amended, or as otherwise required by law. The Contractor shall not allow its existence or its certificate of authority or registration to transact business in the Commonwealth to lapse, if so

required under Title 13.1 or Title 50, or to be revoked or cancelled at any time during the term of the contract. The Commission may void this contract if the Contactor fails to remain in compliance with the provisions of this section.

21. GOVERNING LAW AND VENUE

The provision of this Contract shall be governed by and are intended to be consistent with the laws of the Commonwealth of Virginia. In light of this express choice of law provision; Virginia law for determining governing law shall not apply to the provisions of this Contract. Every action brought under or related to this Contract shall be brought in a Virginia court of competent jurisdiction in the City of Roanoke or in the United States District Court for the Western District of Virginia, Roanoke, Virginia, and not elsewhere. In the event of any such litigation, the prevailing party, as determined by the adjudicating entity, shall have its costs, including all attorneys fees, paid by the non-prevailing party.

Notwithstanding the foregoing, the parties shall make their best efforts, in good faith, to resolve by negotiation all disputes concerning the interpretation and enforcement of this Contract by negotiation. The parties may resort to formal mediation via a professional mediating entity, licensed to conduct business in Virginia, in the event such inter-party negotiation fails. In the event either negotiation or mediation fail to resolve any such dispute, the parties hereby affirmatively agree to submit any action concerning the interpretation or enforcement of this Contract to binding arbitration, pursuant to Chapter 21 of Title 8.01 of the Code of Virginia, as currently existing or amended hereafter. Said arbitration shall be conducted by a professional arbitrating entity licensed to conduct business in Virginia. In the event the parties are unable to agree upon the arbitrating entity, selection shall be determined by a coin toss, choosing between one nominee respectively proposed by each party. The cost of the arbitration shall be shared equally by the parties. The party prevailing in any such arbitration, as determined by the arbitrator, shall have its costs, including all attorney's fees, paid by the non-prevailing party.

22. SEVERABILITY

Wherever possible, each provision of this Contract shall be interpreted in such manner as to be effective and valid under applicable law. If any provision of this Contract is held illegal or unenforceable in a judicial proceeding, such provision shall be severed and shall be inoperative, and all remaining provisions of this Contract shall remain operative and binding on the parties. This Contract shall be construed and interpreted without regard to the identity of the party which drafted its various provisions. Every provision of this Contract shall be construed as if all parties participated equally in the drafting of that provision. Any legal principle or rule of construction that a document is to be construed or interpreted against the drafting party shall not be applicable in any legal or other proceeding involving the provisions of this Contract, and such principle or rule is expressly waived by the parties to this Contract.

23. **SURVIVAL**

All representations, agreements, covenants, and indemnifications made in or given by Contractor in this Contract shall survive the completion of all services under this Contract and the termination of this Contract for any reason.

24. **DUPLICATE COPIES**

This Contract may be executed in any number of counterparts, each of which shall be deemed an original, and all of such counterparts together shall constitute one and the same instrument.

25. **CERTIFICATION**

The undersigned individual executing this Contract on behalf of Contractor certifies and warrants that he or she is authorized to enter into this Contract and bind Contractor to all of the terms and conditions contained herein.

26. **HEADINGS**

The headings used in this Contract are intended for convenience of reference only and do not define, expand, or limit the scope or meaning of any provision of this Contract.

27. **NOTICES**

A. Forms of Notice. Unless otherwise specified, all notices, consents and approvals required or authorized by this Contract to be given by or on behalf of either party to the other, shall be in writing and signed by a duly designated representative of the party by or on whose behalf they are given, and shall be deemed given three days after the time a certified letter, properly addressed, postage prepaid, is deposited in any Untied States Post Office, or upon delivery by hand, or upon delivery by overnight express carrier.

B. Notice to Commission. Notice to Commission shall be addressed to it and delivered at the office of the Executive Director, Roanoke Regional Airport Commission, 5202 Aviation Drive, Roanoke, Virginia 24012, or at such other office as Commission may hereafter designate by notice to contractor in writing.

C. Notice to Contractor. Notice to Permittee shall be addressed and delivered to

_____

_____

_____, or at such other office in the continental United States as Contractor may hereafter designate by notice to Commission in writing.

28. CONTRACT PROVISIONS REQUIRED FOR RECIPIENTS OF VIRGINIA DEPARTMENT OF AVIATION FUNDS

As a recipient of Virginia Department of Aviation grant funds, all Commission contracts and Contracts are subject to all applicable terms and conditions of the Commission's Master Contract, Allocations, and Grant Contracts with the Virginia Department of Aviation, all as amended, which are incorporated by reference as if expressly stated herein, including, without limitation, the following provisions:

1. The Contract is subject to appropriation of funds and applicable grant funding from the Virginia Department of Aviation and may be cancelled and immediately terminated in the event the Virginia of Aviation terminates the funding in whole or in part for the Contract under the provisions of an applicable Master Grant Contract, Allocation, or Grant Amendment.

2. The Contractor or Consultant and all subcontractors, sub-consultants, and any other recipients of pass through funds shall maintain all books, documents, papers, accounting records, and any other written or electronic evidence supporting their project activities and the costs incurred. Such information shall be made available for audit and inspection at the Commission's offices at all times during the Grant Contract, Grant Amendment(s), or Allocation period and for a period of four years from the end of the state fiscal year (i.e. June 30) inn which the final payment is made, except for records pertaining to terminal buildings and the acquisition of land and easements. Records for terminal buildings shall be kept for the useful like of the terminal building. Records for the acquisition of land and easements shall be kept indefinitely.

3. The Contractor or Consultant and all subcontractors, sub-consultants, and any other recipients of pass-through funds shall permit any authorized representatives of the Virginia Department of Aviation to inspect and audit all records related to the performance of the contract or Contract, the Master Contract, or any Grant Contracts, Grant Amendment(s), and Allocations. This shall include, but not limited to the following: the scope of any audit conducted must include those expenditures made by the Commission for the Grant Contract, Grant Amendment(s), or Allocation, including consultants, sub-consultants, and any other recipients of pass-through funds.

END OF CONTRACT PROVISIONS

WITNESS the following signatures:

Contractor: (To be completed after bid is awarded)

By:	(Not for signature)	Attest:	N/A
Title:	N/A	Title:	
Date:	N/A		

Roanoke Regional Airport Commission

By:	N/A	Attest:	N/A
Title:	Executive Director	Title:	Commission Secretary
Date:			

Certification of funding

By: _____

Treasurer
Roanoke Regional Airport
Commission

_____

Account Number

Approved for legal form

By: _____

General Counsel
Roanoke Regional Airport
Commission

** END OF CONTRACT **

ROANOKE REGIONAL AIRPORT COMMISSION

PERFORMANCE BOND FOR CONSTRUCTION PROJECT

KNOW ALL MEN BY THESE PRESENTS: that

_____

(Insert full name or legal title and address of Contractor)

as Principal (hereinafter referred to as "Contractor"), and

_____

(Insert full name or legal title and address of Surety)

as Surety (hereinafter referred to as "Surety")

a corporation duly organized under the laws of the State of _____ and legally authorized to do business in the Commonwealth of Virginia, are held and firmly bound unto the ROANOKE REGIONAL AIRPORT COMMISSION, 5202 Aviation Drive, Roanoke, Virginia 24012, as Obligee (hereinafter referred to as "Commission"), in the amount of

_____DOLLARS ($_____),
(Insert full dollar value of construction contract)

for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein.

WHEREAS, Contractor has entered into a contract with Commission, dated _____, as the successful bidder for the Security Fence Upgrade Project ("Project") at the Roanoke Regional Airport, Bid No. 24-007 in accordance with all contract documents for such Project, including, without limitation and as may be applicable, the Invitation to Bid, Instructions to Bidders, General Conditions, completed Bid Forms, Specifications, Plans and Drawings, if any, and the completed contract form, as well as all other covenants, agreements, and obligations to be performed or paid by Contractor, which documents are referred to collectively as the "Contract" and are expressly incorporated herein by reference and made a part of this bond.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Contractor shall promptly, faithfully, and fully perform the terms, conditions, and provisions of the Contract, in strict conformity with each and every requirement thereof, as determined by Commission, then this obligation shall be null and void; otherwise this obligation and provisions of this bond shall remain in full force and effect as stated herein.

a. If the Contractor shall default, breach, or fail to promptly, faithfully, and fully perform any of the terms, conditions or provisions of the Contract, in strict conformity with each and every requirement thereof, as determined by Commission, Surety shall complete or provide for the completion of the Contract, subject to the approval of the Commission, in accordance with its terms and conditions, and Surety hereby agrees to defend, indemnify, and hold Commission harmless from and against any and all liability, loss, cost, damage or expense, including reasonable attorney's fees and/or the cost of any other professional services which Commission may incur or which may result from or be imposed upon Commission by reason of any default, breach, or failure of Contractor and/or its agents, servants, subcontractors or employees to so perform the Contract, and Surety shall pay and/or repay and reimburse the Commission promptly upon demand for any and all sums due to, paid out, or expended by or on behalf of Commission on account of or resulting from such default, breach, or failure to so perform any of the terms or conditions of the Contract within the time and in the manner therein provided, including, without limitation, any maintenance, warranty, or guarantee obligations in the Contract.

b. Any alteration, amendment, modification, omission, addition, extension, or forbearance which may be made in or to the terms of the Contract, including, without limitation, the amount to be paid or the obligations to be performed under it, or the giving by the Commission of any extension of time for the performance of the Contract or any other forbearance of any nature whatsoever on the part of either the Commission or the Contractor to the other shall not in any way affect or release the Contractor and the Surety, or either of them, their heirs, executors, administrators, successors or assigns with regard to their obligations and liability hereunder. Notice of any such alteration, amendment, modification, omission, addition, extension, or forbearance is hereby expressly waived by Surety. Any delay, omission, or failure by Commission to call upon the Surety in any instance shall not release the Surety from any obligation hereunder.

c. This Performance Bond shall be valid and continue in full force and effect and shall not be canceled or expire or be deemed to be canceled or have expired until all of Contractor's obligations under the Contract have been promptly, faithfully, and fully completed, as determined by Commission, including, without limitation, any maintenance, warranty, and guarantee obligations, as determined by Commission.

d. The obligations evidenced herein shall constitute the joint and several obligations of the Contractor, the Surety, and their respective heirs, executors, administrators, successors and assigns.

e. Any suit or action hereunder shall be brought in a Virginia court of competent jurisdiction in and for the City of Roanoke, Virginia, or in the United States District Court for the Western District of Virginia, Roanoke Division, and not elsewhere.

f. The provisions of this bond shall be governed by and are intended to be consistent with the laws of the Commonwealth of Virginia. In light of this express choice of

law provision, Virginia law for determining governing law shall not apply to the provisions of this bond. The Contractor, for itself and its successors and assigns, and the Surety, for itself and its successors and assigns, do hereby expressly waive any objection that might be interposed as to the right of the Commission to require a bond containing the provisions contained herein, and they do hereby further expressly waive any defense which they or either of them might interpose to any action brought hereon upon the ground that there is no law authorizing the Commission to require the provisions herein.

g. Wherever possible, each provision of this bond shall be interpreted in such manner as to be effective and valid under applicable law. If any provision of this bond is held illegal or unenforceable in a judicial proceeding, such provision shall be severed and shall be inoperative, and all remaining provisions of this bond shall remain operative and binding on the parties.

h. This bond shall be construed and interpreted without regard to the identity of the party which drafted its various provisions. Every provision of this bond shall be construed as if all parties participated equally in the drafting of that provision. Any legal principle or rule of construction that a document is to be construed or interpreted against the drafting party shall not be applicable in any legal or other proceeding involving the provisions of this bond, and such principle or rule is expressly waived by the parties to this bond.

i. Each party to this bond represents and covenants that the individual executing this bond on its behalf has full, unconditional authority to execute this bond and that, upon the signing of the bond by the authorized individual for each party, this bond shall become binding upon all parties

SIGNED and SEALED this _____ day of _____, 20___, in the presence of:

_____

Contractor

WITNESS: By: _____ (Seal)

_____ _____

(Type Name and Title)

_____

Surety

WITNESS: By: _____ (Seal)

Attorney-In-Fact

_____ _____

(Type Name and Title)

SURETY: Affix seal and attach current power of attorney)

ROANOKE REGIONAL AIRPORT COMMISSION

LABOR AND MATERIAL PAYMENT BOND FOR CONSTRUCTION PROJECT

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Insert full name or legal title and address of contractor)

as Principal (hereinafter referred to as "Contractor"), and

_____
(Insert full name or legal title and address of surety)

as Surety (hereinafter referred to as “Surety’)

a corporation duly organized under the laws of the State of _____and legally authorized to do business in the Commonwealth of Virginia, are held and firmly bound unto the Roanoke Regional Airport Commission, 5202 Aviation Drive, Roanoke, Virginia 24012 as Obligee (hereinafter referred to as "Commission"), in the amount of _____ DOLLARS ($_____.00), for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein.

WHEREAS, Contractor has entered into a contract with Commission dated _____for Bid No. 24-007 for the Security Fence Upgrade Construction Project (“Project”) at Roanoke Regional Airport, in accordance with all contract documents for such Project, including, without limitation and as may be applicable, the Advertisement, Invitation to Bid, Instructions to Bidders, General Conditions, Supplementary Conditions, completed Bid Forms, Specifications, Plans and Drawings, if any, and the completed contract form, as well as all other covenants, agreements, and obligations to be performed or paid by Contractor, which documents are referred to collectively as the “Contract” and are expressly incorporated herein by reference and made a part of this bond.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Contractor shall promptly pay or cause to be paid all persons and entities for all labor and materials furnished or supplied in furtherance of the Project and provided for in the Contract, as determined by Commission, then this obligation shall be null and void; otherwise, this obligation and all provisions of this bond shall remain in full force and effect as stated herein.

a. If Contractor shall fail to promptly pay or cause to be paid all persons and entities for all labor and materials furnished or supplied in furtherance of the Project and provided for in the Contract, as determined by Commission, Surety shall defend, indemnify, and hold Commission harmless from and against any and all liability, loss, cost, damage, or expense, including reasonable attorney's fees, which Commission may incur or which may result from or be imposed upon Commission by reason of such failure.

b. Any alteration, amendment, modification, omission, addition, extension, or forbearance which may be made in or to the terms of the Contract, including, without limitation, the amount to be paid or the obligations to be performed under it, or the giving by the Commission of any extension of time for the performance of the Contract or any other forbearance of any nature whatsoever on the part of either the Commission or the Contractor to the other shall not in any way affect or release the Contractor and/or the Surety, or their heirs, executors, administrators, successors or assigns with regard to their obligations and liability hereunder. Notice of any such alteration, amendment, modification, omission, addition, extension, or forbearance is hereby expressly waived by Surety. Any delay, omission, or failure by Commission to call upon the Surety in any instance shall not release the Surety from any obligation hereunder.

c. Surety and Contractor hereby jointly and severally agree that this bond shall be for the protection of claimants who have and fulfill contracts to supply labor or materials, or both, to the Contractor or to any subcontractors, in furtherance of the work provided for in the Contract and shall be conditioned upon the prompt payment for all materials furnished or labor supplied or performed in furtherance of the work. "Labor and materials" hereunder shall include, without limitation, public utility services and reasonable rentals of equipment, but only for periods when the equipment rented is actually used at the Project site.

Any claimant who has a direct contractual relationship with the Contractor and who has performed labor or furnished material in accordance with the Contract in furtherance of the work provided in the Contract for which this bond has been given, and who has not been paid in full before the expiration of 90 days after the day on which the claimant performed the last of the labor or furnished the last of the materials for which it claims payment, may bring an action on this bond to recover any amount due it for the labor or material. The obligee named in the bond need not be named a party to the action.

Any claimant who has a direct contractual relationship with any subcontractor but who has no contractual relationship, express or implied, with the Contractor, may bring an action on this bond only if it has given written notice to the Contractor within 90 days from the day on which the claimant performed the last of the labor or furnished the last of the materials for which it claims payment, stating with substantial accuracy the amount claimed and the name of the person for whom the work was performed or to whom the material was furnished. Notice to the Contractor shall be served by registered or certified mail, postage prepaid, in an

envelope addressed to such contractor at any place where its office is regularly maintained for the transaction of business. Claims for sums withheld as retainages with respect to labor performed or materials furnished, shall not be subject to the time limitations stated in this subsection.

Any action on this bond shall be brought within one year after the day on which the person bringing such action last performed labor or last furnished or supplied materials.

The parties intend that the provisions hereof describing who is entitled to bring an action as a claimant on this bond shall be consistent with sections 2.2-4337.A.2 and 2.2-4341 of the Virginia Public Procurement Act, Code of Virginia (1950), as amended ("Act"). To the extent any provision hereof describing who is entitled to bring an action as claimant on this bond is not consistent with any provision of sections 2.2-4337.A.2 and\or 2.2-4341, the provision(s) of those sections of the Act, as amended, shall govern and control.

d. Any suit or action hereunder shall be brought in a Virginia court of competent jurisdiction in and for the City of Roanoke, Virginia or in the United States District Court for the Western District of Virginia, Roanoke Division, and not elsewhere.

e. This bond shall continue in full force and effect and shall not be deemed canceled or to have expired unless and until all of Contractor's obligations to make payments for labor and materials provided, furnished or supplied in furtherance of the Project have been satisfactorily fulfilled, as determined by Commission, or this bond is otherwise terminated in accordance with its terms or applicable law.

f. The obligations evidenced herein shall constitute the joint and several obligations of the Contractor, the Surety, and their respective heirs, executors, administrators, successors and assigns.

g. The provisions of this bond shall be governed by and are intended to be consistent with the laws of the Commonwealth of Virginia. In light of this express choice of law provision, Virginia law for determining governing law shall not apply to the provisions of this bond. The Contractor, for itself and its successors and assigns, and the Surety, for itself and its successors and assigns, do hereby expressly waive any objection that might be interposed as to the right of the Commission to require a bond containing the provisions contained herein, and they do hereby further expressly waive any defense which they or either of them might interpose to any action brought hereon upon the ground that there is no law authorizing the Commission to require the provisions herein.

h. Wherever possible, each provision of this bond shall be interpreted in such manner as to be effective and valid under applicable law. If any provision of this bond is held illegal or unenforceable in a judicial proceeding, such provision shall be severed and shall be inoperative, and all remaining provisions of this bond shall remain operative and binding on the parties.

i. This bond shall be construed and interpreted without regard to the identity of the party which drafted its various provisions. Every provision of this bond shall be construed as if all parties participated equally in the drafting of that provision. Any legal principle or rule of construction that a document is to be construed or interpreted against the drafting party shall not be applicable in any legal or other proceeding involving the provisions of this bond, and such principle or rule is expressly waived by the parties to this bond.

j. Each party to this bond represents and covenants that the individual executing this bond on its behalf has full, unconditional authority to execute this bond and that, upon the signing of the bond by the authorized individual for each party, this bond shall become binding upon all parties

SIGNED and SEALED this _____ day of _____, 20_____, in the presence of:

_____
Contractor

WITNESS: By: _____ (Seal)

_____ _____
(Type Name and Title)

_____
Surety

WITNESS: By: _____ (Seal)
Attorney-In-Fact

_____ _____
(Type Name and Title)

(<u>SURETY</u>: Affix seal and attach current power of attorney)

(Rev 04/05/2012)

SPECIAL PROVISIONS

SECTION E

SPECIAL PROVISIONS

ROANOKE REGIONAL AIRPORT COMMISSION
ROANOKE-BLACKSBURG REGIONAL AIRPORT

SECTION 1

PROJECT INFORMATION

1. CONTRACT PROVISIONS. These Special Provisions are applicable to all divisions and sections of the Contract Documents and Specifications. It shall be the Contractor's responsibility to so inform all parties who should be bound or influenced thereby.

In the event there are discrepancies between the technical specifications and the special provisions, the interpretation most advantageous to the Owner shall apply.

2. DESCRIPTION OF WORK. The proposed Work includes the following:

A. Replacement of the existing 300-foot long EMAS “Block” System with a new cellular concrete block EMASMAX to meet the current/future needs of traffic at ROA
B. Reconfiguration and Rehabilitation of the Bast Pad and EMAS Support Pavement (Asphalt)
C. Removal of existing concrete EMAS Anchor Beam and replacement of Anchor Beam at new front of EMAS bed
D. Erosion and Sediment Control
E. Permitting
F. Realignment of the Airport Perimeter Road
G. Coordination with FAA regarding NAVAIDS impacts during Construction and after construction impacts to the Localizer Critical Area
H. Site-specific Construction Safety Phasing Plan (“CSPP”) and FAA Form 7460-1

3. LOCATION OF THE WORK. The site of the proposed Work is at **Roanoke-Blacksburg Regional Airport**.

4. DEFINITIONS.

A. ADDENDA. Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the bidding documents or the Contract Documents.

B. BID. The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work and services to be performed.

C. DAY. Unless otherwise defined shall mean "calendar" day.

D. DRAWINGS. The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by the Engineer and are referred to in the Contract Documents.

E. ENGINEER. The term "Engineer" in the Contract Documents means Reynolds Smith and Hills, Inc; 2600 Park Tower Drive, Suite 101, Vienna, Virginia 22180.

F. FIELD ORDER. A written order issued by the Engineer which orders minor changes in the work consistent with the intent of the Contract Documents but which does not involve a change in the Contract Price or the Contract Time.

The Engineer may authorize minor changes in the work not involving an adjustment in the contract price or the contract time, which are consistent with the overall intent of the Contract Documents. These may be accomplished by a field order and shall be binding on the Owner, and also on the Contractor who shall perform the change promptly. If the Contractor believes that a field order justifies an increase in the contract price or contract time, the Contractor shall make a claim under Section 37 of the General Conditions before doing the Work.

G. FURNISH or INSTALL or PROVIDE or SUPPLY. Unless specifically limited in the context, the word "Furnish" or the word "Install" or the word "Provide" or the word "Supply" or any combination or similar directive or usage thereof, shall mean FURNISHING AND INCORPORATION IN THE WORK including all necessary labor, materials, equipment, and anything necessary to perform the work indicated.

H. GOOD REPAIR. Good repair shall be construed to mean any defect, functional or structural deterioration (except that from ordinary and reasonable use) which appreciably reduces the effectiveness or efficiency of the work or improvement for the purpose intended, or any serious departure from the standards of original construction described in the Contract Documents, shall be remedied by the Contractor. Such remedy will be made without further cost to the Owner, including in part, all damages caused by such defect, deficiency, deterioration or departure, and by its repair, replacement or correction.

I. MAY. Permissive.

J. REFERENCE TO TRADE OR SUBCONTRACTORS. When only one principal contract exists for all work covered by the Contract Documents, reference to trade or subcontractors in the Contract Documents shall not create any contractual relationship between the Owner and any trade or subcontractor, with whom the principal contractor may subcontract.

K. SAMPLES. Samples are physical examples furnished or constructed by the Contractor to illustrate materials, equipment, workmanship or finishes, and to establish standards by which the work will be judged.

L. "SHALL" IMPLIED. In the interest of conciseness, some sentences, statements, and clauses used in the specifications exclude any form of the verb "shall" normally expressed in a verb phrase with verbs such as "furnish", "install", "provide", "perform", "construct", "erect", "comply", "apply", "submit", or similar "verb", but any such sentences, statements, and clauses shall be interpreted to include the applicable form of the phrase "The Contractor shall" and the requirements described therein shall be interpreted as mandatory elements of the Contract.

M. SHALL. Mandatory.

N. SUBCONTRACTOR. Party supplying labor and material or any labor for work at the site of the project for, and under separate contract or agreement with the Contractor. Nothing contained in the Contract Documents shall create any contractual relationship between the Owner and any subcontractor.

O. SUBSTANTIAL COMPLETION. When the work is sufficiently complete so it may be safely, conveniently and beneficially utilized by the Owner for all of the purposes for which it was intended.

P. WILL. Mandatory.

Q. SEDIMENT. Soil and other debris that have eroded and have been transported by runoff water or wind.

R. SOLID WASTES. Rubbish, debris, and other discarded solid materials, except hazardous waste as defined in paragraph entitled, "Hazardous Waste," resulting from industrial, commercial, and agricultural operations and from community activities.

S. RUBBISH. Combustible and noncombustible wastes including paper, boxes, glass, crockery, metal, lumber, cans, and bones.

T. DEBRIS. Combustible and noncombustible wastes such as ashes and waste materials resulting from construction or maintenance and repair work, leaves, and tree trimmings.

U. CHEMICAL WASTES. Salts, acids, alkalis, herbicides, pesticides, and organic chemicals.

V. SEWAGE. Waste characterized as domestic sanitary sewage.

W. GARBAGE. Refuse and scraps resulting from consumption of food.

X. HAZARDOUS WASTES. Hazardous substances as defined in 40 CFR 261 or as defined by applicable state and local regulations.

Y. OILY WASTES. Petroleum products and bituminous materials.

Z. HAZARDOUS MATERIALS. As defined in DOT Regulation 49 CFR 171 and listed in CFR 172.

AA. HAZARDOUS SUBSTANCES. As defined in EPA PL 96-510.

5. APPLICABLE DRAWINGS. The drawings applicable to this project are included in the Index of Drawings as included herein.

6. PROPOSAL REQUIREMENTS. In addition to those herein before described items to be submitted with the Bidder's Proposal, the Bidder shall submit, with his Proposal, a list of all Subcontractors the Bidder proposes to use on the Work of this Contract.

After the Sponsor accepts the Bidder's Proposal and such Bidder is awarded a Contract, the successful Bidder may not substitute a Subcontractor listed in the Proposal without the prior written approval of the Owner. Such approval shall be obtained at least ten Calendar Days prior to the date scheduled for that Subcontractor to begin Work.

7. CONTRACTOR'S LIABILITY INSURANCE. The following provisions supplement the requirements specified in Special Provisions--Section 2.

The Contractor shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the Contractor's operations under the Contract, whether such operations be by himself or by any Subcontractor or by anyone directly or indirectly employed by any of them or by any one for whose acts any of them may be liable:

(1) Claims under workmen's compensation, disability benefit and other similar employee benefits acts;

(2) Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;

(3) Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;

(4) Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person; and

(5) Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

General notes regarding liability:

(a) The Comprehensive General Liability policy shall include explosion, collapse and underground (X-C-U) coverage.

(b) The Contractual Liability shall include provisions for covering the indemnity specified under of the General Conditions.

(c) Comprehensive Automobile Liability shall include owned, leased, nonowned, and hired vehicles.

(d) The Comprehensive General Liability and Automobile Liability insurance shall include Contingent Liability and Contingent Property Damage Insurance to protect the Contractor against claims arising from the operations of Subcontractors, suppliers, vendors, or any person, firm or entity providing service to the Contractor.

(e) The Contractor's General Liability insurance shall include coverage to protect the Sponsor, Owner and Engineer from damage resulting either directly or indirectly from acts or omissions of the Contractor to existing buildings near the Work of the Contractor under the Contract, and the contents of such buildings.

(f) Certificates of the Contractor's Comprehensive Liability insurance, Comprehensive Automobile Liability insurance and Workmen's Compensation insurance shall be furnished to the Owner prior to commencement of Work. The certificates of insurance shall contain a provision that coverage afforded under the policies will not be canceled until at least 30 days prior written notice has been given to the Owner.

(g) Certificates of insurance shall be executed on AIA Document G705.

8. ACCESS TO THE WORK.

Access to the Work shall be via the access routes designated on the Contract Layout Plan. The Contractor shall identify access routes with suitable signs, barricades and similar equipment. Access gates shall be locked and secured when not attended by the Contractor. The entire access route and construction site shall be kept free and clean of all debris at all times and maintained in good repair by the Contractor. All damage to the access route caused by the actions of the Contractor or his agents shall be immediately repaired to the satisfaction of the Owner.

No separate payment will be made for complying with the requirements of this paragraph "Access to the Work." No other access to these Work sites will be permitted without written approval of the Engineer. Contractor's vehicles and equipment, including vehicles and equipment of the Subcontractors and others coming under the Contractor's control, will not be permitted to traverse other airfield areas or pavements without written approval of the Engineer. Contractor's vehicles, equipment and materials may be stored in the area designated on the Plans. Upon completion of the Work, the storage area shall be cleaned up and returned to its original condition to the satisfaction of the Owner. No separate payment will be made for cleanup and restoration of the storage area. Personal services, such as canteen trucks, will not be permitted beyond this area and drivers of vehicles being operated beyond this area shall be subject to loss of permission to enter the construction site.

9. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

(1) Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or any Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

(2) Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams or other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work.

(3) Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

(4) The Contractor shall review, approve and submit, with reasonable promptness and in such sequence as to cause no delay in the Work or in the Work of the Owner or any other separate Contractor(s), all Shop Drawings, Product Data and Samples required by the Contract Documents.

(5) By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that he has determined and verified all materials, field measurements and field construction criteria related thereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

(6) The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Engineer's approval of Shop Drawings, Product Data or Samples unless the Contractor has specifically informed the Engineer in writing of such deviation at the time of submission and the Engineer has given written approval of the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Engineer's approval thereof.

(7) The Contractor shall direct specific attention, in writing, or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the Engineer on previous submittals.

(8) No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittals have been approved by the Engineer. All such portions of the Work shall be in accordance with approved submittals.

(9) The Contractor shall not reproduce the Engineer's project drawings for Shop Drawing use without written approval of the Engineer.

(10) The Contractor shall submit five copies, or at Engineer's option, one reproducible copy and one print of all Shop Drawings required for the Work of the various trades unless greater quantities are specifically requested for certain equipment. Of these, three copies, or the reproducible copy, will be annotated as appropriate and returned to the Contractor with appropriate action indicated. By agreement with the Engineer, the Contractor may submit more than the required number of copies. Receipt of less than the required number of copies will be cause for withholding the Shop Drawings from being checked until receipt of the necessary additional copies. Shop Drawings shall be forwarded to **Reynolds, Smith and Hills, Inc.; 2600 Park Tower Drive, Suite 101, Vienna, Virginia 22180**, marked to the attention of **Raymond S. Yankey, PE**. The Contractor's letter of submittal must conform to the typical Contractor's "Transmittal Letter" which is available from the Engineer. The quantity of transmittal letters to be submitted shall be equal to the number of sets of drawings or brochures being submitted plus one. Each drawing or part of the brochure shall be listed separately on the letter and identified as indicated thereon. Failure to do this will cause rejection of the submittal. The Engineer will return to the Contractor the same transmittal letter, with the Shop Drawing disposition noted thereon along with the drawings or brochures when the review is completed. The Contractor shall forward separate transmittal letters for submitting each group of Shop Drawings common to a Specification Section.

(11) In checking Shop Drawings prior to submittal, the Contractor is requested to note corrections or comments on the drawings in orange pencil.

(12) Drawings returned to the Contractor will be stamped "Approved," "Approved as Noted," "Returned for Corrections," or "Not Approved." Drawings stamped "Approved as Noted" need not be returned for further approval if the notations are acceptable to the Contractor and Subcontractors. Drawings stamped "Returned for Corrections" or "Not Approved" shall require new submission. Comments and corrections by the Engineer will be made in red pencil on blue or black line prints and in yellow pencil on white line prints.

(13) Samples shall be submitted to the attention of Raymond S. Yankey, PE, accompanied with the same transmittal letter prescribed for Shop Drawings. Checking by Contractor of samples before transmittal is required the same as for Shop Drawings.

10. PROJECT DOCUMENTATION.

(a) Project Drawings: A field set of Plans and Specifications, supplied by the Contractor, shall remain on the job site at all times and shall be available at all times to the Engineer.

The Contractor shall immediately include plainly and conspicuously on the field set of drawings, and at appropriate paragraphs in the specifications, all changes or corrections made by addenda and Change Orders as they are issued.

Approved copies of all shop drawings and other submittals are to be kept on the job site at all times and shall be available at all times to the Engineer.

Changes and deviations from the existing conditions shall be submitted in writing for approval prior to installation. In no case shall any unspecified equipment or materials be installed without prior approval by the Engineer.

(b) Record Documents:

(1) Definition: Record copies are defined to include those documents or copies relating directly to performance of the Work, which Contractor is required to prepare or maintain for Owner's records, recording the Work as actually performed. In particular, record copies show changes in the Work in relation to way in which shown and specified by original Contract Documents; and show additional information of value to Owner's records, but not indicated by original Contract Documents. Record copies include newly prepared drawings (if any are specified), marked-up copies of Contract drawings, shop drawings, Specifications, addenda and Change Orders, marked-up product data submittals, record samples, field records for variable and concealed conditions such as excavations and foundations, and miscellaneous record information on Work which is otherwise recorded only schematically or not at all.

(2) Record Drawings: Contractor shall maintain a set of record drawings at the job site. These shall be kept legible and current and shall be available for inspection at all times by the Engineer. The Contractor shall show all changes or Work added on these record drawings in a contrasting color.

(i) Mark-Up Procedure: During progress of the Work, maintain a white-print set (blue-line or black-line) of Contract drawings and shop drawings, with mark-up of actual installations which vary substantially from the Work as originally shown. Mark whatever drawing is most capable of showing actual physical condition, fully and accurately. Where shop drawings are marked up, mark cross-reference on Contract drawings at corresponding location. Mark with erasable colored pencil, using separate colors where feasible to distinguish between changes for different categories of Work at same general location. Mark-up important additional information which was either shown schematically

or omitted from original drawings. Give particular attention to information on Work concealed, which would be difficult to identify or measure and record at a later date. Note alternate numbers, Change Order numbers and similar identification. Require each person preparing mark-up to initial and date mark-up and indicate name of firm. Label each sheet "PROJECT RECORD" in 1-1/2-inch high letters.

In showing changes in the Work, use the same legends as used on the original drawings. Indicate exact locations by dimensions and exact elevations by job datum. Give dimensions from a permanent point.

(ii) Preparation of Transparencies: In preparation for Certification of Substantial Completion on last major portion of the Work, review completed mark-up of record drawings and shop drawings with the Engineer. The Engineer will then proceed with preparation of a full set of corrected transparencies for Contract drawings. The Engineer will date each updated drawing and label each sheet "PROJECT RECORD" in 1-1/2-inch high letters. Printing as required herein is the responsibility of the Engineer.

(iii) Copies, Distribution: Upon completion of transparency record drawings, the Engineer shall prepare three blue-line or black-line prints of each drawing, regardless of whether changes and additional information were recorded thereon. The Engineer shall then organize each of three copies into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates. Mark-up set of prints maintained during the construction period shall be bound in the same manner. The Engineer shall also organize transparencies into sets matching print sets, place set in a durable tube-type drawing container (with end caps) and mark end cap of each with suitable identification. The Engineer will retain one copy set. At completion of project, the Engineer shall submit set of mylars, with changes noted thereon, to the Owner.

(3) Record drawings shall contain the names, addresses and phone numbers of the general Contractor and major Subcontractors.

(4) The Engineer shall be the sole judge of the acceptability of the record drawings. Receipt and acceptance of the as-built drawings is a prerequisite for Final Payment.

(c) Record Specifications:

(1) During progress of the Work, maintain one copy of Specifications, including addenda, Change Orders and similar modifications issued in printed form during construction, mark-up variations (of substance) in actual Work in comparison with text of Specifications and modifications as issued. Give particular attention to substitutions, selection of options, and similar information on Work where it is concealed or cannot otherwise by readily discerned at a later date by direct observation. Note related record drawing information and product data, where applicable. Upon completion of mark-up, submit to the Engineer for Owner's records. Label front cover "PROJECT RECORD" in 1-1/2-inch high letters.

(2) Where manual is printed on one side of page only, mark variation on blank left-hand pages of project manual, facing printed right-hand pages containing original text affected by variation.

(d) Record Product Data: During progress of the Work, maintain one copy of each product data submittal, and mark-up significant variations in the actual Work in comparison with submitted information. Include both variations in product as delivered to site, and variations from manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned at a later date by direct observation. Note related Change Orders and mark-up of record drawings and Specifications. Upon completion of mark-up, submit complete set of product data submittal to the Engineer for Owner's records. Label each data submittal "PROJECT RECORD" in 1-1/2-inch high letters.

(e) Record Sample Submittal: Immediately prior to date(s) of Substantial Completion, the Engineer and Owner's personnel will meet with Contractor at site and will determine if any of submitted samples maintained by Contractor during progress of the Work are to be transmitted to Owner for record purposes. Comply with the Engineer's instructions for packaging, identification marking and delivery to Owner's sample storage space. Dispose of other samples in manner specified for disposal of surplus and waste materials, unless otherwise indicated by the Engineer.

(f) Miscellaneous Record Submittals: Refer to other sections of these Specifications for requirements of miscellaneous recordkeeping and submittals in connection with actual performance of the Work. Immediately prior to date(s) of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to Engineer for Owner's records. Categories of requirements resulting in miscellaneous Work records are recognized to include, but not be limited to, the following:

(1) Required field records on excavations, foundations underground construction, wells and similar Work.

(2) Accurate survey showing locations and elevations of underground lines, including invert elevations of drainage piping, valves, tanks and manholes.

(3) Surveys establishing lines and levels of building.

(4) Soil treatment certification.

(5) Inspection and Test Reports: Where not processed as shop drawings or product data.

(6) Concrete mix design record.

(7) Concrete block certification.

(g) Project Closeout: Closeout is hereby defined to include general requirements near end of Contract time, in preparation for Final Acceptance, Final Payment, normal termination of Contract, occupancy by Owner and similar actions evidencing completion of the Work. Specific requirements for individual units or Work are specified in other sections. Time of closeout is directly related to Substantial Completion, and therefore may be a single-time period for entire Work or a series of time periods for individual parts of the Work which have been certified as Substantially Complete at different dates. The time variation, if any, shall be applicable to other provisions of this section.

(h) Prerequisites to Substantial Completion:

(1) Prior to requesting the Engineer's inspection for Certification of Substantial Completion, for either entire Work or portions thereof, complete the following and list no exceptions in request.

(i) In progress payment request coincident with, or first following date claimed, show 100 percent completion for portion of Work claimed as "Substantially Completed," or list incomplete items, value of incompletion and reasons for being incomplete.

(ii) Include supporting documentation for completion as indicated in the Contract Documents.

(iii) Submit statement showing accounting of changes to the Contract sum.

(iv) Advise Owner of pending insurance change-over requirements.

(v) Obtain and submit releases enabling Owner's full and unrestricted use of the Work and access to services and utilities, including, where required, occupancy permits, operating certificates and similar releases.

(vi) Deliver tools, spare parts, extra stocks of materials and similar physical items to Owner.

(vii) Make final change-over of locks and transmit keys to Owner, and advise Owner's personnel of change-over in security provisions.

(viii) Complete start-up testing of systems, and instructions of Owner's operating-maintenance personnel. Discontinue, or change over, and remove from project site temporary facilities and services, along with construction tools and facilities, mock-ups and similar elements.

(2) Inspection Procedures: Upon receipt of Contractor's request, the Engineer will proceed with inspection or advise Contractor of prerequisites not fulfilled. Following initial inspection, the Engineer will prepare Certificate of Substantial Completion or advise Contractor of Work which must be performed prior to issuance of certificate and repeat inspection when requested and assured that Work has been substantially completed. Results of completed inspection will form initial "punch list" for Final Acceptance.

(i) Prerequisites to Final Acceptance:

(1) Prior to requesting the Engineers' final inspection for Certification of Final Acceptance, complete the following and list known exceptions in request:

(i) Submit certified copy of Engineer's final punch list of itemized Work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, endorsed and dated by the Engineer.

(ii) Submit final meter readings for utilities, measured record of stored fuel, and similar data as of time of Substantial Completion or when Owner took possession of and responsibility for corresponding elements of the Work.

(iii) Complete final cleaning up requirements, including touch-up of marred surfaces.

(iv) Touch-up and otherwise repair and restore marred exposed finishes.

(2) Reinspection Procedures: Following Substantial Completion, the Contractor shall correct or remedy all punch list items to the satisfaction of the Engineer and Owner within a two (2)-week period after the date of Substantial Completion. If subsequent inspections are necessary after the two-week period in order to eliminate all deficiencies, the cost of all subsequent inspections with respect to Owner's and Engineer's time shall be paid by the Contractor. When ready, the Contractor shall request in writing, a final inspection of the Work. Upon completion of reinspection, Engineer will prepare a Certificate of Final Acceptance or advise Contractor of Work not completed or obligations not fulfilled as required for Final Acceptance. If necessary, procedures will be repeated.

(j) Prerequisites to Final Payment:

(1) Final Payment: Final Payment will be made after Final Acceptance of the project by the Engineer and Owner upon request by the Contractor on condition that the Contractor:

(i) Furnish properly executed complete release of lien from all material men and Subcontractors who have furnished materials or labor for the Work and submit supporting

documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

(ii) Furnish Contractor's Affidavit of Release of Liens (2 copies) that all material men and Subcontractors have been paid in full. In the event they have not been paid in full, the Owner shall retain a sufficient sum to pay them in full and at his option, may make direct payment as provided in the appropriate Commonwealth of Virginia statutes, as amended, to obtain complete releases of lien.

(iii) Furnish Contractor's Affidavit of Debts and Claims (2 copies).

(iv) Furnish required sets of record drawings and maintenance and operating instructions of new mechanical equipment.

(v) Furnish guarantees signed by Subcontractors, material suppliers and countersigned by the Contractor for operating equipment.

(vi) Submit specific warranties, workmanship-maintenance bonds, maintenance agreements, final certifications and similar documents.

(v) Furnish a signed guarantee, in form acceptable to Engineer and Owner agreeing to repair or replace as decided by the Engineer, all Work and materials that prove defective within one (1) year (or more) from the date of Final Acceptance, including restoration of all other Work damaged in making such repairs or replacements.

(vi) Furnish consent of Surety to Final Payment.

(vii) Submit updated final statement, accounting for final changes to Contract sum.

(viii) Submit evidence of final, continuing insurance coverage complying with insurance requirements.

(ix) Certify that all social security, employment and all other taxes (city, state, federal government) have been paid.

(x) Provide receipt, as applicable, of affidavits certifying all labor standards of local, state or federal requirements have been complied with by the Contractor.

(xi) Submit actual DBE participation percentages.

(k) Record Document Submittals: Specific requirements for record documents are shown in Section, RECORD DOCUMENTS. Other requirements are indicated in Section 38 of the General Conditions. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

(1) Record Drawings: The Engineer shall organize record drawing sheets into manageable sets, bind with durable paper cover sheets and print suitable titles, dates and other identification on cover of each set.

(2) Record Specifications: Upon completion of mark-up, submit to the Engineer for Owner's records.

(3) Record Product Data: Upon completion of mark-up, submit complete set to the Engineer for Owner's records.

(4) Record Sample Submittal: Comply with the Engineer's instructions for packaging, identification marking and delivery to Owner's sample storage space.

(5) Miscellaneous Record Submittals: Complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Engineer for Owner's records.

(6) Maintenance Manuals: Complete, place in order, properly identify and submit to the Engineer for Owner's records.

(l) Closeout Procedures: General Operating and Maintenance Instructions: Arrange for each installer or Work requiring continuing maintenance or operation to meet with Owner's personnel, at project site, to provide basic instructions needed for proper operation and maintenance of entire Work. Include instructions by manufacturer's representatives where installers are not expert in the required procedures. Review maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuel, identification system, control sequences; hazards, cleaning and similar procedures and facilities. For operational equipment, demonstrate start-up, shut-down, emergency operations, noise and vibration adjustments, safety, economy, efficiency adjustments and similar operations. Review maintenance and operations in relation with application warranties, agreements to maintain bonds, and similar continuing commitments.

11. FINAL CLEANING.

(a) Provide final cleaning of the Work, at time indicated, consisting of cleaning each surface or unit of Work to normal "clean" condition.

(b) Removal of Protection: Remove temporary protection devices and facilities which were installed during course of the Work to protect previous completed Work during remainder of construction period.

(c) Compliances: Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at site, or bury debris or excess materials on Owner's property, or discharge volatile or other harmful or dangerous materials into drainage systems; remove waste materials from site and dispose of in a lawful manner.

Where extra materials of value remaining after completion of associated Work have become Owner's property, dispose of these as directed by owner.

END OF SPECIAL PROVISIONS - SECTION 1

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SPECIAL PROVISIONS

ROANOKE REGIONAL AIRPORT COMMISSION
ROANOKE-BLACKSBURG REGIONAL AIRPORT

SECTION 2

INSURANCE REQUIREMENTS

1. REQUIREMENTS OF CONTRACTOR LIABILITY INSURANCE. The Contractor shall procure and maintain at his own expense, during the life of this Contract, liability insurance with limits of coverage not less than the amounts as hereinafter specified. The policies shall be written by reputable companies authorized to do business in the Commonwealth of Virginia, rated no less than A-9 by A.M. BEST. All such insurance shall be subject to the approval of the Owner for adequacy of protection, and shall include a provision preventing cancellation without thirty days prior notice to the Owner in writing. At the time of execution of the Contract, the successful Bidder shall furnish the Owner evidence that appropriate insurance has been procured and will be maintained for the life of the Contract liability and compensation insurance.

The Contractor will provide protection from claims set forth below which may arise out of or result from the Contractor's performance and furnishing of the Work and the Contractor's other obligations under the Contract as follows:

1. Commercial General Liability - $5,000,000 per loss for bodily injury, personal injury and property damage. If a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.

2. Automobile Liability - $ 5,000,000 per accident for bodily injury and property damage,

3. Employer's Liability - $ 1,000,000 per accident for bodily injury or disease.

4. Umbrella Liability - $ 5,000,000 aggregate limit.

5. Workers' Compensation coverage as required by law.

6. The Contractor will be required to provide a Certificate of Insurance and a copy of the additional insured endorsement, indicating:

    - Commercial General Liability insurance, including contractual liability, and defense costs outside of policy limits. Contractor's policy will be primary and be on an occurrence basis.
    - Automobile Liability insurance
    - Umbrella Liability insurance
    - Workers' Compensation insurance

In carrying out any of the Contract provisions or in exercising any power or authority granted to the Contractor by this Contract, there shall be no liability upon the Engineer, his authorized representatives, or any official of the Owner, either personally or as an official of the Owner. It is understood that in such

matters they act solely as agents and representatives of the Owner. THE ROANOKE REGIONAL AIRPORT COMMISSION, ROANOKE-BLACKSBURG **REGIONAL AIRPORT,** AND THE ENGINEER SHALL BE AN ADDITIONAL INSURED AND PROTECTED, IN THE CONTRACTOR'S LIABILITY INSURANCE POLICY, FROM ALL CLAIMS ARISING OUT OF, OR IN CONNECTION WITH, ANY OPERATIONS CONDUCTED IN CONNECTION WITH THIS CONTRACT BY THE CONTRACTOR OR HIS SUBCONTRACTORS.

END OF SPECIAL PROVISIONS - SECTION 2

SPECIAL PROVISIONS

ROANOKE REGIONAL AIRPORT COMMISSION
ROANOKE-BLACKSBURG REGIONAL AIRPORT

SECTION 3

MISCELLANEOUS

1. BID AND CONTRACT ACCEPTANCE. The Roanoke Regional Airport Commission reserves the following rights: to accept or reject any or all bids; and to award the Contract to the lowest responsive and responsible Bidder whose bid is determined by the Commission to be in its best interest. Further, any and all agreements arising out of these proposals shall not be binding or valid against the Commission, its departments, officers, employees, or agents unless fully executed in writing and authorized by the Roanoke Regional Airport Commission.

2. PROVISIONS REQUIRED BY LAW DEEMED INSERTED. Each and every provision of law and clause required by law to be inserted in the Contract Documents shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein. If, for any reason, any such provision is not inserted in the Contract, or is not correctly inserted, then upon application of either party, the Contract shall forthwith be physically amended to make such insertion or correction.

3. CORRELATION OF DOCUMENTS.

A. The drawings and specifications are cooperative and supplementary. Portions of the work which can be best be illustrated by the drawings may not be included in the specifications and portions best described by the specifications may not be depicted on the drawings. All items necessary or incidental to completely construct or erect the work shall be furnished, whether called for in the specifications or shown on the drawings. Anything mentioned in the specifications and not shown on the drawings, or anything shown or mentioned on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both.

B. In case of disagreement between the drawings and specifications, or within either document itself, the better quality or greater quantity of work shall be estimated and included in the bid and contract price and the matter drawn to the Engineer's attention for decision.

4. NOTICE AND SERVICE THEREOF. Where the manner of giving notice is not otherwise provided for in the Contract Documents, any notice to the Contractor from the Owner relative to any part of the Contract shall be in writing and considered delivered and the service thereof completed, when said notice is posted, by certified or registered mail, to the Contractor at the address given in the Contractor's proposal, or at the last business address known to him who gives the notice, or delivered in person to the Contractor or his authorized representative on the site. It is mutually agreed that such notice shall be sufficient and adequate.

5. SUBCONTRACTING.

A. The Contractor may utilize the services of specialty or minority subcontractors on those parts of the work which, under normal contracting practices, are performed by specialty or minority subcontractors.

B. The Owner reserves the right to approve subcontractors for any work. The Contractor, if requested by the Owner, shall submit to the Owner the proposed award and such information as the Owner may require concerning any subcontractor.

C. The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, or under their control, as he is for the acts and omissions of persons directly employed by him.

D. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the work of subcontractors, and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.

E. Nothing contained in the Contract Documents shall create any contractual relationships between any subcontractor and the Owner.

6. PROTECTION OF PERSONS.

A. The Contractor shall:

(1) At all times protect the lives and health of his employees under the Contract;

(2) Take all necessary precautions for the safety of all persons on or in the vicinity of the project site.

(3) Comply with all applicable provisions of Federal, State and Municipal safety laws and building codes.

(4) Comply with all pertinent provisions of the Manual of Accident Prevention in Construction issued by the Associated General Contractors of America, Inc., latest edition, to prevent accidents or injury to persons on or about or adjacent to the premises where the work is being performed. He shall erect and properly maintain at all times, as required by the conditions and progress of the work, all necessary safeguards for the protection of persons and shall post danger signs warning against the hazards created in part by features of construction such as protruding nails, rod hoists, well holes, falling materials, etc., and he shall designate a responsible member of his organization on the work site whose duty shall be the prevention of accidents;

(5) Provide for all safeguards for the protection of those having Right-of-Entry during field review and observation of the work.

B. The Contractor shall comply with all provisions of the "Williams-Steiger Occupational Safety and Health Act of 1970" including any amendments thereto and rules and regulations issued pursuant thereto, applicable to the Work and performance of the Contract. Where a State in which work is performed has passed legislation bearing on Occupational Safety and Health, such legislation and amendments thereto, together with rules and regulations issued pursuant thereto, shall be complied with by the Contractor.

7. AUTHORITY OF ENGINEER.

A. The Engineer, through its duly authorized representatives, shall furnish engineering services during construction of the work to the extent provided in the Contract Documents. He shall observe and review the work in the process of construction or erection. Compliance with the Contract Documents shall be the Contractor's responsibility notwithstanding such observation or review. The Engineer has authority to recommend suspension of the work to the Owner when it appears such suspension may be necessary to accomplish the proper implementation of the intent of the Contract Documents. The authority to observe, review or recommend suspension of the work, or exercise such other authority as may be granted by the Contract Documents, shall not be construed or interpreted to mean supervision of construction, which is the Contractor's responsibility, nor make the Engineer responsible for providing a safe place for the performance of work by the Contractor or by the Contractor's employees, or those

of suppliers or subcontractors, or for access, visits, use, work, travel, or occupancy by any other person. The Engineer shall also have the authority to reject any work, materials, or equipment which do not conform to the Contract Documents and to decide technical questions which arise in the execution of the work.

B. The Engineer shall determine the amount, quality, acceptability, and fitness of the several kinds of work, materials, equipment and supplies which are to be paid for under the Contract and shall decide questions which may arise in relation to said work and its compliance with the Contract Documents. The Engineer's estimates and decisions shall be final and conclusive, except as otherwise expressly provided in case any question shall arise between the parties to the Contract relative to the Contract Documents, the determination or decision of the Engineer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under the Contract affected in any manner or to any extent by such question.

C. The Engineer shall decide the meaning and intent of any portion of the Contract Documents where the same may be found obscure or be in dispute.

8. "GOOD REPAIR" PERIOD.

A. The Contractor hereby agrees to keep all work constructed under the Contract in good repair for a minimum period of one (1) year, unless a longer period is otherwise specified in the Contract Documents, from the date of acceptance of all of the work by the Owner. No provision of the Contract documents shall be valid which limits the "Good Repair" period to less than one (1) year from the date of acceptance of all of the work by the Owner. The work may be phased. If the work is phased, each phase of Work completed shall be inspected and approved for use by the Owner but shall not be accepted until all work for all phases is complete and a final inspection for all work has been performed.

B. It is intended that this provision shall apply whether or not bond is required, as a personal obligation of the Contractor.

C. The obligations of the Contractor as herein provided shall be in addition to and not in limitation of any obligations imposed upon him by special guarantees required by the Contract Documents or otherwise prescribed by law.

9. VARIATION FROM ESTIMATED QUANTITIES. The Contractor may reasonably expect a variation in estimated quantities such that the total payment for the completed work may range from 75 to 125 percent of the total amount of the Contract based on the estimated quantities defined in the proposal. The Contractor will not be allowed any claims for anticipated profits, for loss of profits, or for any damages because of a difference between the estimate of any item defined in the proposal and the amount of the item actually required or for the elimination of any part of the work. Funds for construction of the work herein contemplated are limited. The Owner reserves the right to eliminate or reduce the items of the proposal or any of the work as may be required to bring the cost of the work within the limits of available funds.

10. WATER FOR CONSTRUCTION. Water used for construction of this project will be furnished by the Contractor. The Contractor shall make the necessary arrangements with the Owner of the source of water for securing and/or transporting such water. No separate payment will be made for water used but the cost thereof shall be included in the various items of the proposal and bid schedule.

11. LIGHTS AND POWER. The Contractor shall provide, at his own expense, temporary lighting and facilities required for the proper prosecution and inspection of the work.

12. COORDINATION WITH OTHERS. In the event other contractors are doing work in the same area simultaneously with this project, the Contractor shall coordinate his proposed construction with that of the other contractors. The Contractor shall notify the Engineer of said coordination attempts and the results.

13. TESTING, INSPECTION, AND CONTROL. The Contractor's Quality Control (QC) program will be paid by the Contractor and reimbursed according to the C-100 specification. The Owner will pay separately for Quality Assurance (QA) testing. QA testing will be coordinated through the RPR. The Owner shall pay for all passing tests; the Contractor shall pay for all failing tests. Charges for failing tests will be deducted from the Contractor's earnings at the end of each month when the Contractor submits his periodic pay requests. The Contractor shall furnish, at his own expense, all necessary specimens for testing of the materials, as required by the Engineer. The Contractor shall be responsible for notifying the testing laboratory to pick up the test samples. Also, the Engineer reserves the right to test at any location on the project, and at any frequency he deems necessary before, during and after incorporation of all materials into the project to satisfy himself and ensure that all materials meet the specified requirements. All materials utilized in the project must meet specification requirements before, during and after incorporation into the project. Any additional testing that the Contractor deems necessary to ensure himself that the materials he is installing meet the required specifications and/or as a proof of the authorized testing laboratory shall be solely the expense of the Contractor whether the tests pass or fail.

14. TRADE NAMES AND MATERIALS. No material that has been used by the Contractor for any temporary purpose whatsoever is to be incorporated in the permanent structure without written consent of the Engineer.

Where materials or equipment are specified by a trade or brand name, it is not the intention of the Owner to discriminate against an equal product of another manufacturer, but rather to set a definite standard of quality or performance, and to establish an equal basis for the evaluation of bids. Where the words "equivalent", "proper", or "equal to" are used, they shall be understood to mean that the thing referred to shall be proper, the equivalent of, or equal to some other thing, in the opinion or judgement of the Engineer. Unless otherwise specified, all materials shall be the best of their respective kinds and shall be in all cases fully equal to approved samples. Notwithstanding that the words "or equal to" or other such expressions may be used in the plans and specifications in connection with the material, manufactured article or process, the material, manufactured article or process specifically designated shall be used, unless a substitute shall be approved in writing by the Engineer and the Engineer shall have the right to require the use of such specifically designated material, article or process.

15. PROPERTY LINES AND MONUMENTS. The Contractor shall protect all property corner markers and any other monument, and when any such markers or monuments are in danger of being disturbed, they shall be properly referenced and if disturbed shall be reset at the expense of the Contractor.

16. FENCES AND DRAINAGE CHANNELS. Boundary fences or other improvements removed to permit the installation of the work shall be replaced in the same location and left in a condition as good or better than that in which they were found. Existing fences not to be removed and intersecting with new fencing (fencing outside airport property) shall be connected to the new fencing in a manner acceptable to the fence owner and the Owner and/or Engineer.

Where surface drainage channels are disturbed or blocked during construction, they shall be restored to their original condition of grade and cross section after the work of construction is completed.

17. DISPOSAL OF WASTE AND SURPLUS EXCAVATION. All trees, stumps, slashings, brush or other debris to be removed from the site as a preliminary to the construction work shall be removed from the property and legally disposed of in a manner approved by the Engineer and at a site approved by the Owner. No burning on site will be permitted.

All excavated earth in excess of that required for embankment and backfill shall be disposed of in a satisfactory manner as shown on the plans or as directed by the Engineer to a site approved by the Owner.

18. AIR POLLUTION. The Contractor shall comply with all Federal, State and Local Requirements.

19. EXISTING UTILITIES AND SERVICE LINES. The Contractor shall be responsible for the protection of all existing utilities or service lines crossed or exposed by his construction operations. Where existing utilities or service lines are cut, broken or damaged, the Contractor shall replace or repair the utilities or service lines with the same type of original material and construction, or better, at his own cost and expense, with the exception of those items included in the bid schedule.

20. RECORDS OF MATERIALS PURCHASED. By a certain time each month as defined and established at the preconstruction conference, the Contractor shall furnish to the Engineer, duplicate copies of all invoices for materials furnished to be incorporated into the work, plus a statement of all materials previously included on monthly estimates and incorporated into the work during the preceding month. This information is to be used to determine the value of materials on hand to be included in the monthly estimate for periodical payment.

21. CONTRACTOR ACCESS TO PROJECT SITE. The Contractor shall have a specific access route to the project site. This route is shown in the construction drawings. The Contractor shall use this route to bring all equipment and materials in. If the Contractor has a better route that will prevent damage to existing roads or provide safer access to the construction site, the Contractor shall supply a drawing showing the recommended route to the Owner and Engineer for approval at the preconstruction conference.

22. NIGHTTIME WORK. In phases of work requiring daytime work, the Contractor shall not perform nighttime work unless given approval in writing by the Engineer. The Contractor shall request in writing approval to perform nighttime work. If the Engineer approves said nighttime work, the Contractor shall coordinate closely with the Engineer and the Owner during any and all approved nighttime work. This includes any nighttime hauling of materials to the project site. If the Contractor wishes to perform nighttime work or haul materials at night, the Contractor shall reimburse the Owner for any nighttime inspection costs incurred by the Owner to adequately and properly inspect said nighttime work or hauling of materials.

In phases of work requiring nighttime work, the Contractor shall perform said nighttime work within the time frame allotted by the Owner and shown on the phasing plans. The Contractor shall coordinate with the Owner and Engineer each day before nighttime operations to ensure all special instructions, time limitations, directives, etc. are adhered to each night of nighttime operations. The Contractor shall not enter areas requiring nighttime construction operations until cleared to do so by the Owner. Any violation will result in a $1,000.00 fine for each individual and each piece of equipment committing the infraction. In case of equipment breakdown during nighttime operations, the Contractor shall have on site, back up equipment, to ensure that the night work is completed on time at the end of each night shift, and the airfield is reopened to traffic per the phasing plans. At a minimum, back up equipment shall include a paver and a roller.

23. DUST CONTROL. The Contractor shall maintain strict dust control during the project duration. There are operational areas, aircraft parked on the airport as well as commercial facilities that perform maintenance and repair work to aircraft. Therefore, it is imperative that strict dust control be maintained so that damage or nuisance to the areas and facilities described above or airport operational areas is prevented. This dust control shall also include the dust that may occur during any construction procedure.

24. TRIP TICKETS, INVOICES, WEIGH BILLS, ETC. The Contractor shall be responsible for supplying any and all trip tickets, invoices, weigh bills, etc. which show the quantities actually used in the construction of the project. All said trip tickets, invoices, weigh bills, etc. shall relate directly to specific bid items. If the Contractor fails to submit said trip tickets, invoices, weigh bills, etc. to the Engineer or his authorized representative prior to or during the time of installation of materials into the project, any material overruns claimed by the Contractor at the end of the project shall not be accepted.

25. FINAL IN-PLACE EXCAVATION & EMBANKMENT SECTIONS. At the completion of the project, the Contractor shall submit final in-place earthwork cross sections for the entire project site affected by earthwork operations with the detailed calculations as to as-built excavation and/or embankment. The

Contractor may use the cross sections provided in the plans and plot the as-built conditions on those cross section sheets along with the accompanying calculations. The Contractor shall be paid based upon the volume between the original ground line and the as-built ground line. The Contractor shall be paid based on the type of operations for which a bid price was provided.

END OF SPECIAL PROVISIONS - SECTION 3

SPECIAL PROVISIONS

ROANOKE REGIONAL AIRPORT COMMISSION
ROANOKE-BLACKSBURG REGIONAL AIRPORT

SECTION 4

LISTING OF DUTIES, RESPONSIBILITIES AND LIMITATIONS OF AUTHORITY OF THE RESIDENT PROJECT REPRESENTATIVE

The Owner and/or Engineer shall furnish a Resident Project Representative (RPR), assistants and other field staff to assist the Engineer in observing performance of the Work of the Contractor.

Through more extensive on-site observations of the Work in progress and field checks of materials and equipment by the RPR and assistants, the Engineer shall endeavor to provide further protection for the Owner against defects and deficiencies in the Work; but, the furnishing of such services will not make the Engineer responsible for or give the Engineer control over construction means, methods, techniques, sequences or procedures or for safety precautions or programs, or responsibility for the Contractor's failure to perform the Work in accordance with the Contract Documents.

The duties and responsibilities of the RPR are limited to those of the Engineer in the Engineer's agreement with the Owner and in the construction Contract Documents, and are further limited and described as follows:

A. General

The RPR is the Engineer's agent at the site, will act as directed by and under the supervision of the Engineer, and will confer with the Engineer regarding the RPR's actions. The RPR's dealings in matters pertaining to the on-site Work shall in general be with the Engineer and the Contractor keeping the Owner advised as necessary. The RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of the Contractor. The RPR shall generally communicate with the Owner with the knowledge of and under the direction of the Engineer.

B. Duties and Responsibilities of the RPR

1. Schedules: Review the progress schedule, schedule of Shop Drawing submittals and schedule of values prepared by the Contractor and consult with the Engineer concerning acceptability.

2. Conferences and Meetings: Attend meetings with the Contractor, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.

3. Liaison:

a. Serve as the Engineer's liaison with the Contractor, working principally through the Contractor's superintendent and assist in understanding the intent of the Contract Documents; and assist the Engineer in serving as the Owner's liaison with the Contractor when the Contractor's operations affect the Owner's on-site operations.

b. Assist in obtaining from the Owner additional details or information, when required for proper execution of the Work.

4. Shop Drawings and Samples:

   a. Record date of receipt of Shop Drawings and samples.

   b. Receive samples which are furnished at the site by the Contractor, and notify the Engineer of availability of samples for examination.

   c. Advise the Engineer and the Contractor of the commencement of any Work requiring a Shop Drawing or sample if the submittal has not been approved by the Engineer.

5. Review of Work, Rejection of Defective Work, Inspections and Tests:

   a. Conduct on-site observations of the Work in progress to assist the Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.

   b. Report to the Engineer whenever the RPR believes that any Work is unsatisfactory, faulty or defective or does not conform to the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise the Engineer of Work that the RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

   c. Verify that tests, equipment and systems startups and operating and maintenance training are conducted in the presence of appropriate personnel, and that the Contractor maintains adequate records thereof; and observe, record and report to the Engineer appropriate details relative to the test procedures and startups.

   d. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of those inspections and report to the Engineer.

6. Interpretation of Contract Documents: Report to the Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to the Contractor clarifications and interpretations as issued by the Engineer.

7. Modifications: Consider and evaluate the Contractor's suggestions for modifications in Drawings or Specifications and report with the RPR's recommendations to the Engineer. Transmit to the Contractor decisions as issued by the Engineer.

8. Records:

   a. Maintain at the job site orderly files for correspondence, reports of job conferences, Shop Drawings and samples, reproductions of original Contract Documents including all Work Directive Changes, Addenda, Change Orders, Field Orders, additional Drawings issued subsequent to the execution of the Contract, the Engineer's clarifications and interpretations of the Contract Documents, progress reports, and other Project related documents.

   b. Keep a diary or log book, recording the Contractor hours on the job site, weather conditions, data relative to questions of Work Directive Changes, Change Orders or changed conditions, list of job site visitors, daily activities, decisions,

observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to the Engineer.

c. Record names, addresses and telephone numbers of all the Contractors, Subcontractors and major suppliers of materials and equipment.

9. Reports:

a. Furnish the Engineer periodic reports as required of progress of the Work and of the Contractor's compliance with the progress schedule and schedule of Shop Drawing and sample submittals.

b. Consult with the Engineer in advance of scheduled major tests, inspections or start of important phases of the Work.

c. Draft proposed Change Orders and Work Directive Changes, obtaining backup material from the Contractor and recommend to the Engineer Change Orders, Work Directive Changes, and Field Orders.

d. Report immediately to the Engineer and the Owner upon the occurrence of any accident.

10. Payment Requests: Review applications for payment with the Contractor for compliance with the established procedure for their submission and forward with recommendations to the Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed and materials and equipment delivered at the site but not incorporated in the Work.

11. Certificates, Maintenance and Operation Manuals: During the course of the Work, verify that certificates, maintenance and operation manuals and other data required to be assembled and furnished by the Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have this material delivered to the Engineer for review and forwarding to the Owner prior to final payment for the Work.

12. Completion:

a. Before the Engineer issues a Certificate of Substantial Completion, submit to the Contractor a list of observed items requiring completion or correction.

b. Conduct final inspection in the company of the Engineer, the Owner and the Contractor and prepare a final list of items to be completed or corrected.

c. Observe that all items on final list have been completed or corrected and make recommendations to the Engineer concerning acceptance.

C. Limitations of Authority of the Resident Project Representative:

1. Shall not authorize any deviation from the Contract Documents or substitution of materials or equipment, unless authorized by the Engineer.

2. Shall not exceed limitations of the Engineer's authority as set forth in the Contract Documents.

3. Shall not undertake any of the responsibilities of the Contractor, Subcontractors or the Contractor's superintendent.

4. Shall not advise on, issue directions relative to or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction unless such advice or directions are specifically required by the Contract Documents.

5. Shall not advise on, issue directions regarding or assume control over safety precautions and programs in connection with the Work.

6. Shall not accept Shop Drawing or sample submittals from anyone other than Contractor.

7. Shall not authorize the Owner to occupy the Project in whole or in part.

8. Shall not participate in specialized field or laboratory tests or inspections conducted by others except as specifically authorized by the Engineer.

END OF SPECIAL PROVISIONS - SECTION 4

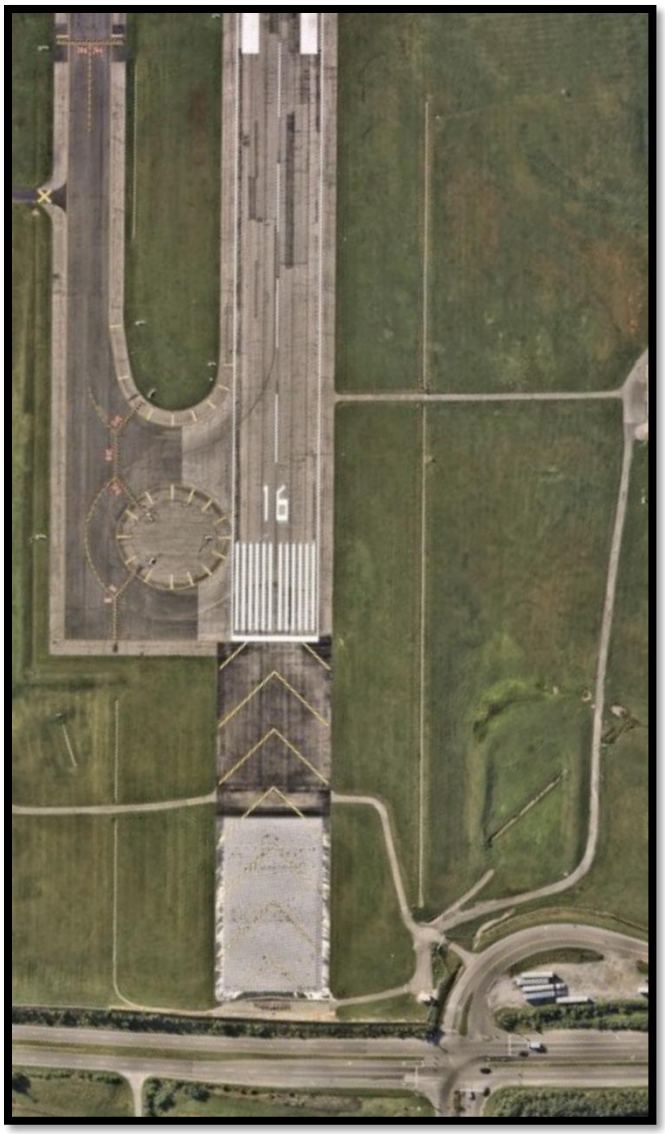
SPECIAL PROVISIONS

ROANOKE REGIONAL AIRPORT COMMISSION
ROANOKE-BLACKSBURG REGIONAL AIRPORT

SECTION 5

CONSTRUCTION SAFETY AND PHASING PLAN (CSPP)

Attached herein is the Airport's Construction Safety and Phasing Plan (CSPP) that has been developed specifically for this project. The Contractor shall use the CSPP to aid in the development of the required Safety Plan Compliance Document (SPCD), as detailed in Specification C-103, Safety and Security.

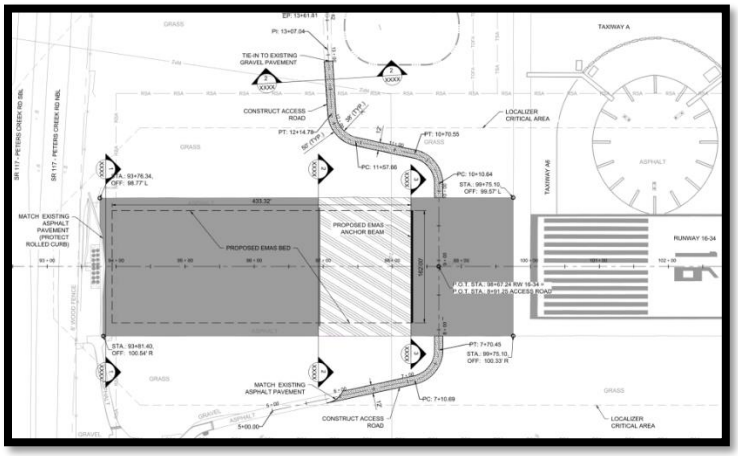


Runway 16-34 Engineered Materials Arresting System (EMAS) Replacement

Construction Safety and Phasing Plan (CSPP)

Roanoke-Blacksburg Regional Airport (ROA)

September 2023



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Appendices

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0. Project Overview

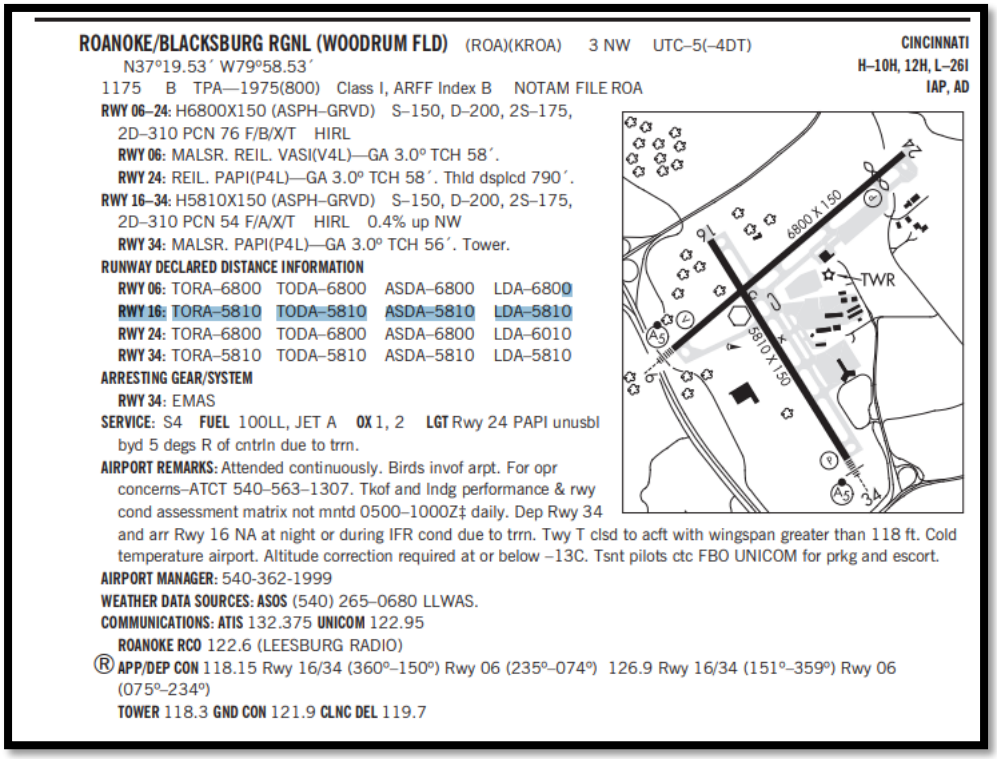
Runway 16-34 Engineered Materials Arresting System (EMAS) Replacement
1022-0071-003
Roanoke-Blacksburg Regional Airport (ROA)
Roanoke, Virginia

Roanoke-Blacksburg Regional Airport (ROA) is located in the City of Roanoke, Virginia. ROA is categorized as a non-hub primary commercial facility by the FAA. ROA has been rated one of the top ten airports within usable distance of the Andrews Air Force Base for training pilots as part of the US President's Special Air Mission fleet. Excerpt from 2023 NPIAS plan:

City	Airport	LocID	Owner-ship	Svc Lvl (FY23)	Hub (FY23)	Role (FY23)	Enplaned (CY21)	Based (CY21) Aircraft	Development Estimate 2023-2027
Roanoke	Roanoke/Blacksburg Regional (Woodrum Field)	ROA	PU	P	N		242,814	77	$5,389,386

This project site is located three miles northwest of Roanoke, Virginia.

Excerpt from the current Airport Facility Directory is below:



ROANOKE/BLACKSBURG RGNL (WOODRUM FLD) (ROA)(KROA) 3 NW UTC–5(–4DT) — CINCINNATI
N37°19.53′ W79°58.53′ — H–10H, 12H, L–26I
1175 B TPA—1975(800) Class I, ARFF Index B NOTAM FILE ROA — IAP, AD

RWY 06–24: H6800X150 (ASPH–GRVD) S–150, D–200, 2S–175, 2D–310 PCN 76 F/B/X/T HIRL
RWY 06: MALSR. REIL. VASI(V4L)—GA 3.0° TCH 58′.
RWY 24: REIL. PAPI(P4L)—GA 3.0° TCH 58′. Thld dsplcd 790′.
RWY 16–34: H5810X150 (ASPH–GRVD) S–150, D–200, 2S–175, 2D–310 PCN 54 F/A/X/T HIRL 0.4% up NW
RWY 34: MALSR. PAPI(P4L)—GA 3.0° TCH 56′. Tower.

RUNWAY DECLARED DISTANCE INFORMATION

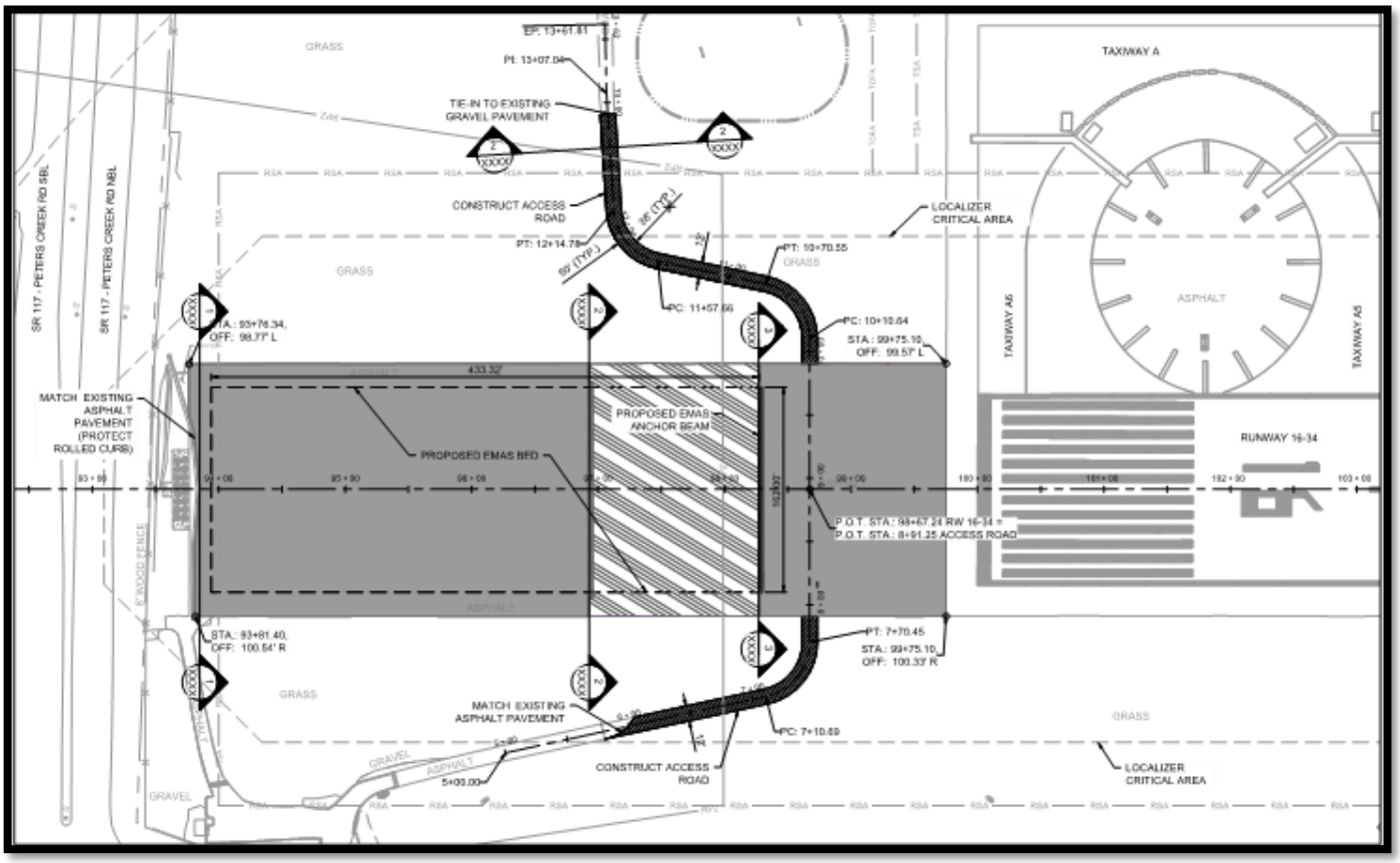
RWY 06:	TORA–6800	TODA–6800	ASDA–6800	LDA–6800
RWY 16:	TORA–5810	TODA–5810	ASDA–5810	LDA–5810
RWY 24:	TORA–6800	TODA–6800	ASDA–6800	LDA–6010
RWY 34:	TORA–5810	TODA–5810	ASDA–5810	LDA–5810

ARRESTING GEAR/SYSTEM
RWY 34: EMAS
SERVICE: S4 **FUEL** 100LL, JET A **OX** 1, 2 **LGT** Rwy 24 PAPI unusbl byd 5 degs R of cntrln due to trrn.
AIRPORT REMARKS: Attended continuously. Birds invof arpt. For opr concerns–ATCT 540–563–1307. Tkof and ldng performance & rwy cond assessment matrix not mntd 0500–1000Z‡ daily. Dep Rwy 34 and arr Rwy 16 NA at night or during IFR cond due to trrn. Twy T clsd to acft with wingspan greater than 118 ft. Cold temperature airport. Altitude correction required at or below –13C. Tsnt pilots ctc FBO UNICOM for prkg and escort.
AIRPORT MANAGER: 540-362-1999
WEATHER DATA SOURCES: ASOS (540) 265–0680 LLWAS.
COMMUNICATIONS: ATIS 132.375 **UNICOM** 122.95
ROANOKE RCO 122.6 (LEESBURG RADIO)
Ⓡ **APP/DEP CON** 118.15 Rwy 16/34 (360°–150°) Rwy 06 (235°–074°) 126.9 Rwy 16/34 (151°–359°) Rwy 06 (075°–234°)
TOWER 118.3 **GND CON** 121.9 **CLNC DEL** 119.7

AIRSPACE: CLASS C svc ctc **APP CON** svc continuous.
RADIO AIDS TO NAVIGATION: NOTAM FILE ROA.
(L) (L) VORW/DME 109.4 ROA Chan 31 N37°20.61′ W80°04.22′ 107° 4.7 NM to fld. 3072/4W.
VOR unusable:
045°–063° byd 25 NM blo 7,000′
WOODRUM (T) VORW 114.9 ODR N37°19.45′ W79°58.74′ at fld. 1164/8W.
VOR unusable:
035°–050° byd 20 NM blo 7,000′
035°–110° byd 10 NM blo 4,200′
035°–110° byd 15 NM blo 6,500′
290°–360° byd 15 NM
VINTON NDB (MHW) 277 VIT N37°12.24′ W79°52.90′ 336° 8.6 NM to fld. 1543/8W.
NDB unusable:
Byd 11 NM
LDA/DME 111.1 I–SZK Chan 48 Rwy 06. Glideslope AIMED parl to LOC course. DME unusable byd 30° left of course. LOC unusable wi 0.6 NM. ILS unusable blw 1,475′.
ILS 109.7 I–ROA Rwy 34. Class IB. Unmonitored when ATCT clsd.

ROA consists of two runways with cross field taxiway connectors and the airport terminal building located on the south side of airfield. The existing EMAS (Engineered Materials Arresting System) in the Runway 16 safety area is planned to be removed and replaced with a new EMAS bed bound by the project limits as shown in Figure 1. The proposed EMAS bed is contained on the existing paved area near Runway 16 blast pad, increasing the overall size of the bed, which in turn results in an increased factor of safety accommodating the current fleet mix utilizing Runway 16-34. This creates an improved environment to slow down or stop an aircraft that overruns the runway 34 on aborted takeoff or arrival. The airport will close Runway 16-34 during the construction of the EMAS replacement.

Figure 1 – Project Work Scope



1. Coordination

Roanoke Regional Airport Commission (RRAC), the airport sponsor, will host pre-bid, pre-construction, and Safety/Risk Management (SRM) coordination meetings to ensure the sponsor, the Resident Project Representative (RPR), the Contractor, the FAA, tenants, and all other interested parties are aware of design, safety, and construction

requirements and understand their individual responsibilities, as well as the technical and legal requirements of the contract.

1.2 Pre-Bid Meeting:

The pre-bid coordination meeting will include discussion of the project's scope of work, construction phasing, schedule, unique construction items, bid forms to be submitted, minority requirements, and question and answer session. The meeting will clarify and explain project construction methods, procedures, and safety measures. The Construction Safety and Phasing Plan (CSPP) will be reviewed and discussed with key attendees.

- Key Attendees:
  - RRAC (*Owner*)
  - RS&H (*Designer*)
  - ADCI (*Designer*)
  - Bidding Contractors (*Contractor*)
  - Construction Manager (*Owner's Representative/RPR*)

1.3 Pre-Construction Meeting

The pre-construction coordination meeting will include discussion of project scope, staging, phasing, operational safety, security, environmental factors, and other project-specific issues. The CSPP and Safety Plan Compliance Document (SPCD) will be reviewed and discussed.

- Key Attendees:
  - RRAC Project Manager
  - RRAC Construction Manager (RPR)
  - RRAC Operations, Access Control, and Security
  - RRAC Minority Affairs
  - RS&H (Designer)
  - ADCI (Designer)
  - Testing Laboratory representative
  - Contractor and Subcontractor representative(s)
  - Tenants
  - Airlines
  - Utility companies affected by proposed construction
  - Federal, State, and local agencies affected by the proposed construction
  - FAA Airports District Office
  - FAA Air Traffic Control Tower (ATCT)
  - ROA Airport Rescue and Fire Fighting (ARFF)
  - Contractor Safety and Security Supervisor

1.4 Weekly Progress Meetings

Throughout the duration of the project, weekly progress meetings will be held. Construction phasing and operational safety will be a standing agenda item at the weekly progress meeting. ROA OPS will keep FAA ATCT and ARFF informed of progress meeting information.

- Key Attendees:
  - RRAC Project Manager
  - RRAC Construction Manager (RPR)
  - RRAC Operations, Access Control, and Security
  - RS&H (Designer)
  - Superintendent and Foreman of Prime Contractor
  - Project foreman for each subcontractor with work occurring during current period
  - Contractor Safety and Security Coordinator

1.5 Daily Safety Meeting

The General Contractor is responsible to host Daily Safety Meetings prior to the start of each construction day with all workers to review and discuss daily project scope and appropriate safety equipment and measures.

At the end of each construction day, the General Contractor is responsible to maintain a clean and safe construction site. The General Contractor is responsible for daily monitoring and routine maintenance of safety devices and equipment. The Contractor is responsible for immediately repairing malfunctioning safety devices and equipment to

the satisfaction of the Airport.

1.6 Scope or Schedule Changes

Changes in project scope or schedule may require revisions to the CSPP. Changes to the CSPP would need to be reviewed and approved by RRAC and the FAA. Approved changes to the CSPP will be reflected in the SPCD.

1.7 FAA ATO Coordination

Coordination with airport management who have been in contact with FAA Air Traffic Organization (ATO) has occurred throughout the design process. Runway 16-34 EMAS will coincide with the timelines of other airfield construction projects. Some activities will likely occur in the same vicinity as work for these projects. Construction activity was considered by ADCI to determine any impacts or restrictions during construction. Coordination with Operations & Stakeholders has occurred throughout the design and will continue through construction of the Runway 16-34 EMAS.

The Contractor will provide two-week look-ahead schedules at every weekly construction meeting. RRAC will maintain coordination with the FAA and inform the FAA and other stakeholders of any changes to the project scope or schedule.

2. Phasing

Runway 16-34 EMAS work includes pavement demolition, ductbank work, E&S controls and is one single phase. The phase limits have been developed to minimize the impact of construction operations on the airport and its tenants while also promoting construction efficiency and safety. The construction is anticipated to begin with a start date of Spring 2024.

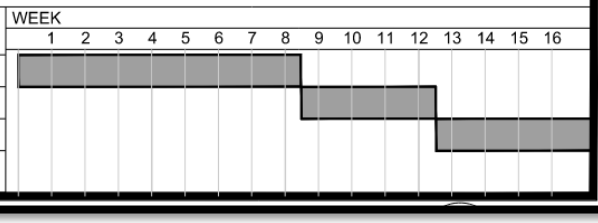
Estimated Start Date: Spring 2024

Estimated Completion Date: Summer 2024

Figure 2 – Runway 16-34 EMAS Conceptual Construction Schedule

CONCEPTUAL CONSTRUCTION SCHEDULE

WORK ITEM	DURATION (CALENDAR DAYS)		WORK HOURS
ADMINISTRATION/MOBILIZATION	75/30		
PHASE 1 (FULL CLOSURE)*	35		24 HRS
PHASE 2 (NIGHTLY)	30		11PM - 7AM
TOTAL	170		



The plan described in this section is not all-inclusive. The Contractor is required to submit a fully detailed schedule for the entire project prior to beginning major construction activities in accordance with the General Provisions of the contract. This schedule shall include time periods, anticipated night work, runway/taxiway closures, modification to the Air Operations Area (AOA) circulation, and other information necessary to clearly describe the prosecution and progress of the work. The Contractor is required to distinguish the project area from the rest of the secure area. Temporary barricades and/or flags or stakes or other material deemed suitable by the RPR are to be placed where he/she decides are necessary, except where access is required. As stated above, there is a single work area of construction. The intent of the phasing plan is to provide the contractor the largest area available as long as an acceptable level of safety or airport impacts is not exceeded. Once each work area is initiated, it must be completed within the duration indicated. The work areas shall commence as shown in the Construction Safety and Phasing Plan and on approval from the RPR.

Operational Conditions:

The Contractor is offered the following operational conditions for reference information only. Based on discussions with stakeholders, the following characteristics were provided with regards to the Roanoke-Blacksburg Regional Airport (ROA) operation and included in the contract drawings.

- Work in RSA will require closure of Runway 16-34
- Work in ROFA will require permission of RPR and temporary signage if contractor is permitted to work in active ROFA. Provisions are included in the construction documents to work in active ROFA.
- Construction access to portions of the site may require the crossing of taxiways/airfield pavements. Contractor shall access these sites using the haul route(s) shown in the Construction Documents.
- Contractor is responsible for escorting his vehicles to/from the work site.
- Contractor is responsible for gate guards and badging.
- Construction access to portions of the site will require the crossing of adjacent/potentially active construction sites and using the same entrance gates and haul routes. Contractor shall access these sites using the haul route(s) shown in the Construction Documents.
- Closures of pavements are either temporary, meaning they are reopened following the shift, or hard, meaning they are closed for the duration of the phase.

Construction Phasing Requirements:

The construction safety and phasing plans show general items of work and when they may be completed along with the acceptable impacts to airport operations. For details related to the items highlighted on the phasing plans, the contractor shall utilize the appropriate civil, electrical and/or utility plans and details for actual layout and construction. The phasing plans represent the items of work required to be completed in that phase. Bidders are encouraged to carefully consider the resources necessary to comply with the phasing, sequence of work, and durations included in the contract documents. These requirements will not be changed by the Contractor during the project without going through an arduous FAA approval process.

2.2 Mobilization/Administration

Duration: 105 calendar days

Contractor shall have 30 calendar days from the notice to proceed (NTP) to the start of construction. The anticipated construction start date is April 2024, meaning mobilization is anticipated to start in March 2024. The mobilization activities may overlap with the start of construction if determined by contractor's schedule to be feasible (along with approval of the RPR).

Mobilization shall include but is not limited to:

- Submittals (QC Plan, Electrical, Schedule, Safety Plans, SPCD, JMF)
- Long lead items
- Security plan approval and badging (as required)
- Haul route establishment and approval
- Requests for Information (RFI)
- Ordering of materials required (note phase may not start without certain materials onsite)
- Any required meetings/coordination with the RPR
- Coordination with adjacent projects
- Trailer/Temporary Construction setup (if required by contractor)
- Construction Schedule development and approval
- Investigation and verification of existing conditions
- Calling out surface and subsurface utilities found of site
- Permit acquisition

COMPLETION REQUIREMENTS:

Contractor must have the following items completed at the end of Mobilization:

- QC Plan approval
- SPCD approval
- Verification of existing conditions completed
- Permits acquired
- Gate agreement(s)
- Safety Plan approval
- Security Plan approval
- Schedule approval

AIRFIELD IMPACTS:

- Contractor shall not impact any part of the airfield as part of Mobilization unless otherwise authorized by the RPR.

2.3 Phase 1

Duration: 35 days
Liquidated Damages: $5,000 per calendar day of part thereof beyond phase duration

COMPLETION REQUIREMENTS:

- Restoration of the RSA
- Install perimeter controls
- Demolition of Existing Anchor Beam
- Strengthening of Existing Blast Pad Pavement
- Install proposed utilities/ductbanks
- Fine Grading of Project Site
- Install EMAS Bed Blocks
- Temporary Marking

PHASE RESTRICTIONS:

A. OPERATIONAL RESTRICTIONS:

- Runway 16-34 is closed, contractor shall remain clear of Runway 6-24 throughout this project.

B. TIME RESTRICTIONS:

- None during phase 1
- 30 consecutive calendar day duration

AIRFIELD IMPACTS:

- Extended closure of 16-34 for duration of Phase 1

2.3 Phase 2

Duration: 30 days
Liquidated Damages: $2,500 per calendar day of part thereof beyond phase duration, $500 per 15 minutes or portion thereof for daily runway reopening.

COMPLETION REQUIREMENTS:

- Any remaining work from Phase 1
- Final Marking and Grooving of pavement
- Restoration of Project Site (final grading/turf establishment)

PHASE RESTRICTIONS:

A. OPERATIONAL RESTRICTIONS:

- Work within runway object free area (ROFA) has a restriction on permanent heights. There will be crossing of active taxiways with construction equipment. Care shall be taken to protect existing airfield lights.
- The site will need to be restored to meet RSA criteria (smooth slopes, no holes/drop-offs, etc) existing conditions prior to opening the Runway in the morning.

B. TIME RESTRICTIONS:

- This phase will be nightwork, 11 PM to 7 AM.

AIRFIELD IMPACTS:

Closure of Runway 16-34 Nightly

2.4 Project Closeout

Duration: Completed within duration of Phase 2, no additional days will be ranted for punchlist and closeout

- Punchlist items and clean-up
- Submission of final as-built information
- No effect on daytime aircraft movement – any work will be at night with rolling closures coordinated with the RPR

The contractor will be required to submit a Safety Plan Compliance Document (SPCD) as part of mobilization activities illustrating his/her understanding of the CSPP before they are permitted to start construction.

3. Areas and Operations Affected by Construction

Temporary and extended closure of Runway 16-34 will be required during this project. Full closure of the runway for construction should last approximately 30 consecutive calendar days.

The Contractor will not enter any safety area of any active runway without an appropriately badged escort or approval from the ATCT. In addition, there will be no construction activities, placement of stockpiles, storage of materials, or fueling in the approach protection area of any active runway/taxiway.

There are no expected changes to ARFF response routes as a result of construction, the ARFF building is within Line of Sight of the work area (Approx 1,500 feet away)..

4. Navigational Aid (NAVAID) Protection

Aircraft navigational aids (NAVAIDS) provide visual and electronic information which are used by pilots who operate and land aircraft at the airport. Construction activities may have negative impacts on the functionality and serviceability of NAVAIDS.

There are no proposed or expected impacts to existing NAVAIDS for the Runway 16-34 EMAS. The ROA-SSC may wish to power the facilities down during the full or nightly closures. If for any reason NAVAID impact is required, the Contractor is required to provide notice to ROA Operations and FAA Tech Ops personnel at least 72 hours prior to disturbing power supply or removing a NAVAID from service. FAA Tech Ops Office – (267) 688-2770.

5. Contractor Access

5.1 Location of Stockpiled Construction Material

No stockpiled materials or staged equipment may be placed outside of the designated staging or stockpiling areas unless otherwise approved by the RPR.

- *Height restrictions*: Stockpiles shall not exceed the heights shown on the Maximum Equipment Height Plan

(see Contract Drawings) and will not be located within any area (TOFA, TLOFA, TSA, RSA, ROFA, RPZ, etc.) that is required for the operation of the aircraft.

- *Wildlife attractant*: Contractor to manage stockpiles so that they do not attract wildlife. Refer to Section 6 of this document.
- *Foreign Object Debris (FOD)*: Contractor to manage material stockpiles and trash so that they do not create FOD. Refer to Section 7 of this document.
- *Marking and Lighting of Stockpiles*: Contractor will not be required to mark or light material stockpiles.

5.2 Vehicle and Pedestrian Operations

5.2.1 Access to AOA

The airport operations area is defined by the perimeter fence surrounding the airfield. Contractor access onto the AOA is limited to Gates 50 and 51, as shown on the CSPP drawings. No person shall enter the AOA, or any other restricted area, except authorized personnel assigned to duty therein escorted by an appropriately badged escort.

5.2.2 Mechanisms to Prevent Improper Movement

Contractor operations within the AOA are limited to the areas shown on the CSPP. A visual boundary will be installed by the Contractor around all areas of work, consisting of low-profile barricades and stakes on pavement surfaces as well as grassed areas. The project phasing plans show locations of work area and sub-area boundaries. Construction vehicles and personnel must not cross boundaries at any time without an appropriately badged escort and if applicable, approval from the ATCT. Contractor haul route is shown on CSPP.

5.2.3 Parking Areas for Personal Vehicles and Equipment

Contractor employee personal vehicles may not be parked or driven in the AOA.

5.2.4 Haul Routes

Contractor access to the project site will be through Gates 50 & 51 as shown in the Contract Drawings, and/or approved by the RPR.

The Contractor shall provide enclosures, fences, barricades, or other devices where necessary to prevent access to the site or danger to the public, as approved by the RPR.

The Staging Area, Stockpile, and Haul Route Plan in the Contract Drawings illustrates the proposed access points, haul routes, stockpile areas, and landside staging area. The Contractor will not be permitted to use any access or haul roads other than those designated on the Contract Drawings and will be required to submit a detailed Staging Area and Haul Route Plan prior to the start of construction.

Contractor access and hauling operations are strictly limited to the haul routes shown. Contractor is responsible for any improvements and maintenance to haul routes as needed to efficiently perform construction activities. Temporary signage shown on construction safety and phasing plan is required.

5.2.5 Airport Rules for Ground Vehicle Operations

Rules for vehicular and equipment travel on the airport are included in the construction drawings and in the training materials provide by ROA. These rules must always be followed when driving on the airport.

5.2.6 Contractor Vehicle Marking and Lighting

Only Contractor licensed vehicles will be permitted to enter the AOA. Each Contractor licensed vehicle must display a company logo on both sides of the vehicle, as well as a yellow/amber rotating beacon affixed to the uppermost part of the vehicle that is visible from any direction, day and night. Contractor vehicle marking and lighting is the sole responsibility of the Contractor; the Airport will not provide marking or lights. Additional vehicle marking and signage guidelines can be found in AC 150/5210-5D “Painting, Marking, and Lighting of Vehicles Used on an Airport” and the Special Provisions, Section C.

5.2.7 Contractor Construction Equipment Parking

Any unused equipment shall not be parked any closer than 160’ feet from the centerline of an active taxiway and no closer than 400 feet from an active runway unless noted or shown otherwise on the phasing plans. Additional information about safety areas is shown in Section 18 of this document.

5.3 Radio Communications

5.3.1 Two-way Radios

Contractors may utilize two-way radios on the project provided that they do not interfere with existing Airport, FAA, or military communication equipment and frequencies

5.3.2 Air Traffic Control Tower (ATCT) Radio Communications

Vehicle operations on the movement area require contact with the ATCT. The Contractor will not communicate directly with the ATCT. The Contractor must contact the RPR who will coordinate with ROA Operations for an escort onto any movement area.

5.3.3 Personnel Required to Communicate with ATCT

All communications with the ATCT will be made by ROA Operations.

5.3.4 Training

All training of Contractor personnel will be completed by ROA Operations/Badging Office.

5.3.5 Procedure for Communicating

Radio types: Contractor shall have an aviation band radio for listening only. All radio communication will be by ROA operators or trained RPR staff.

5.4 Airport Security

Roanoke Airport maintains an active security program, which is of primary importance. The project will take place within the Airport's Security Identification Display Area (SIDA), which requires specific security protocol be followed. General project security requirements include the following:

- The project plans show the entry point(s), barricades, Contractor's staging area, and work area. The Contractor shall provide security for these areas. The Contractor is to provide to the Airport, for review and approval, all security measures, barricades, and other means to be taken to secure scheduled openings between the secure and non-secure areas, prior to creating the opening.
- No Contractor employee may tamper or interfere with, compromise, modify, attempt to circumvent, or cause a person to tamper or interfere with, compromise, modify, or attempt to circumvent any security system, measure, or procedure implemented at the Airport.
- Each Contractor employee must immediately notify the Airport when security-related facilities and equipment within the Contractor's area are malfunctioning or no longer adequate to perform the control function.
- No Contractor employee may enter or be present within a secured area, SIDA, AOA, or Sterile Area without complying with the systems, measures, or procedures being applied in such areas.
- The project will require AOA badges for all Contractor personnel performing work within the AOA, and the Contractor will be required to maintain a list of all badged employees and badged subcontractor employees.

5.5 Work Zone Lighting for Nighttime Construction

The contractor is permitted to work during nighttime hours for construction . The contractor will be responsible for supplying adequate lighting to the work area in order to complete and inspect the work done.

6. Wildlife Management

6.1 Trash

Food scraps must be collected from construction personnel activity and disposed of by the contractor.

6.2 Standing Water

Any activity taking place that creates a standing body of water must be resolved immediately. Standing water will not be permitted and must drain within 48 hours.

6.3 Poorly Maintained Fencing and Gates

Periodic perimeter fence inspections are conducted by ROA Security to ensure the fence is secured. These inspections also include identifying any animal digs that are located under the fence and ensuring that perimeter gates and drainage grates are tightly secured to prevent animal access. In addition, Airport Operations will take appropriate actions to reduce any other observed wildlife activity. The Contractor shall be vigilant in observing the security fence for areas that may not be secured and report any problems immediately to ROA Operations and security.

6.4 Disruption of Existing Wildlife Habitat

Contractor personnel should immediately notify ROA Operations of a wildlife sighting.

7. Foreign Object Debris (FOD) Management

Foreign object debris at airports includes any object found in an inappropriate location that can damage aircraft, equipment, or airport personnel. Foreign object debris on construction sites is typically comprised of things such as loose gravel, blowing sand, wire bristles from sweeper heads, food wrappers, and material packaging. The presence of FOD on an airport's air operations area (AOA) poses a significant threat to the safety of air travel. FOD has the potential to damage aircraft during critical phases of flight, which can lead to catastrophic loss of life and airframe, and at the very least increased maintenance and operating costs. As such, these hazardous materials shall not be allowed near active aircraft movement areas, and they shall be continuously removed by the Contractor during the construction project. The construction area shall be kept clean at all times of debris that may blow onto the airfield.

7.1 Methods of FOD Control

- *Sweeper Equipment*: The Contractor will be required to have a self-propelled street type vacuum sweeper truck on site at all times. Sweepers will operate full time to keep haul routes and work areas clean at all times.
- *Dust Control Equipment*: The Contractor will be required to have **a** water truck on site at all times for dust control.
- *Training*: Contractor shall provide training to all employees working within the AOA on effective FOD management. Training shall include description and consequences of FOD, FOD awareness, and housekeeping procedures.
- *Housekeeping*: Preventing FOD from occurring is the most effective form of FOD management. Contractor must monitor construction activities and proactively develop a plan to prevent FOD from occurring. Typical FOD prevention measures include the use of covered trash containers, covered loads, zero tolerance of littering, and tying down items which may be easily windblown.
- *Ground Vehicle Tire Inspections*: Prior to crossing active airfield pavement the Contractor must perform a vehicle tire check for any loose rocks that may be in the tread. Tires covered in mud must be cleaned prior to crossing active pavement in order to prevent tracking of dirt.
- *Pavement Sweeps*: Prior to opening sections of pavement within a work area to aircraft traffic, the Contractor will be required to sweep the entire pavement surface (including shoulders). Metal bristled brooms are known to create FOD, and the Contractor will be required to clean all bristles from the pavement. Compressed air and vacuums can be used to clean pavement surfaces as well.
- *FOD Inspections*: Refer to Section 10 of this document for FOD inspection requirements.

8. Hazardous Material (HAZMAT) Management

HAZMAT Procedures to be developed by the Contractor prior to the issuance of the notice to proceed including but not limited to:

- Fuel Storage Locations and Handling Procedures
- Spill Response Procedures
- Safety Data Sheets (SDS)

The Contractor shall not introduce explosives or any other hazardous materials or equipment without the prior written

consent of the RPR.

9. Notification of Construction Activities

9.1 List of Responsible Representatives

Persons who have questions concerning policies, procedures, or requirements of the Airport Security Program, should contact ROA Security. Persons who observe a security violation, suspicious act or any serious act that may endanger persons or property, should immediately contact ROA Security, ROA Operations, Police, and Fire Departments. For this project, all communications with the ATCT will be made by ROA Operations. Important telephone numbers are listed below:

- Police Department – 540-853-2212 (county)
- Fire Department– 540-853-2327 (county)
- Airport Communication Center – 540-362-1999 (airport)
- FAA Tech Ops Office – (540) 523-8220
- ROA ATCT/TRACON – 540-392-8029
- ROA Operations – 540-362-1999 (airport)
- Access Control and Security – 540-362-1999 (airport)

9.2 Notices to Air Missions (NOTAMs)

Contractor shall coordinate with the RPR and ROA Operations personnel 7 days in advance for the issuance of all NOTAMs related to the project construction. ROA Operations will generate and issue NOTAMs based on Contractor construction schedule and facility impacts.

9.3 Emergency Notification Procedures

In the case of life-threatening situation, dial 911 and the Airport's Emergency Number (540-362-1999) immediately thereafter. ROA Operations will coordinate any emergency response.

9.4 Coordination with ARFF

Weekly construction progress meetings will be held throughout the duration of the project and prior to commencement of phasing changes. During these weekly meetings, ARFF will be notified of re-routing, blocking, and restoration of emergency access routes. Contractor is required to adjust haul routes and hauling activities as necessary to accommodate ARFF operations. At this time, no impacts to any haul routes are anticipated.

9.5 Notification to the FAA

If the Contractor needs use of cranes, equipment, or other items on or near the airport taller than Part 77 elevations (for permanent features) or OFZ elevations (for temporary features) on Drawings G010 (included in Appendix B), he/she must submit a new 7460-1 form to the FAA for airspace review and approval.

10. Inspection Requirements

10.1 FOD Inspection

The Contractor shall keep the project site and vehicles clean, employing a "clean as you go" approach throughout the project.

10.2 Contractor Inspection

Prior to opening work areas and pavement to aircraft traffic, the Contractor must coordinate with the RPR and ROA Operations for inspection of the work area. Pavements must be free of all dirt, sand, gravel, wire bristles, or any other objects that could cause damage to aircraft. All soil/turf areas must be free of dirt clods, ruts, or surface irregularities that could damage an aircraft should it leave the pavement. Daily inspections must be completed to

assure all traffic control devices are in proper location and working order.

10.3 Final Inspection

The Contractor will be required to coordinate with the Airport to schedule a final inspection before opening runway and leaving the site.

11. Underground Utilities

The location of the underground utilities and FAA cables shown on the plans has been obtained from available records, but existing depths are unknown. Locations of existing and proposed underground utilities and facilities shown on the Contract Drawings have been developed from the latest available information. Completeness and accuracy of the location and depth of utilities and facilities cannot be guaranteed.

Prior to beginning any excavating operations, the Contractor is to use hand excavation, as required, to verify the depth and location of all utilities and facilities and clear them. Any underground utilities located which do not appear on the plans shall be brought to the attention of the RPR and reflected on the Contractor's Markup plans.

Contractor is responsible to confirm on-airport utilities (except FAA utilities which are to be located by the FAA) at least three (3) and not more than ten (10) working days prior to construction. The Contractor is responsible for contacting all applicable utility companies.

If FAA cables are damaged during construction, repairs shall be done from point to point in accordance with FAA requirements and in the presence of a FAA Representative. If the Contractor damages any existing utilities during construction, he/she shall immediately repair the damaged item to the RPR's satisfaction, at the sole expense of the Contractor. Contractor must work 24/7 until repair is complete.

12. Penalties

The following penalties will be administered by the Airport, FAA, and TSA as allowed per the requirements of the Construction Safety and Phasing Plan and ROA Rules and Regulations. If the Airport receives a fine from the FAA or TSA for a Contractor's violation, the Airport will pay the fine and deduct it from the Contractor's monthly payment.

If a discrepancy or violation occurs, the Owner will allow construction work to resume only when the discrepancy is corrected to his/her satisfaction. The Owner may permanently prohibit any Consultant or Contractor Employee acting in violation of airport rules and regulations from entering or working on airport property.

12.1 Vehicle Operations

Stiff penalties exist to punish those who violate airport driving regulations. Prosecution can be a fine, imprisonment, lease violation, or impoundment of vehicle.

12.2 Security Violations

Individuals who violate Airport Security rules may be subject to prosecution. Penalties may be a fine, imprisonment, lease violation or impoundment of vehicle. TSA can levy fines for security incidents. In addition to these penalties, the Airport reserves the right to remove or eject from the airport premises and suspend the contract of any person who violates any Airport Security rules or regulations. These violations include entering the AOA outside of the designated work area and the unescorted operation of a vehicle on any active AOA surface.

12.3 FOD

The airport has a zero-tolerance approach to FOD, and the Contractor may be subject to fines from the Airport, FAA, or other agencies for failure to properly manage FOD during construction activities.

13. Special Conditions

The Contractor may be required to halt construction activities during periods of low visibility conditions, snow removal, emergency situations, or VIP movements. In all cases the Contractor shall follow instructions from ROA Operations. See Section 5 of this document for airport safety and security measures and radio communications procedures. See Section 9 of this document for emergency notification procedures.

14. Runway and Taxiway Visual Aids

14.1 General

All lighting and signs that are located within an Object Free Area will be frangible.

14.2 Markings

Markings must follow the standards of AC 150/5340-1M. Temporary runway closures will be marked with an “X” during the runway closure. The EMAS marking will be submitted to ROA to coordinate with approved SAMP and Part 139 inspector.

14.3 Lighting and Visual NAVAIDs

. No NAVAID or VISAID impacts are expected with this project scope. I

15. Markings and Signs for Access Routes

The pavement markings and signs for construction personnel will conform to AC 150/5340-18G, and to the extent practicable, with Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD). Signs placed adjacent to areas used by aircraft must comply with the frangibility requirements of AC 150/5220-23. Access routes for Contractor are shown in the CSPP drawings.

16. Hazard Marking and Lighting

Low-profile barricades with flashing red lights will be used for all pavement closures. The Contractor shall ensure that the barricades are completely filled with water at all times. Contractor must have a plan for daily inspection of barricades at start of work and completion of work for each shift. Cones may be utilized to establish limits of construction haul routes. Barricades will be placed end to end with no space in between except to allow ARFF access or as directed by the RPR. A Contractor’s representative will be on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades.

Hazard marking and lighting of excavation areas are to be in accordance with the Occupational Safety and Health Organization (OSHA) requirements. Open trenches and excavations shall be prominently marked with barricades and orange flags and illuminated by flashing red light units during hours of restricted visibility and darkness, as directed by the RPR.

17. Work Zone Lighting for Nighttime Construction

Lighting equipment must adequately illuminate the work area if the construction is to be performed during nighttime hours. Refer to AC 150/5370-10H for minimum illumination levels for nighttime paving projects. Additionally, it is recommended that all support equipment, except haul trucks, be equipped with artificial illumination to safely illuminate the area immediately surrounding their work area. The lights should be positioned to provide the most natural color illuminations and contrast with minimum of shadows. The spacing must be determined by trial. Light towers should be positioned and adjusted to aim away from ATCT cabs and active runways to prevent blinding

effects. Shielding may be necessary. Light towers should be removed from the construction site when the area is reopened to aircraft operations.

Runway closure markers will be utilized for all runway closures.

18. Protection of Areas, Zones, and Surfaces

All Safety Areas, Object Free Areas, and Obstacle Free Zones will be protected from construction activity. Open trenches and excavations are not permitted within the RSA while the Runway is open. All trenches and excavations within an RSA must be backfilled prior to opening a Runway for aircraft use. Any pavement construction related drop-offs shall be covered by at least one lift of asphalt prior to opening adjacent pavements to aircraft use. Pavement shall be brought up to RSA grading standards as defined by FAA AC 150/5300-13B. No non-frangible obstructions or drop-offs greater than three inches in height will be permitted within active Runway object free areas.

If a runway must be opened before excavations are backfilled, they must be covered appropriately, as approved by the RPR.

For work on and adjacent to active taxiways, runways, and aprons, the following conditions apply:

- *Runway Construction Limits:* Contractor may perform construction up to this limit which is 250 feet from the active runway centerline.
- *Runway Safety Area (RSA):* An area within 250 feet of a runway centerline.
- *Runway Object Free Area (ROFA):* An area within 400 feet of the runway centerline. Any equipment that is not in use (no operator available to move equipment for more than 15 minutes) must be completely removed from the ROFA.
- *Taxiway Safety Area (TSA):* an area within 59 feet of ADG III taxiway centerlines, 85.5 feet of ADG IV taxiway centerlines, and 107 feet of ADG V taxiway centerlines, unless otherwise noted on the plans.
- *Taxilane Object Free Area (TLOFA)*: an area within 79 feet of ADG III taxilane centerlines, 112 feet of ADG IV taxilane centerlines, and 135 feet of ADG V taxilane centerlines, unless otherwise noted on the plans.
- *Taxiway Object Free Area (TOFA)*: an area within 85.5 feet of ADG III taxiway centerlines, 121.5 feet of ADG IV taxiway centerlines, and 142.5 feet of ADG V taxiway centerlines, unless otherwise noted on the plans.
- *Obstacle Free Zone (OFZ):* Construction equipment and stockpiles shall not penetrate the OFZ. See OFZ Typical Section on the Construction Phasing Notes and Details for elevations and dimensions of OFZ surfaces.

All construction activity within an RSA or ROFA will require an applicable NOTAM and the closure of that runway, or a designated portion thereof, or a restriction to the aircraft which will be permitted to use that runway during construction. The Contractor shall request through the RPR a NOTAM for the closure or restriction of the required portion of the runway. The request shall include the times requested and the Contractor's proposed detailed schedule of this operation within the area utilizing only the requested closure times. NOTAMs require 72 hours' notice and are subject to Airport approval.

19. Other Limits of Construction

Certain work areas and sub-areas may be made available to the Contractor with advanced notice and coordination with the RPR and ROA Operations. The specific sequence of work within each phase will be determined by the Contractor. Additional limitations include but are not limited to:

- The Contractor shall coordinate with the Resident Project Representative (RPR), DOA personnel and Air Traffic Control Tower (ATCT) for any activities within the airfield at all times.
- The Contractor will be required to halt construction activities when required by emergency crews at the airport.
- The Contractor may be required to halt construction activities in the event of VIP movements on the airport.
- The Contractor may not use tall equipment (cranes, concrete pumps, etc.) above the elevations shown on the Maximum Equipment Height Plan(s) unless a 7460-1 determination letter is issued for such equipment.
- The use of electrical blasting caps is prohibited on or within 1,000 feet of the airport property.
- The use of flare pots is prohibited within the AOA.
- Open flame, welding, or torch-cutting operations are prohibited unless adequate fire and safety precautions

have been taken and the procedure is approved by the fire inspector, ROA Operations, and the RPR. No debris burning will be allowed unless authorized by the RPR.

20. Safety Plan Compliance Document (SPCD) – Contractor's Responsibility

Contractor shall be responsible for meeting all of the requirements contained in this CSPP including the requirements shown in the Safety and Phasing drawings. In addition, the Contractor will be required to submit a Safety Plan Compliance Document (SPCD) to the RPR and Airport for review in time for an approval prior to Notice to Proceed. The requirements for the SPCD are stated in AC 150/5370-2G. A sample is included in Appendix A.

No work may commence until the SPCD is approved. The SPCD shall include but not be limited to:

- A plan for controlling construction equipment, personnel, and vehicular movements in the AOA. The plan must include material haul routes. The plan shall detail the general requirements contained in the CSPP. The Contractor shall coordinate with the RPR, DOA personnel and Air Traffic Control Tower (ATCT) for any activities within the airfield at all times.
- The SPCD shall discuss in detail any deviations or topics and complete any details that could not be included in the CSPP when it was prepared. Should the SPCD include substantive changes to the CSPP requested by the Contractor, the SPCD must be submitted 45 days prior to the start of work in order for the Airport to obtain approval of such changes from the FAA.

- The SPCD shall include a general statement by the construction Contractor that he/she has read and will abide by the CSPP, the approval date of the CSPP, and a reference to any supplemental information (that is, "I [***Name of Contractor***], have read the [***Title of Project***] CSPP, approved on [***Date***], and will abide by it as written and with the following additions as noted:"). The supplemental information in the SPCD should be written to match the format of the CSPP indicating each subject by corresponding CSPP subject number and title. If no supplemental information is necessary for any specific subject, the statement, "No supplemental information," should be written after the corresponding subject title.

Appendix A. Sample Safety Plan Compliance Document (SPCD)

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SAFETY PLAN COMPLIANCE DOCUMENT (SPCD)

Project Location: Roanoke-Blacksburg Regional Airport

Project Name: Runway 16-34 EMAS Replacement

General Information:

The Construction Safety and Phasing Plan (CSPP), identified as Attachment "A" to Section 80, has been prepared in accordance with FAA Advisory Circular 150/5370-2F, *Operational Safety on Airports During Construction and the requirements of the Airport Owner*. The CSPP has been submitted to the FAA for review and comment. Any comments from the FAA which were received prior to bid opening have been incorporated into the CSPP.

In the event that the FAA transmits comments which require that the CSPP be revised after bid opening, I understand that I am obligated to abide by the conditions and statements contained in the revised CSPP. I further understand that I will be given the opportunity to evaluate the revised CSPP as it relates to my contract and request appropriate compensation in accordance with the provisions of the contract.

Supplemental Information:

Where the CSPP covers a subject and no additional information is needed, the statement below reads, "No supplemental information required". Where additional information is required by the Contractor, the information shall be provided in the spaces below.

The section numbers below correspond with the section numbers in the CSPP.

D.1 Coordination

Statement: [Explain how you will distribute information and details of meetings to employees and subcontractors.]

_____

_____

_____

_____

D.2 Phasing

Statement: [List the number of days each Work Area will take. State the time day work will start and finish for each work area.]

_____

_____

_____

_____

D.3 Areas and operations affected by the construction activity

Statement:

D.4 Protection of NAVAIDs

Statement:

D.5 Contractor Access

Security Statement: [Explain how you will maintain integrity of the airport security fence at the access gate, e.g.: Gate guards, closed and locked gates, temporary fencing, etc.]

Training Statement: [List individuals who will receive driver training (for certificated airports and as requested.]

Communication Statement: [Identify types of radios, if any, you will use to communicate with drivers and personnel. Identify who will be monitoring radios. Identify a contact person and phone number if ATCT cannot reach the contractor's designated person by radio.]

Escort Statement: [Identify who will escort material delivery vehicles.]

D.6 Wildlife Management

Statement: [Identify who will be monitoring wildlife in the construction area. Identify who will be monitoring wildlife at the construction gate.]

D.7 Foreign Object Debris (FOD) Management

Statement: [Identify who will be preparing a FOD Management Plan. (Plan must be approved prior to the start of construction activities.)]

D.8 Hazardous Material (HAZMAT) Management

Statement: [Identify who will be preparing a Spill Prevention Plan. (Plan must be approved prior to the start of construction activities.)]

D.9 Notification of construction activities. Provide the following:

Key Personnel Statement: [Identify your key personnel points of contact with phone numbers.]

Emergency Contacts Statement: [Identify your emergency contacts with 24-hour phone numbers.]

Equipment Statement: [Part 77: Identify equipment you will be using that is taller than 30 feet, including on-site batch plants. Identify the maximum height it will be extended to during construction for each Work Area and the expected duration. Identify when during the day it will be used.]

D.10 Inspection requirements.

Statement: [Identify the person who will be responsible for daily inspections to ensure conformance with the CSPP. Describe additional inspections you will employ, if any, to ensure conformance.]

D.11 Underground utilities.

Statement: [Discuss proposed methods of identifying and protecting underground utilities.]

D.12 Penalties

Statement:

D.13 Special conditions.

Statement: [Identify who will be responsible for moving equipment and personnel from the work area and vacating the area in the event of a special condition listed in the CSPP.]

D.14 Runway and taxiway visual aids. Including marking, lighting, signs, and visual NAVAIDs.

Statement:

D.15 Marking and signs for access routes. Discuss proposed methods of demarcating access routes for vehicle drivers.

Statement:

D.16 Hazard marking and lighting.

Statement: [Identify who will be responsible for maintaining hazard marking and lighting. Include a 24-hour phone number.]

D.17 Protection of taxiway and runway safety areas.

Include object free areas, obstacle free zones, approach/departure surfaces and safety areas as required. Discuss proposed methods of identifying, demarcating, and protecting airport surfaces including:

Equipment and methods for maintaining Runway Safety Area standards.

Statement:

Equipment and methods for separation of construction operations from aircraft operations, including details of barricades.

Statement: Information is provided in the CSPP. No supplemental information is required.

D.18 Other limitations on construction.

Other limitations are identified in the CSPP and do not require an entry in this document.

Appendix B. Construction Safety and Phasing Drawings *

* Construction Safety and Phasing Drawings provided in this CSPP are for CSPP submittal to FAA only. In the event of any discrepancy between these drawings and the bid set of plans, the bid set of plans shall govern.

SAFETY/PHASING NOTES AND REQUIREMENTS:

1. THIS CONSTRUCTION SAFETY AND PHASING PLAN IS A GENERAL DESCRIPTION OF WORK TO BE PERFORMED. A DETAILED SEQUENCE OF WORK SHALL BE DEVELOPED BY THE CONTRACTOR AND SUBMITTED FOR APPROVAL. THE CONTRACTOR SHALL NOT DEVIATE FROM THE APPROVED SEQUENCE OF WORK WITHOUT THE PRIOR WRITTEN APPROVAL OF THE RPR.
2. SECONDARY STAGING AREAS MAY BE LOCATED INSIDE THE WORK LIMITS. FINAL LOCATION SUBJECT TO RPR APPROVAL/AIRSPACE LIMITATIONS.
3. THE CONTRACTOR SHALL NOTE THAT OTHER CONSTRUCTION PROJECTS MAY BE ONGOING WITHIN OR ADJACENT TO THE LIMITS OF THIS CONTRACT AT THE TIME THE NOTICE TO PROCEED (NTP) IS ISSUED. THE CONTRACTOR SHALL COORDINATE PROJECT WORK LIMITS AND SITE ACCESS WITH OTHER CONTRACTORS THROUGH THE RPR.
4. THE CONTRACTOR MAY POTENTIALLY UTILIZE THE SAME INGRESS/EGRESS GATES AS OTHER CONCURRENT PROJECTS.
5. THE CONTRACTOR SHALL FOLLOW THE APPROVED EROSION & SEDIMENTATION CONTROL PLAN. SEE SHEET C101.
6. THE CONTRACTOR SHALL SUBMIT A TWO-WEEK WORK SCHEDULE AT LEAST ONE WEEK PRIOR TO COMMENCEMENT OF ANY WORK. THE CONTRACTOR SHALL COORDINATE THE WORK SCHEDULE THROUGH THE RPR, WITH THE FEDERAL AVIATION ADMINISTRATION (FAA), ROA OPERATIONS, AND OTHER WORK ON THE AOA REQUIRING THE ISSUING OF A NOTICE TO AIR MISSIONS (NOTAM) BY THE AIRPORT. INFORM ELECTRIC SHOP PERSONNEL A WEEK IN ADVANCE TO ALLOW ADJUSTMENTS IN THEIR SCHEDULE.
7. THE CONTRACTOR SHALL COORDINATE RUNWAY OR TAXIWAY CLOSURES WITH THE RPR A MINIMUM OF TWO WEEKS PRIOR TO WORK BEGINNING IN THOSE AREAS, PROVIDING SUFFICIENT TIME FOR FAA AND ROA OPERATIONS COMMENTS AND APPROVALS.
8. FOR ACCESS TO THE SITE, VEHICULAR & EQUIPMENT TRAVEL ON AIRPORT, AND AIRPORT SECURITY, THE CONTRACTOR MUST ADHERE TO ANY SPECIAL PROVISIONS IN CONTRACT DOCUMENTS.
9. AS OUTLINED IN FAA AC 150/5370-2G, PARA 2.14, THE CONTRACTOR SHALL CONDUCT INSPECTIONS DAILY, BUT MORE FREQUENTLY IF NECESSARY TO ENSURE CONFORMANCE WITH THE CONSTRUCTION SAFETY AND PHASING PLAN (CSPP).
10. THE CONTRACTOR SHALL SUPPLY AND PLACE LOW PROFILE BARRICADES AS SHOWN ON THE PLANS AND AS DIRECTED BY THE RPR. BARRICADES SHALL BE PLACED AT ALL LOCATIONS WHERE PROPOSED WORK AREAS ADJOIN ACTIVE TAXIWAYS OR RUNWAYS AND WHERE EXCAVATIONS ON THE AIRFIELD ARE GREATER THAN 3 INCHES IN DEPTH. EXCAVATIONS WITHIN SAFETY AREAS MUST BE FILLED TO WITHIN 3 INCHES OF THE PAVEMENT SURFACE PRIOR TO OPENING THE ADJACENT PAVEMENT TO TRAFFIC.
11. THE CONTRACTOR SHALL DELINEATE THE PERIMETER OF WORK AREA WITH LIGHTED BARRICADES OR OTHER METHODS AS APPROVED BY RPR, ON PAVEMENT, TAXIWAY SAFETY AREA (TSA) AND RUNWAY SAFETY AREA (RSA) SHALL BE DELINEATED WITH LOW PROFILE BARRICADES. OFF PAVEMENT, TSA AND RSA SHALL BE DELINEATED BY SURVEY STAKES, AS APPROVED BY THE RPR.
12. THE CONTRACTOR SHALL ACQUAINT THEIR SUPERVISORS AND EMPLOYEES WITH THE AIRPORT ACTIVITY AND OPERATIONS THAT ARE INHERENT TO ROA AND SHALL CONDUCT THEIR CONSTRUCTION ACTIVITIES TO CONFORM TO ALL ROUTINE AND EMERGENCY AIR TRAFFIC REQUIREMENTS AND GUIDELINES FOR SAFETY SPECIFIED HEREIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL SAFETY DEVICES AS REQUIRED FOR THE PROTECTION OF THEIR PERSONNEL.
13. PROTECTION OF ALL PERSONS SHALL BE PROVIDED THROUGHOUT THE PROGRESS OF THE WORK. THE WORK SHALL PROCEED IN SUCH A MANNER AS TO PROVIDE SAFE CONDITIONS FOR ALL WORKERS AND AIRPORT PERSONNEL. THE SEQUENCE OF OPERATION SHALL BE SUCH THAT MAXIMUM PROTECTION IS AFFORDED TO CONSTRUCTION AND NON-CONSTRUCTION PERSONNEL. TO ENSURE THAT PERSONNEL AND WORKERS IN THE AREA ARE PROTECTED, THE CONTRACTOR MUST PROVIDE SAFETY MEASURES TO GUARD AGAINST INJURY.
14. DURING PERFORMANCE OF THIS CONTRACT, THE AIRPORT RUNWAYS, TAXIWAYS AND AIRCRAFT HOLDING APRONS SHALL REMAIN OPEN FOR USE BY AIRCRAFT TO THE MAXIMUM EXTENT POSSIBLE. ALL AIRCRAFT TRAFFIC IN THESE AREAS SHALL HAVE PRIORITY OVER CONTRACTOR'S TRAFFIC. THE OWNER RESERVES THE RIGHT TO ORDER THE CONTRACTOR, AT ANY TIME, TO VACATE ANY AREA NECESSARY TO MAINTAIN SAFE AIRCRAFT OPERATIONS. USE OF AREAS NEAR THE CONTRACTOR'S WORK WILL BE CONTROLLED TO MINIMIZE DISTURBANCE TO THE CONTRACTOR'S OPERATION. THE CONTRACTOR SHALL NOT ALLOW UNAUTHORIZED PERSONS TO ENTER OR REMAIN IN ANY AIRPORT AREA WHICH WOULD BE HAZARDOUS TO PERSONS OR TO AIRCRAFT OPERATIONS.
15. ALL WORK IS TO BE COORDINATED TO KEEP RUNWAY AND TAXIWAY INTERSECTIONS OPEN FOR TAXIING TO AND FROM AIRPORT SUPPORT AREAS. CAREFUL COORDINATION AND COMMUNICATION MUST BE MAINTAINED WITH TOWER AND ROA OPERATIONS VIA THE RPR, AS TO WHEN EACH RUNWAY AND TAXIWAY IS OPEN OR CLOSED.
16. WHEN WORK IS REQUIRED TO CROSS THE HOLD BAR (280' FROM RUNWAY CENTERLINE), THE CONTRACTOR MUST COORDINATE WITH RPR 2 WEEKS IN ADVANCE SO THE AREA CAN BE CLEARED FROM THE AIRPORT MONITORED RADAR AREA. ONCE CLEARED, ACCESS MAY BE PERMITTED BY RPR. ACCESS BEFORE CLEARING AREA WILL TRIGGER AN ALARM IN THE ATCT.
17. WORK WITHIN AN OBJECT FREE AREA (OFA) MAY NOT PROCEED, NOR MAY VEHICLES ENCROACH WITHIN THIS AREA, UNTIL THE APPROPRIATE NOTAMS HAVE BEEN ISSUED.
18. ALL CONSTRUCTION VEHICLES THAT ROUTINELY OPERATE ON THE AIRPORT AIRSIDE SHALL BE MARKED AND LIGHTED IN ACCORDANCE WITH THE REQUIREMENTS OF FAA AC 150/5370-2 (CURRENT VERSION). ALL VEHICLES MUST HAVE COMPANY NAME PERMANENTLY AFFIXED ON DOORS AND BE PROPERLY INSURED AS PER THIS CONTRACT'S LIMITS. ANY VEHICLE OPERATING IN THE ACTIVE AIRPORT OPERATIONS AREA (AOA) DURING THE HOURS OF DARKNESS, TIMES OF LOW VISIBILITY, OR IN THE RUNWAY SAFETY AREA AT ANY TIME, SHALL BE EQUIPPED WITH A FLASHING YELLOW DOME TYPE LIGHT MOUNTED ON TOP OF THE VEHICLE AND OF SUCH INTENSITY TO CONFORM WITH FAA REQUIREMENTS. NO PERSONAL VEHICLES ARE PERMITTED WITHIN THE AOA. ALL VEHICLES USED ON THE AIRPORT DURING CONSTRUCTION SHALL HAVE REQUIRED SIGNAGE, SAFETY FLAGS, AND BEACON AS SET FORTH IN THE SPECIFICATIONS. ANY PERSON NOT ADHERING TO THE PROPER OPERATION OF A VEHICLE OR NOT OPERATING WITHIN THE DESIGNATED AREA ON THE AIRPORT SHALL BE IMMEDIATELY REMOVED FROM THE SITE AND NOT ALLOWED TO CONTINUE WORK ON THE PROJECT.
19. DURING TIMES WHEN SAFETY OF FLIGHT OPERATIONS COULD BE IMPAIRED, OR WHEN EQUIPMENT IS IDLE, ALL CONTRACTOR'S BOOMS, TOWERS, AND OTHER MOVABLE APPENDAGES SHALL BE LOWERED TO THE MAXIMUM EXTENT AND PARKED OFFSITE OR IN A LOCATION DIRECTED BY THE RPR.
20. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BRIEF ALL OF THE CONTRACTOR'S AND SUBCONTRACTOR'S EMPLOYEES ON THE FAA OPERATING AND SAFETY REQUIREMENTS. THE SAFETY PLAN FOR THIS SPECIFIC PROJECT MUST INCLUDE ALL ITEMS SPECIFIED IN THE ADVISORY CIRCULARS REFERENCED IN THE SAFETY NOTES (FAA AC 150/5370-2G, CURRENT VERSION, FAA AC 150/5300-13, CURRENT VERSION). THE CONTRACTOR MUST SUBMIT FOUR COPIES OF THE "SAFETY PLAN COMPLIANCE DOCUMENT (SPCD)" TO THE RPR FOR APPROVAL AT LEAST 10 DAYS PRIOR TO MOBILIZING ON THE JOB. THE APPROVED SPCD MAY CONTAIN DEVIATIONS FROM THE CRITERIA OUTLINED IN FAA AC 150/5370-2 (CURRENT VERSION) SO LONG AS THEY ARE BASED UPON A COMMITMENT BY AIRPORT OPERATOR AND USERS TO PROVIDE THE MAXIMUM CONSTRUCTION CLEARANCES POSSIBLE BETWEEN CONSTRUCTION ACTIVITIES AND AIRCRAFT WITHIN THE LIMITS IMPOSED BY LOCAL CONDITIONS.
21. THE CONTRACTOR SHALL RESPOND IMMEDIATELY (WITHIN 15 MINUTES) TO DIRECTION FROM ROA, FAA, OR THE RPR REGARDING AIRSIDE OPERATIONS.
22. THE CONTRACTOR SHALL COORDINATE PLANNED DAILY CONSTRUCTION OPERATION WITH THE RPR EACH DAY PRIOR TO BEGINNING WORK.
23. THE CONTRACTOR SHALL PREVENT ANY MATERIAL ASSOCIATED WITH THE CONTRACTOR'S OPERATIONS FROM BLOWING, SPILLING, OR BEING TRANSPORTED ONTO ACTIVE PAVEMENT AND ADJACENT AREAS (PAVEMENT OPEN TO AIRCRAFT TRAFFIC) WHERE IT CAN POSE A FOREIGN OBJECT DEBRIS (FOD) HAZARD TO AIRCRAFT. THE CONTRACTOR SHALL IMMEDIATELY REMOVE ANY FOD MATERIAL RESULTING FROM THEIR ACTIVITIES, FROM ACTIVE OPERATIONAL PAVEMENT AND ADJACENT AND SHALL BE RESPONSIBLE FOR ANY DAMAGE WHICH RESULTS. IN ADDITION, ALL PAVEMENTS ADJACENT TO CONTRACTOR WORK AREAS WILL BE SWEPT CLEAN BEFORE OPENING TO AIRCRAFT TRAFFIC.THE CONTRACTOR SHALL MONITOR WIND DIRECTION AND PREVENT DUST FROM BEING BLOWN INTO ADJACENT OPERATIONAL AREAS. CONTRACTOR REQUIRED TO MAINTAIN CLEAN AIRFIELD PAVEMENTS AT CROSSING LOCATIONS. FLAGMEN REQUIRED TO PERFORM VISUAL INSPECTION OF AIRFIELD PAVEMENTS AT CROSSING LOCATIONS AFTER EACH CROSSING. AT A MINIMUM, ONE SELF-PROPELLED, STREET TYPE, VACUUM SWEEPER TRUCK (NO METAL BRISTLES), IN GOOD OPERATING CONDITION (OR OTHER APPROVED METHOD FOR KEEPING PAVEMENT FREE OF DEBRIS), SHALL BE ON SITE AT ALL TIMES DURING PAVING OPERATIONS.
24. CONTRACTOR IS RESPONSIBLE FOR FLAGGERS AND CONTROL OF HIS WORKFORCE ON THE AIRFIELD. CONTRACTOR WILL BE REQUIRED TO FOLLOW THE DESIGNATED ROUTE UNDER THE CONTROL OF ROA-APPROVED FLAGGERS.
25. THE MAXIMUM CONSTRUCTION TRAFFIC SPEED ON ALL AIRPORT PROPERTY SHALL BE 15 MPH UNLESS POSTED OTHERWISE.
26. EMERGENCY VEHICLE ACCESS SHALL BE MAINTAINED AT ALL TIMES ON THE EXISTING PAVEMENT ON THE AIR OPERATIONS AREA SIDE OF THE SECURITY FENCE. MAINTAIN ALL EXISTING MEANS OF EGRESS FREE FROM OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO TEMPORARY OR PERMANENT CONSTRUCTION, STAGED MATERIALS, TOOLS AND EQUIPMENT AT ALL TIMES.
27. ALL CONSTRUCTION TRAFFIC MUST REMAIN ON THE VEHICLE SERVICE ROAD (VSR), OR DESIGNATED HAUL ROUTES, MAINTAINING A DISTANCE OF AT LEAST 25 FEET FROM ANY PARKED AIRCRAFT AT ALL TIMES. IF ANY AIRCRAFT PAVEMENT USED FOR HAUL ROUTE, CONTRACTOR VEHICLES SHALL USE SHOULDER/EDGE OF PAVEMENT ONLY UNLESS OTHERWISE APPROVED BY RPR.
28. FAA ADVISORY CIRCULARS (AC), ORDERS, AND REGULATIONS. THE FOLLOWING PUBLICATIONS CONTAIN DEFINITIONS/DESCRIPTIONS OF CRITICAL AIR OPERATING AREAS. THE AREAS DEFINED BELOW PERTAIN TO AIRFIELD SAFETY REQUIREMENTS AND ARE REFERENCED THROUGHOUT THE CONTRACT DOCUMENTS. COPIES OF THESE PUBLICATIONS ARE AVAILABLE THROUGH THE FAA:
    A. AC 150/5370-2G, "OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION", CURRENT EDITION AT TIME OF BID, SETS FORTH GUIDELINES TO ASSIST AIRPORT OPERATORS IN COMPLYING WITH CFR PART 139, "CERTIFICATION AND OPERATION: LAND AIRPORTS SERVING CERTAIN AIR CARRIERS" AND WITH THE REQUIREMENTS OF FEDERALLY FUNDED CONSTRUCTION PROJECTS.
    B. CODE OF FEDERAL REGULATION (CFR) PART 77 "SAFE EFFICIENT USE AND PRESERVATION OF NAVIGABLE AIRSPACE", CURRENT EDITION:
        1. ESTABLISHES STANDARDS FOR DETERMINING OBSTRUCTIONS TO NAVIGABLE AIRSPACE. CIVIL AIRPORT IMAGINARY SURFACES ARE DEFINED IN THE PUBLICATION AND ARE SHOWN ON DRAWING G104.
        2. SETS FORTH REQUIREMENTS FOR NOTICE OF CERTAIN PROPOSED CONSTRUCTION OR ALTERATION. NOTICE OF CONSTRUCTION PROVIDES A BASIS FOR RECOMMENDATIONS FOR IDENTIFYING THE CONSTRUCTION OF ALTERATION IN ACCORDANCE WITH AC 70/7460-1L "OBSTRUCTION MARKING AND LIGHTING", CURRENT EDITION AT TIME OF BID.
    C. AC 150/5300-13 B "AIRPORT DESIGN", CURRENT EDITION AT TIME OF BID, ESTABLISHES DESIGN, OPERATIONAL, AND MAINTENANCE STANDARDS FOR AIRPORTS. STANDARD TERMS USED IN THE CONTRACT PLANS AND SPECIFICATIONS ARE DEFINED BELOW:
        1. OBSTACLE FREE ZONE (OFZ) - THE OFZ IS A VOLUME OF SPACE WHICH IS FREE OF ALL FIXED OBJECTS AND CLEAR OF VEHICLES IN THE PROXIMITY OF AN AIRPLANE CONDUCTING AN APPROACH, MISSED APPROACH, LANDING, TAKEOFF, OR DEPARTURE.
        2. RUNWAY PROTECTION ZONE (RPZ) - A TRAPEZOIDAL AREA CENTERED ON THE RUNWAY BEGINNING AT A POINT 200 FEET BEYOND THE END OF THE AREA USEABLE FOR TAKE OFF OR LANDING.
        3. OBJECT FREE AREA (OFA) - A TWO-DIMENSIONAL GROUND AREA SURROUNDING RUNWAYS, TAXIWAYS, AND TAXILANES, WHICH IS CLEAR OF OBJECTS EXCEPT FOR OBJECTS WHOSE LOCATION IS FIXED BY FUNCTION.
        4. SAFETY AREA - THE SURFACE ADJACENT TO RUNWAYS, TAXIWAYS, AND TAXILANES OVER WHICH AIRCRAFT SHOULD, IN DRY WEATHER, BE ABLE TO CROSS AT NORMAL SPEEDS WITHOUT INCURRING SIGNIFICANT DAMAGE. A SAFETY AREA IS GRADED, DRAINED AND COMPACTED. IT IS FREE OF ANY HOLES, TRENCHES, BUMPS OR OTHER SIGNIFICANT SURFACE VARIATIONS OR OBJECTS OTHER THAN THOSE WHICH MUST BE THERE BECAUSE OF THEIR ESSENTIAL AERONAUTICAL FUNCTION. THE SAFETY AREA REQUIRES THE CAPABILITY OF SUPPORTING MAINTENANCE VEHICLES AND AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) VEHICLES UNDER NORMAL (DRY) CONDITIONS.
29. THE CONTRACTOR SHALL ALLOW TIME IN THEIR SCHEDULE FOR COORDINATION OF WORK WITH THE FAA AND OTHER WORK ON THE AOA REQUIRING THE ISSUING OF NOTICE TO AIR MISSIONS (NOTAM) BY THE AIRPORT. THE CONTRACTOR SHALL SEND ADVANCED WRITTEN NOTIFICATION OF THE NEED FOR NOTAMS A MINIMUM OF 7 CALENDAR DAYS IN ORDER TO RECEIVE RRAC OPERATIONAL REVIEW OF THIS REQUEST. REQUESTS SENT LESS THAN 7 CALENDAR DAYS SHALL BE DENIED AND RETURNED WITHOUT REVIEW.
30. ALL TRUCKS HAULING DEBRIS FROM THE AIRPORT OR MATERIAL TO THE PROJECT SHALL BE EQUIPPED WITH TAILGATES AND COVER TARPS WHICH CLOSE TIGHTLY AND DO NOT PERMIT DEBRIS TO SPILL FROM THE TRUCK. TRUCK BEDS SHALL BE SWEPT CLEAN AT THE TAILGATE BEFORE ENTERING THE AOA OR LEAVING THE WORK AREA. SIDEBOARDS SHALL BE KEPT IN GOOD REPAIR. UNDER NO CIRCUMSTANCES WILL TRUCKS BE PERMITTED TO BE LOADED GREATER THAN THE LEGAL LIMIT OR HIGHER THAN THE SIDEBOARDS. TRUCKS NOT MEETING THESE REQUIREMENTS OR THAT ALLOW MATERIAL TO BE WINDBLOWN OR TO ESCAPE THEIR CONTAINMENT BEDS ONTO THE ROADWAYS OR AIRCRAFT PAVEMENTS WILL BE REMOVED FROM THE PROJECT AT THE RPR'S DIRECTION. THE RPR WILL MONITOR CONTRACTOR ACTIVITIES ACCORDINGLY.
31. ALL CONTRACTOR PERSONNEL WORKING ON THE AIRFIELD AT NIGHT SHALL WEAR LIGHTED SAFETY VESTS.
32. OPEN FLAME, WELDING OR TORCH-CUTTING OPERATIONS, ARE PROHIBITED. NO DEBRIS BURNING WILL BE ALLOWED. BLASTING CAPS SHALL BE PROHIBITED WITHIN 1,000 FEET OF AIRPORT PROPERTY.
33. THE CONTRACTOR SHALL MAINTAIN A CLEAN CONSTRUCTION AREA. NO TRASH, FOOD OR ANY OTHER MATERIAL THAT MAY ATTRACT WILDLIFE SHALL BE LEFT IN THE CONSTRUCTION/STOCKPILE AREAS.
34. IF NECESSARY FOR CONSTRUCTION, COORDINATE ACCEPTABLE TIMES FOR BORING/TUNNELING/DRILLING PROPOSED UTILITIES UNDER EXISTING PAVEMENTS WITH RPR.
35. CONTRACT DURATION, MILESTONES AND LIQUIDATED DAMAGES ARE OUTLINED IN THE PROJECT MANUAL AND PHASING PLANS.
36. AIRPORT NAVAIDS OPERATIONS SHALL NOT BE IMPACTED BY CONTRACTOR OPERATIONS, UNLESS ALLOWED BY BID DOCUMENTS.
37. CONTRACTOR MUST BE AWARE OF JET BLAST AND TAKE PRECAUTIONS TO PROTECT HIS WORKERS IN ACCORDANCE WITH HIS APPROVED SAFETY PLAN. JET BLAST IS NOT ONLY THE WIND, BUT ALSO ITEMS THAT MAY BE CARRIED BY THE WIND.

AIRSIDE SECURITY NOTES:

1. GENERAL INTENT: IT IS INTENDED THAT THE CONTRACTOR SHALL COMPLY WITH ALL SECURITY REQUIREMENTS SPECIFIED HEREIN. THE CONTRACTOR SHALL DESIGNATE TO THE ROANOKE REGIONAL ARIPORT COMMISSION (RRAC) IN WRITING THE NAME OF THEIR AIRSIDE SECURITY OFFICER (ASO). THE ASO SHALL REPRESENT THE CONTRACTOR ON THE SECURITY REQUIREMENTS OF THE CONTRACT. THE ASO SHALL BE A RESPONSIBLE PERSON.
2. THE CONTRACTOR SHALL HAVE A GATE AGREEMENT THROUGH ROA SECURITY (SEE PROJECT MANUAL). ANY PERSONNEL PERMITTED ENTRANCE BY THE CONTRACTOR THROUGH THAT PARTICULAR GATE SHALL BE LISTED ON THE CONTRACTOR'S GATE ACCESS LIST. ALL VEHICLES SHALL BE INSPECTED AT THE AOA ACCESS POINT. COORDINATION AND PAYMENT FOR GATE GUARDS SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYMENT OF ANY FINES ASSESSED TO THE RRAC DUE TO THE CONTRACTOR'S VIOLATIONS OF FAA AND/OR TRANSPORATION SECURITY ADMINISTRATION (TSA) OPERATING, SAFETY, OR SECURITY REQUIREMENTS.
4. ALL CONTRACTOR EMPLOYEES SHALL BE BADGED IN ACCORDANCE WITH THE REQUIREMENTS OF AIRPORT OPERATIONS. THE CONTRACTOR SHALL MAKE ARRANGEMENTS WITH AIRPORT OPERATOR TO SCHEDULE TESTING AND BADGING OF THE CONTRACTOR EMPLOYEES. NON-MOVEMENT AREA DRIVER TRAINING WILL BE PROVIDED BY ROA OPERATIONS, AS ONLY RRAC PERSONNEL ARE ALLOWED TO ESCORT IN MOVEMENT AREAS. MOVEMENT AREA DRIVER TRAINING WILL NOT BE PROVIDED.
5. CONSTRUCTION VEHICLES SHALL HAVE REQUIRED SIGNAGE, SAFETY FLAGS, AND BEACONS.
6. ALL MATERIALS OR EQUIPMENT TAKEN INTO OR LEAVING THE AOA SHALL BE APPROVED BY THE RPR.

CONSTRUCTION AND FACITIES MAINTENANCE:

THE CONTRACTOR SHALL BE AWARE OF AND MITIGATE THE FOLLOWING TYPES OF SAFETY PROBLEMS AND/OR HAZARDS:

1. TRENCHES, HOLES, OR EXCAVATION ON OR ADJACENT TO ANY ACTIVE RUNWAY OR IN SAFETY AREAS.
2. UNMARKED/UNLIT HOLES OR EXCAVATION.
3. MOUNDS OR PILES OF EARTH, CONSTRUCTION MATERIALS, TEMPORARY STRUCTURES, OR OTHER OBJECTS WITHIN THE OFA OF ANY ACTIVE RUNWAY, TAXIWAY, TAXILANE, OR IN ANY RELATED SAFETY, APPROACH, OR DEPARTURE AREA.
4. VEHICLES OR EQUIPMENT, WHETHER OPERATING OR IDLE, OR PERSONNEL ON ANY ACTIVE RUNWAY, TAXIWAY, TAXILANE, OR IN ANY RELATED SAFETY, OBJECT FREE, APPROACH, OR DEPARTURE AREA.

SITE ACCESS:

1. CONTRACTOR IS REQUIRED TO ESCORT HIS PERSONNEL/DELIVERIES TO/FROM AOA GATE TO THE JOB SITE USING DESIGNATED HAUL ROUTE WITH APPROVED FLAGGER LOCATIONS.
2. GATE GUARDS SHALL BE PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH ROA REQUIREMENTS.
3. ALL CONTRACTOR PERSONNEL ENTERING THE AOA MUST BE BADGED OR ESCORTED BY APPROPRIATELY BADGED PERSONNEL. REFER TO CURRENT RRAC SECURITY STANDARDS FOR MAXIMUM ALLOWABLE ESCORTED PERSONNEL PER BADGE. ESCORTS MUST REMAIN IN DIRECT CONTROL OF ALL UNBADGED PERSONNEL AT ALL TIMES.
4. CONTRACTOR IS NOT PERMITTED TO COMMUNICATE WITH THE ATCT (RADIO). ALL RADIO COMMUNICATION WILL BE THROUGH THE RPR OR RRAC OPERATIONS. CONTRACTOR IS ONLY PERMITTED TO LISTEN WITH THE ATCT, EXCEPT IN CASE OF AN EMERGENCY.

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6-27-2023

RUNWAY 16-34 EMAS REPLACEMENT

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: OCTOBER 10, 2023
REVIEWED BY: KMF
DRAWN BY: AJB
DESIGNED BY: CFM

RS&H PROJECT NUMBER
1022-0071-003

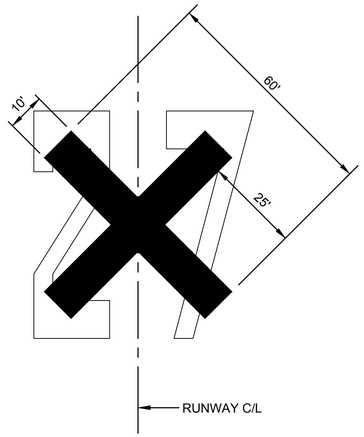
SHEET TITLE

CONSTRUCTION SAFETY AND PHASING NOTES

SHEET NUMBER
G101
SHEET 10 OF 31

BID SUBMITTAL

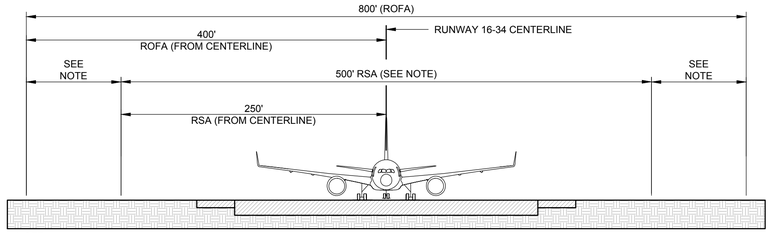
Drawing: O:\ROA\Projects\2022-XXXX\CAD\SHEETS\G102_CONSTRUCTION SAFETY AND PHASING DETAILS.dwg – Plotted on: 9/26/2023 9:49 AM – Plotted by: Colin McErlean



NOTES:

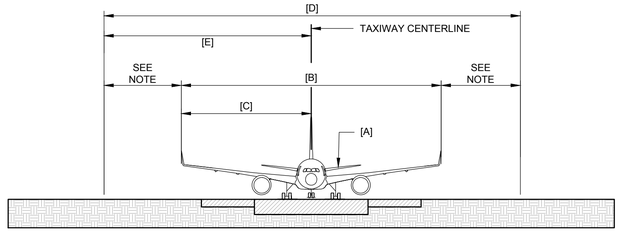
1. CLOSED RUNWAY CLOSURE MARKINGS SHALL BE AVIATION YELLOW.
2. FABRIC PORTABLE RUNWAY CLOSURE MARKER TRANSPORT AND STORAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.
3. FABRIC X RUNWAY CLOSURE MARKERS SHALL BE PLACED ON TOP OF RUNWAY DESIGNATION NUMERALS FOR EACH RUNWAY BEING CLOSED.
4. FABRIC X RUNWAY CLOSURE SHALL BE SECURED BY A GROUND ANCHOR DEVICE. ANCHORING DEVICES SHOULD BE DESIGNED TO MINIMIZE DAMAGE TO PAVEMENT, AND ANY DAMAGE SHOULD BE REPAIRED BEFORE THE RUNWAY IS OPENED TO AIRCRAFT TRAFFIC
5. FABRIC X RUNWAY CLOSURE MARKERS SHALL MEET THE REQUIREMENTS DESCRIBED IN FAA AC 150/5340-1M SPECIFICATION, CHAPTER 5.7.1.2.
6. FABRIC CLOSURE MARKERS SHALL BE PROVIDED BY THE CONTRACTOR. CONTRACTOR TO MAINTAIN MARKERS AS REQUIRED IN ORDER TO ADHERE TO CONSTRUCTION SCHEDULE. RUNWAY CLOSURES SHALL NOT BE PERMITTED WITHOUT PROPER CLOSURE MARKERS. CLOSURE MARKERS SHALL REMAIN THE PROPERTY OF THE CONTRACTOR UPON PROJECT COMPLETION.
7. CONTRACTOR WILL BE ESCORTED TO THE RUNWAY ENDS BY THE RPR WHEN PLACEMENT/REMOVAL/ACCESS TO THE CLOSURE MARKERS IS REQUIRED.

1 / G102 RUNWAY CLOSURE MARKER
SCALE: N.T.S.



NOTE:
NO WORK SHALL BE PERMITTED IN ACTIVE RSA WITHOUT A RUNWAY CLOSURE. RESTORATION OF ROFA OUTSIDE RSA NOT REQUIRED TO OPEN RUNWAY TO TRAFFIC.

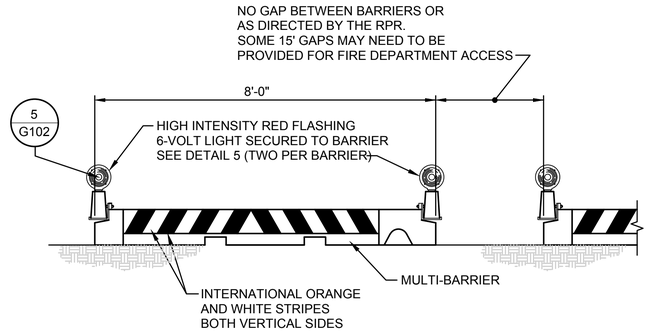
2 / G102 RUNWAY SAFETY AREA (RSA) RUNWAY OBJECT FREE AREAS (ROFA)
SCALE: N.T.S.



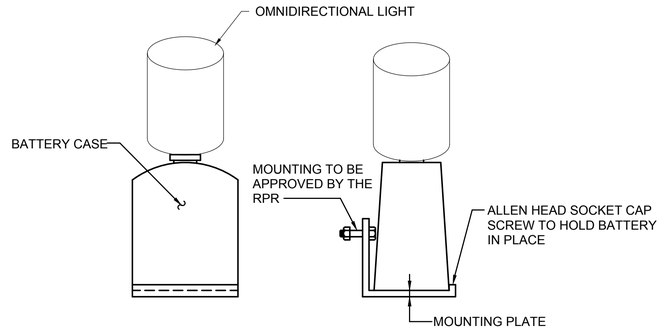
NOTE:
NO WORK SHALL BE PERMITTED IN ACTIVE TSA. WORK WITHIN ACTIVE TOFA SHALL REQUIRE "CONSTRUCTION AHEAD" SIGNS AND FLAGPERSON. EQUIPMENT/PERSONNEL SHALL BE MOVED OUTSIDE TOFA IF 36' CLEARANCE TO WINGTIP CANNOT BE MAINTAINED. RESTORATION OF TOFA OUTSIDE TSA NOT REQUIRED TO OPEN TAXIWAY TO TRAFFIC, AS SHOWN IN DETAIL 3 ON THIS SHEET. CONTRACTOR SHALL COORDINATE ANY WORK WITHIN AN ACTIVE OFA WITH ROA OPERATIONS AND INCLUDE COORDINATION IN THE APPROVED MOT PLAN IF APPLICABLE.

TAXIWAY	GROUP	AIRCRAFT [A]	TSA [B]	TSA FROM CENTERLINE [C]	TOFA [D]	TOFA FROM CENTERLINE [E]
A	IV	BOEING 767	171'	85.5'	243'	121.5'

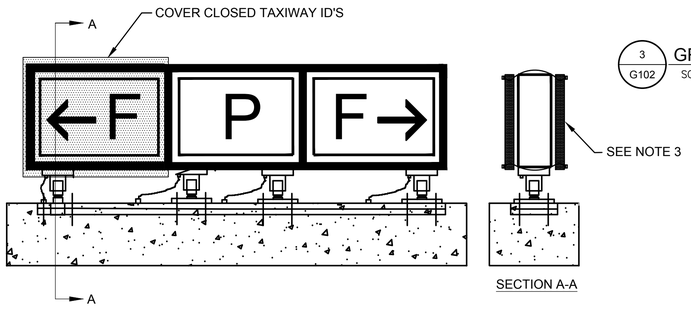
3 / G102 GROUP IV TAXIWAY SAFETY AREA (TSA) TAXIWAY OBJECT FREE AREA (TOFA) - TANGENT SECTION
SCALE: N.T.S.



4 / G102 POLYETHYLENE CONSTRUCTION BARRIERS
SCALE: N.T.S.



5 / G102 POLYETHYLENE CONSTRUCTION BARRIER LIGHT DETAIL
SCALE: N.T.S.

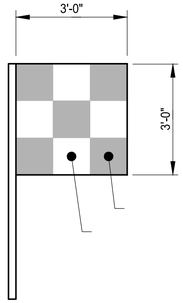


NOTES:

1. COVER ONLY TAXIWAYS CLOSED TO AIRCRAFT TRAFFIC AS SHOWN ON PHASING PLANS OR DIRECTED BY THE RPR.
2. FASTEN TO WITHSTAND 80 MPH WINDS.
3. METHOD OF COVERING SHALL BE SUBMITTED FOR APPROVAL OF RPR. NO BAGS OR TAPE WILL BE PERMITTED.

   FOR COSTS ASSOCIATED WITH TEMPORARY CONSTRUCTION FEATURES SEE TEMPORARY CONSTRUCTION ITEMS.
4. MAINTAIN EXISTING SIGNAGE OR PROVIDE TEMPORARY SIGNAGE DURING DURATION OF PROJECT. AS WORK PROGRESSES, COVER ANY NEW OR EXISTING MESSAGES THAT DO NOT APPLY OR LEAD INTO NEW WORK AREAS NOT READY FOR TRAFFIC. NO SIGNAGE MAY BE DISCONNECTED OR COVERED WITHOUT APPROVAL BY THE CONSTRUCTION MANAGER.

6 / G102 SIGN COVERING DETAIL
SCALE: N.T.S.



7 / G102 VEHICLE EQUIPMENT FLAG
SCALE: N.T.S.

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RUNWAY 16-34 EMAS REPLACEMENT

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: OCTOBER 10, 2023
REVIEWED BY: KMF
DRAWN BY: AJB
DESIGNED BY: CFM

RS&H PROJECT NUMBER
1022-0071-003

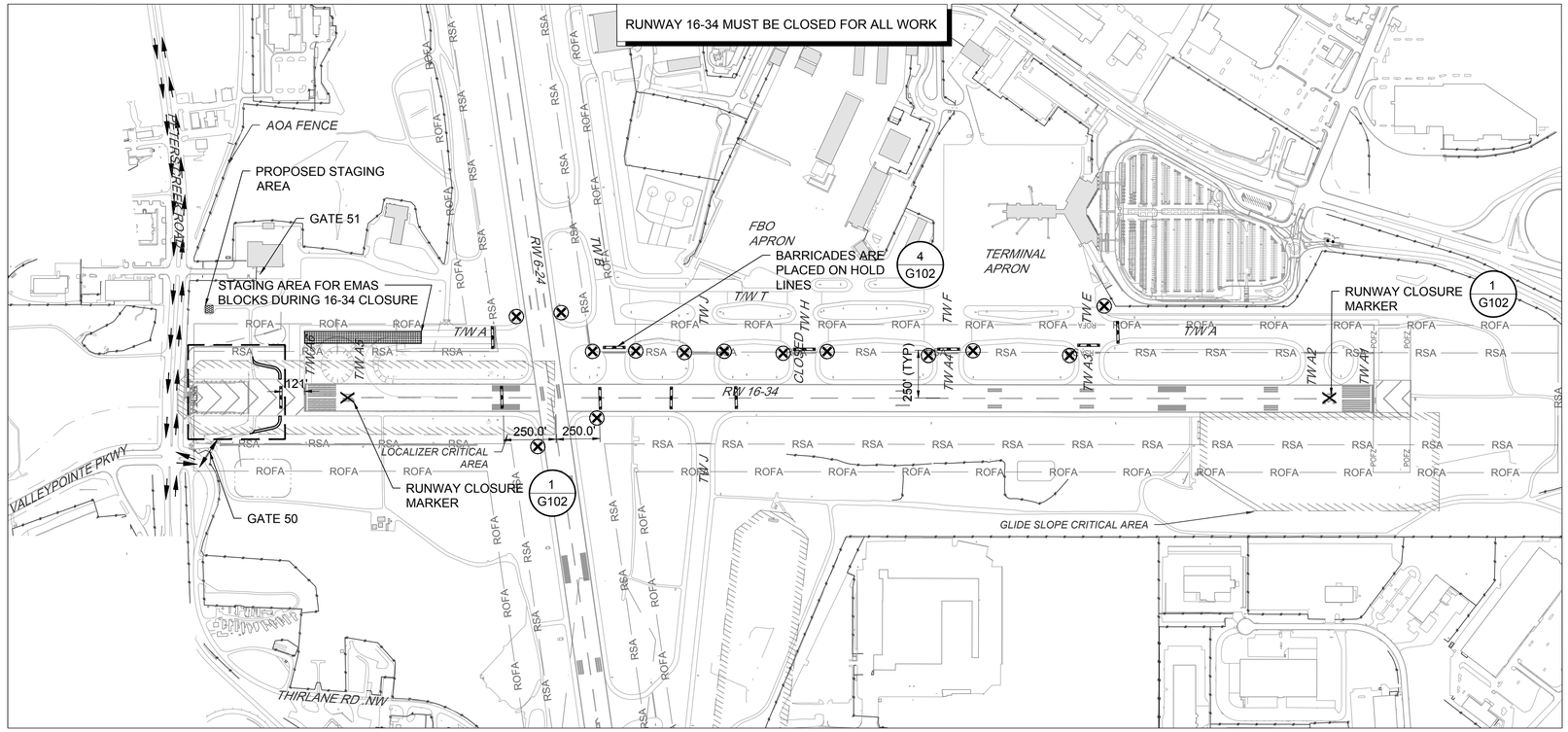
SHEET TITLE

CONSTRUCTION SAFETY AND PHASING DETAILS

SHEET NUMBER
G102
SHEET 11 OF 31

BID SUBMITTAL

Drawing: O:\ROA\Projects\2022-XXXX\CAD\SHEETS\G102_CONSTRUCTION SAFETY AND PHASING DETAILS.dwg — Plotted on: 9/27/2023 11:13 AM — Plotted by: Colin McErlean



KEYMAP
(N.T.S.)

LEGEND

- SIGN COVERING DETIAL (SEE DETAIL 6, SHEET G102)
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA
- ROFZ — RUNWAY OBJECT FREE ZONE
- TOFA — TAXIWAY OBJECT FREE AREA
- TSA — TAXIWAY SAFETY AREA
- PROJECT AREA
- LOW PROFILE BARRICADES
- HAUL ROUTE
- PROPOSED STAGING AREA (STAGING IS AVAILABLE ON 16 NUMERALS WHEN RUNWAY 16-34 IS CLOSED)

AIRFIELD IMPACTS:

1. TAXIWAY A CLOSURE WEST OF RUNWAY 6-24. THIS TAXIWAY WILL NEED ITS LIGHTING SYSTEMS TURNED OFF FOR DURATION OF PHASE 1 AND SIGNS COVERED.
2. WORK IN RUNWAY 34 LOCALIZER CRITICAL AREA
3. 30 DAY CLOSURE OF RUNWAY 16-34 FOR PHASE 1 AND NIGHTLY CLOSURE FOR PHASE 2.

OPERATIONAL IMPACTS:

1.TAXIWAY DECLARED DISTANCE.

PHASING NOTES

1. "DAYS" SHOWN ON CONSTRUCTION SCHEDULE REFERS TO CONSECUTIVE CALENDAR DAYS
2. CONCEPTUAL CONSTRUCTION SCHEDULES ARE SHOWN FOR REFERENCE ONLY AND MAY NOT REFLECT THE ACTUAL AVAILABILITY OF EACH WORK AREA AT THE TIME OF CONSTRUCTION. CONTRACTOR SHALL PREPARE AND SUBMIT A BASELINE SCHEDULE, WHICH MUST BE APPROVED BY THE RPR PRIOR TO CONSTRUCTION

WORK HOURS:

1. NIGHTLY (11PM TO 7AM) FOR PHASE 2 WORK.
2. FULL CLOSURE OF RUNWAY 16-34 FOR PHASE 1.

21. ALL VEHICLES UTILIZED WILL BE INSPECTED AT ACCESS GATES BY CONTRACTOR-SUPPLIED GATE GUARDS. CONTRACTOR SHALL ENSURE THAT EACH GUARD WHO WILL MONITOR ACCESS TO THE AOA THROUGH APPROVED CONTRACTOR GATES HAS A VALID ROA ID BADGE PROMINENTLY DISPLAYED ABOVE WAIST LEVEL AND ON THEIR OUTERMOST GARMENT AT ALL TIMES AT ROA, HAS COMPLETED ROA GUARD ORIENTATION, AND HAS SIGNED AN ROA GUARD ACKNOWLEDGEMENT FORM THAT IS ON FILE WITH THE AIRPORT SECURITY. THE CONTRACTOR IS ADVISED TO EXPECT DELAYS AT GATE ENTRANCES AND TO PLAN ACTIVITIES ACCORDINGLY. THE CONTRACTOR WILL NOT BE ALLOWED UNESCORTED INSIDE THE MOVEMENT AREA.

HAUL ROUTE NOTES

1. FOR SAFETY, PHASING, AND SECURITY NOTES AND DETAILS, SEE SHEETS G101 TO G102.
2. LOCATION OF HAUL ROUTES ON THE AIRPORT SITE SHALL BE AS SHOWN ON THIS PLAN OR COORDINATED WITH RPR. ON-SITE HAUL ROUTES SHALL BE MAINTAINED BY THE CONTRACTOR AND SHALL BE RESTORED TO THEIR PRE-CONSTRUCTION CONDITION OR TO THE SATISFACTION OF THE RPR UPON COMPLETION OF BEING USED AS A HAUL ROUTE. THE BEFORE AND AFTER CONDITION OF THE ON-SITE HAUL ROUTES SHALL BE JOINTLY INSPECTED, DETERMINED, AND DOCUMENTED BY THE CONTRACTOR AND RPR. MISCELLANEOUS CONSTRUCTION AND RESTORATION REQUIRED TO CONSTRUCT TEMPORARY HAUL ROUTES OR ACCESS POINTS ON THE AIRPORT WILL BE THE CONTRACTOR'S TOTAL RESPONSIBILITY, AND SHALL BE APPROVED BY THE RPR PRIOR TO THE START OF WORK. THERE WILL BE NO SEPARATE DIRECT PAYMENT FOR MISCELLANEOUS CONSTRUCTION, MAINTENANCE, REPAIR, OR RESTORATION OF HAUL ROUTES.
3. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE OFF-SITE HAUL ROUTES WITH THE APPROPRIATE OWNERS WHO HAVE JURISDICTION OVER THE AFFECTED ROUTE. PUBLIC STREETS SHALL REMAIN CLEAN. THE CONTRACTOR SHALL COORDINATE AND MEET THE CLEANING AND REPAIR REQUIREMENTS SET BY THE AUTHORITY HAVING JURISDICTION FOR USE OF THEIR ROADS FOR CONSTRUCTION RELATED WORK.
4. CONTRACTOR ACCESS ALONG HAUL ROUTES CROSSING ACTIVE OPERATIONAL PAVEMENT WILL BE SUBJECT TO DELAYS DUE TO AIRPORT OPERATIONS. THE CONTRACTOR'S USE OF THE HAUL ROADS SHALL IN NO WAY HINDER THE SAFE AND UNOBSTRUCTED FLOW OF AIRPORT TRAFFIC. AIRCRAFT SHALL HAVE THE RIGHT OF WAY AT ALL TIMES. ALL WORK OR HAULING ON THE AIR OPERATIONS AREA (AOA) SHALL BE COORDINATED AND SCHEDULED WITH THE RESIDENT PROJECT REPRESENTATIVE (RPR) SO AS TO MINIMIZE THE TIME THAT ANY RUNWAY OR TAXIWAY IS CLOSED TO AIR TRAFFIC. DEPARTMENT OF AVIATION AIRPORT OPERATIONS PERSONNEL CONTROL ALL RUNWAY AND TAXIWAY CLOSURES AND CROSSINGS.
5. NO CONTRACTOR'S VEHICLES, PERSONNEL, OR OPERATION WILL BE ALLOWED TO CROSS, ENTER, OR OBSTRUCT ANY ACTIVE RUNWAY OR TAXIWAY WITHOUT APPROVAL FROM THE RPR. INCURSIONS ONTO OR ACROSS ANY ACTIVE RUNWAY OR TAXIWAY WITHOUT PRIOR APPROVAL IS A SERIOUS VIOLATION THAT WILL SUBJECT THE CONTRACTOR TO THE MAXIMUM FINE ALLOWED BY THE FAA.
6. THE CONTRACTOR SHALL PROVIDE FLAGGERS WHO ARE RESPONSIBLE FOR THE CONTROL OF MOVEMENT OF THE CONTRACTOR'S EQUIPMENT AND PERSONNEL ACROSS ACTIVE TAXIWAYS, INSTRUMENT LANDING SYSTEM (ILS) CRITICAL AREAS, GLIDE SLOPE CRITICAL AREAS, AND ANY OTHER CRITICAL AREAS AS DETERMINED BY RPR. ANY CLEARANCE GRANTED BY THE RPR MUST BE CONFIRMED BY THE DRIVER'S PERSONAL OBSERVATION AT ALL TIMES TO KEEP ANY AND ALL ACTIVE PAVEMENT CROSSINGS CLEAN AND TO ASSURE NO AIRCRAFT IS APPROACHING THEIR POSITION.
7. THE CONTRACTOR SHALL MAINTAIN A PAVEMENT CLEANING OPERATION DURING PERIODS OF ACTIVITY REQUIRING CONTRACTOR TRAFFIC ACROSS ACTIVE TAXIWAYS OR RUNWAYS. ANY AND ALL DEBRIS DEPOSITED ON PAVEMENT DUE TO CONSTRUCTION ACTIVITIES SHALL BE REMOVED IMMEDIATELY. THE OPERATIONAL AREA OF THE AIRPORT PAVEMENT MUST BE FREE OF FOREIGN OBJECT DEBRIS (FOD) AT ALL TIMES.
8. WHEN REQUESTED, NO LESS THAN ONE SELF-PROPELLED, STREET TYPE, VACUUM SWEEPER TRUCKS IN GOOD OPERATING CONDITION SHALL BE AVAILABLE ON SITE AT ALL TIMES. THE CONTRACTOR SHALL MAINTAIN ONGOING PAVEMENT VACUUMING OPERATIONS DURING ALL WORKING HOURS WITHIN AND ADJACENT TO THE CONSTRUCTION SITE AREAS AS DETERMINED BY THE RPR.
9. THE CONTRACTOR SHALL CONTROL CONSTRUCTION AREA GENERATED DUST ON A 24-HOUR BASIS. ONE WATER TRUCK IN GOOD OPERATING CONDITION SHALL BE AVAILABLE AT ALL TIMES. ALL TRUCK BEDS SHALL BE COVERED DURING HAULING OPERATIONS. DURING WINDY OR DRY PERIOD A SECOND HAUL ROUTE MAY BE REQUIRED. THE RPR MAY ALSO IMPOSE ADDITIONAL DUST CONTROL REQUIREMENTS AS NECESSARY THROUGHOUT CONSTRUCTION.
10. HAUL ROUTES SHALL BE CONTINUOUSLY MAINTAINED AND CLEARED BY THE CONTRACTOR THROUGHOUT THE WORK SHIFT AND AT THE END OF THE SHIFT. CLEANUP EQUIPMENT (SWEEPERS, WATER TRUCKS, ETC.) AND OPERATORS SHALL REMAIN AT THE SITE UNTIL THE AREA IS ACCEPTED BY THE RPR AND AIRPORT OPERATIONS FOR START OF AIRCRAFT OPERATIONS.
11. DURING THE PERIODS OF TIME THAT THERE IS NO CONSTRUCTION ACTIVITY (BETWEEN WORK SHIFTS), THE SWEEPERS AND WATER TRUCKS MUST BE READY AND ON-SITE WITH CONTRACTOR'S PERSONNEL AVAILABLE BY PHONE TO RESPOND IMMEDIATELY TO A DUST OR DEBRIS PROBLEM AS IDENTIFIED BY THE RPR. AT NO TIME SHALL THERE BE MORE THAN A 10 MINUTE RESPONSE TIME TO CALLS CONCERNING DUST OR DEBRIS PROBLEMS DURING WORK HOURS, AND A 90-MINUTE RESPONSE TIME AT ALL OTHER TIMES ON A 24-HOUR BASIS.
12. LIMITS OF WORK SHALL BE VERIFIED BY THE CONTRACTOR AND THE RPR PRIOR TO BEGINNING WORK. THE CONTRACTOR'S VEHICLES AND EQUIPMENT SHALL BE RESTRICTED TO THE CONSTRUCTION AREA LIMITS ONLY, UNLESS TRAVELING TO OR FROM THE SITE VIA APPROVED HAUL ROUTES. UNDER NO CIRCUMSTANCES SHALL VEHICLES BE PARKED OR EQUIPMENT/MATERIALS BE STORED OUTSIDE OF THESE AREAS.
13. MAXIMUM CONSTRUCTION TRAFFIC SPEED ON THE CONSTRUCTION ZONE AND HAUL ROUTE SHALL BE 15 MPH UNLESS POSTED OTHERWISE.
14. SOME PORTIONS OF THE HAUL ROAD MAY REQUIRE TWO-WAY TRAFFIC ON A SINGLE LANE ROAD. THE CONTRACTOR SHALL PROVIDE THEIR OWN TRAFFIC CONTROL ON THESE PORTIONS OF THE HAUL ROUTE.
15. IF REQUIRED BY RPR, STOP SIGNS SHALL CONFORM TO AC 150/5370-2 (CURRENT EDITION).
16. TRACK DRIVEN VEHICLES MUST BE DELIVERED TO THE WORK AREA. METAL TRACK VEHICLES ARE NOT PERMITTED TO OPERATE ON PAVEMENT SURFACES THAT ARE TO REMAIN.
17. PARKING OF EMPLOYEE'S PRIVATE VEHICLES IS RESTRICTED TO PARKING AREAS OFF THE AOA. NO EMPLOYEE VEHICLES OR FOOD VENDORS WILL BE PERMITTED ON THE AOA. CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFE TRANSPORT OF EMPLOYEES TO/FROM WORK AREAS CONSISTENT WITH AIRPORT STANDARD PRACTICES.
18. EQUIPMENT OPERATING ON ALL ROADS WITHIN THE AIRFIELD SHALL CONFORM TO LEGAL LOAD LIMITS FOR PUBLIC HIGHWAYS. ROAD SURFACES SHALL BE SMOOTH (NON-MILLED) AND DEBRIS FREE AT ALL TIMES.
19. UNLESS OTHERWISE DIRECTED BY THE RPR, WHEN USING RUNWAYS OR TAXIWAYS AS HAUL ROUTES, CONSTRUCTION VEHICLES SHALL USE THE OUTER 25 FEET ON ONE SIDE OF THE RUNWAY OR TAXIWAY.
20. ACCESS TO THE AOA WILL BE LIMITED TO ACCESS-CONTROLLED GATES 50 AND 51 ONLY. ACCESS THROUGH ANY OTHER GATE WILL NOT BE ALLOWED UNLESS APPROVED BY THE RPR.

CONCEPTUAL CONSTRUCTION SCHEDULE

WORK ITEM	DURATION (CALENDAR DAYS)		WORK HOURS
ADMINISTRATION/MOBILIZATION	75/30		
PHASE 1 (FULL CLOSURE)*	35		24 HRS
PHASE 2 (NIGHTLY)	30		11PM - 7AM
TOTAL	170		

WEEK 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

* RUNWAY CLOSURE PERIOD INCLUDES 5 DAYS OF WEATHER FOR IMPACTS TO CRITICAL PATH ITEMS ANY WEATHER DAYS IN EXCESS OF 5 DAYS (ON CRITICAL PATH ITEMS) WILL BE CONSIDERED A NON-COMPENSABLE TIME EXTENSION.

0 400 800 Feet

RS&H
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Vienna, Virginia 22180
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Virginia Registration Nos. 0407-003171 * 0411-000438

ADCI AIRPORT DESIGN CONSULTANTS INC
ROANOKE-BLACKSBURG REGIONAL AIRPORT

ROANOKE-BLACKSBURG REGIONAL AIRPORT (ROA)

COMMONWEALTH OF VIRGINIA
KEITH MATTHEW BRUNK
Lic. No. 59104
6-27-2023
PROFESSIONAL ENGINEER

RUNWAY 16-34 EMAS REPLACEMENT

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: OCTOBER 10, 2023
REVIEWED BY: KMF
DRAWN BY: AJB
DESIGNED BY: CFM

RS&H PROJECT NUMBER
1022-0071-003

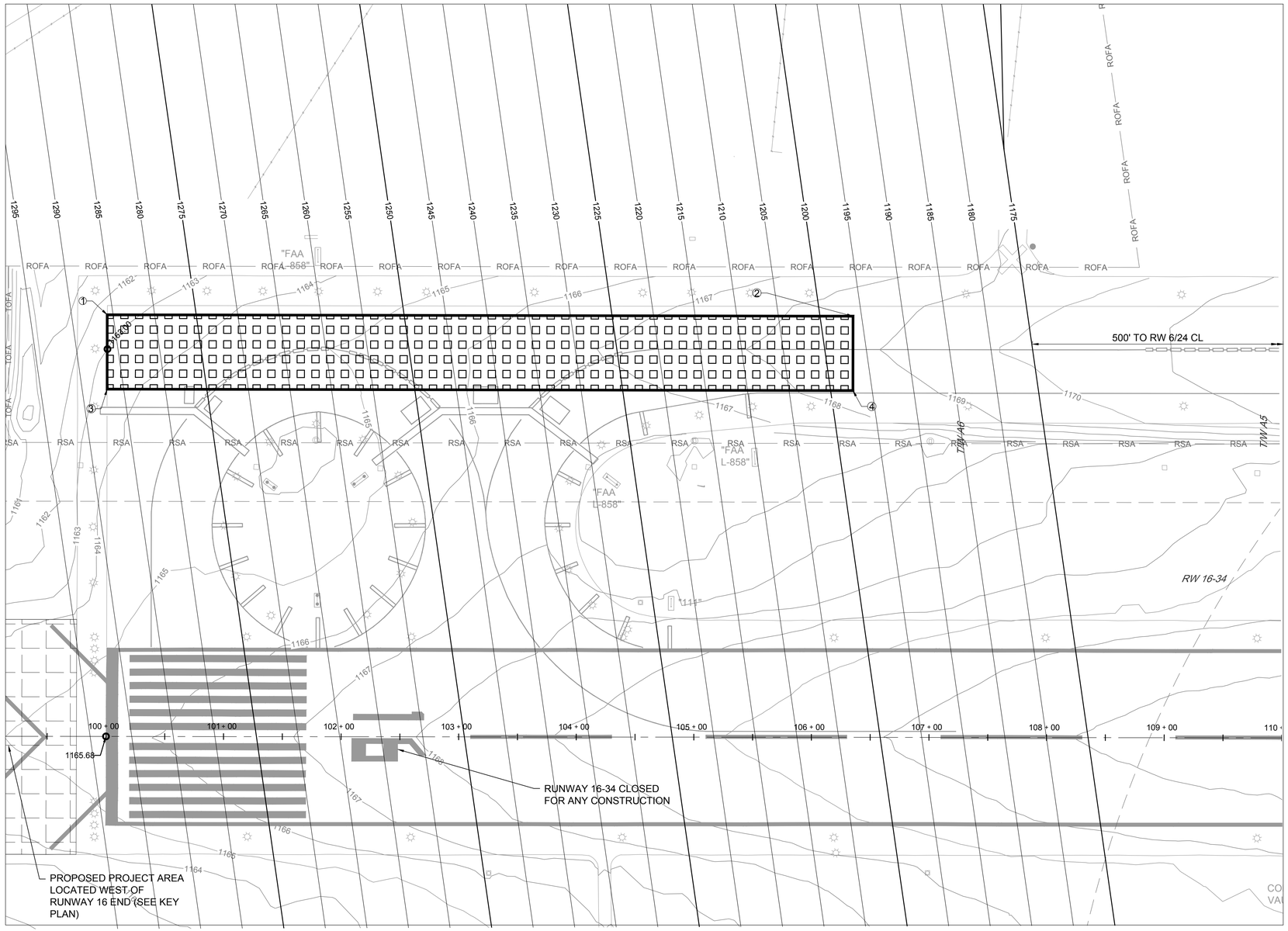
SHEET TITLE

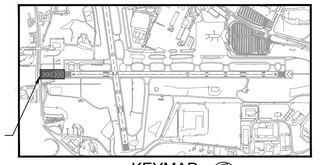
CONSTRUCTION SAFETY AND PHASING OVERVIEW PLAN

SHEET NUMBER
G103
SHEET 12 OF 31

BID SUBMITTAL

Drawing: O:\ROA\Projects\2022-XXXX\CAD\SHEETS\G103_CONSTRUCTION SAFETY AND PHASING OVERVIEW PLAN.dwg – Plotted on: 9/27/2023 9:00 AM – Plotted by: Colin McErlean





KEYMAP
(N.T.S.)

LEGEND

- EMAS BLOCK STAGING AREA
- 1170 — FAR PART 77 SURFACE CONTOUR
- 1162 — EXISTING GROUND CONTOUR

NOTES

1. ANY BOOMS AND CONSTRUCTION EQUIPMENT SHALL BE LOWERED TO THE RESPECTIVE EQUIPMENT MINIMUM HEIGHT WHEN NOT IN USE AND/OR AT THE END OF EACH WORK SHIFT. NOT IN USE IS DEFINED AS NO OPERATOR BEING AVAILABLE TO MOVE A PARTICULAR PIECE OF EQUIPMENT FOR 15 MINUTES OR MORE.
2. THE MAXIMUM ELEVATIONS FOR CONSTRUCTION EQUIPMENT ARE INDICATED FOR THE CONTRACTOR AND REFERS TO ALL CONSTRUCTION EQUIPMENT.
3. ACTIVE CONSTRUCTION ACTIVITIES WILL BE SUBJECT TO OFZ RESTRICTIONS ONLY. PERMANENT OBSTRUCTIONS (EQUIPMENT NOT IN USE, STOCKPILES, BOOMS, ETC.) SHALL BE SUBJECT TO FAR PART 77 RESTRICTIONS.
4. CONTRACTOR SHALL NOTIFY THE RPR 7 DAYS PRIOR TO USING ANY EQUIPMENT OVER 20 FEET IN HEIGHT OR EQUIPMENT THAT VIOLATES MAXIMUM ALLOWABLE EQUIPMENT HEIGHT FOR COORDINATION WITH ROA OPERATIONS AND THE AIR TRAFFIC CONTROL TOWER.
5. ONLY EXISTING AND PART 77 CONTOURS ARE SHOWN FOR CLARITY.
6. THIS MAX EQUIPMENT HEIGHT PLAN SHOWS RUNWAY 6-24 PART 77 SURFACE ONLY, AS RUNWAY 16-34 WILL BE CLOSED DURING CONSTRUCTION.

FAR PART 77 POINT TABLE								
POINT NO.	NORTHING	EASTING	LATITUDE (N)	LONGITUDE (W)	SITE ELEV.	EQUIPMENT HEIGHT	FAR PART 77 ELEV.	EQUIPMENT CLEARANCE
1	3646892.38	11052598.58	N037° 19' 46.12"	W079° 58' 48.29"	1162.39	1182.39	1285.700	123.307
2	3646349.48	11052926.54	N037° 19' 40.80"	W079° 58' 44.12"	1168.49	1188.49	1196.030	27.541
3	3646859.63	11052544.46	N037° 19' 45.79"	W079° 58' 48.95"	1163.38	1183.38	1286.990	123.611
4	3646316.74	11052872.43	N037° 19' 40.47"	W079° 58' 44.78"	1168.38	1188.38	1197.310	28.927

0 50 100 Feet

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6-27-2024
PROFESSIONAL ENGINEER

RUNWAY 16-34 EMAS REPLACEMENT

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: OCTOBER 10, 2023
REVIEWED BY: KMF
DRAWN BY: AJB
DESIGNED BY: CFM

RS&H PROJECT NUMBER
1022-0071-003

SHEET TITLE

MAXIMUM EQUIPMENT HEIGHT PLAN

SHEET NUMBER
G104
SHEET 13 OF 31

BID SUBMITTAL

Drawing: O:\ROA\Projects\2022-XXXX\CAD\SHEETS\G104_MAX EQUIPMENT HEIGHT PLAN - Copy.dwg - Plotted on: 9/27/2023 9:28 AM - Plotted by: Colin McErlean

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Appendix C. Safety and Phasing Plan Checklist

APPENDIX C. SAFETY AND PHASING PLAN CHECKLIST

This appendix is keyed to Chapter 2. In the electronic version of this AC, clicking on the paragraph designation in the Reference column will access the applicable paragraph. There may be instances where the CSPP requires provisions that are not covered by the list in this appendix.

This checklist is intended as an aid, not a required submittal.

Table C-1. CSPP Checklist

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
General Considerations					
Requirements for predesign, prebid, and preconstruction conferences to introduce the subject of airport operational safety during construction are specified.	2.5	✓			
Operational safety is a standing agenda item for construction progress meetings.	2.5	✓			
Scheduling of the construction phases is properly addressed.	2.6	✓			
Any formal agreements are established.	2.5.3			✓	Potential for RA?
Areas and Operations Affected by Construction Activity					
Drawings showing affected areas are included.	2.7.1	✓			
Closed or partially closed runways, taxiways, and aprons are depicted on drawings.	2.7.1.1	✓			
Access routes used by ARFF vehicles affected by the project are addressed.	2.7.1.2			✓	No ARFF Impacts
Access routes used by airport and airline support vehicles affected by the project are addressed.	2.7.1.3	✓			
Underground utilities, including water supplies for firefighting and drainage.	2.7.1.4	✓			

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Approach/departure surfaces affected by heights of temporary objects are addressed.	2.7.1.5	✓			
Construction areas, storage areas, and access routes near runways, taxiways, aprons, or helipads are properly depicted on drawings.	2.7.1	✓			
Temporary changes to taxi operations are addressed.	2.7.2.1	✓			
Detours for ARFF and other airport vehicles are identified.	2.7.2.2			✓	No ARFF Impacts
Maintenance of essential utilities and underground infrastructure is addressed.	2.7.2.3	✓			
Temporary changes to air traffic control procedures are addressed.	2.7.2.4			✓	NOTAM Process
NAVAIDs					
Critical areas for NAVAIDs are depicted on drawings.	2.8	✓			EMAS work in the 34 LCA
Effects of construction activity on the performance of NAVAIDS, including unanticipated power outages, are addressed.	2.8	✓			
Protection of NAVAID facilities is addressed.	2.8	✓			
The required distance and direction from each NAVAID to any construction activity is depicted on drawings.	2.8			✓	No Expected NAVAIDs Impacts
Procedures for coordination with FAA ATO/Technical Operations, including identification of points of contact, are included.	2.8, 2.13.1, 2.13.5.3.1, 2.18.1	✓			
Contractor Access					
The CSPP addresses areas to which contractor will have access and how	2.9	✓			

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
the areas will be accessed.					
The application of 49 CFR Part 1542 Airport Security, where appropriate, is addressed.	2.9	✓			
The location of stockpiled construction materials is depicted on drawings.	2.9.1	✓			
The requirement for stockpiles in the ROFA to be approved by FAA is included.	2.9.1	✓			No Stockpiles are expected
Requirements for proper stockpiling of materials are included.	2.9.1	✓			
Construction site parking is addressed.	2.9.2.1	✓			
Construction equipment parking is addressed.	2.9.2.2	✓			
Access and haul roads are addressed.	2.9.2.3	✓			
A requirement for marking and lighting of vehicles to comply with AC 150/5210-5, *Painting, Marking and Lighting of Vehicles Used on an Airport,* is included.	2.9.2.4	✓			
Proper vehicle operations, including requirements for escorts, are described.	2.9.2.5, 2.9.2.6	✓			
Training requirements for vehicle drivers are addressed.	2.9.2.7	✓			
Two-way radio communications procedures are described.	2.9.2.9	✓			
Maintenance of the secured area of the airport is addressed.	2.9.2.10	✓			
Wildlife Management					
The airport operator's wildlife management procedures are addressed.	2.10	✓			

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Foreign Object Debris Management					
The airport operator's FOD management procedures are addressed.	2.11	✓			
Hazardous Materials Management					
The airport operator's hazardous materials management procedures are addressed.	2.12	✓			
Notification of Construction Activities					
Procedures for the immediate notification of airport user and local FAA of any conditions adversely affecting the operational safety of the airport are detailed.	2.13	✓			
Maintenance of a list by the airport operator of the responsible representatives/points of contact for all involved parties and procedures for contacting them 24 hours a day, seven days a week is specified.	2.13.1	✓			
A list of local ATO/Technical Operations personnel is included.	2.13.1		✓		To Be Coordinated By RPR During Construction
A list of ATCT managers on duty is included.	2.13.1		✓		To Be Coordinated By RPR During Construction
A list of authorized representatives to the OCC is included.	2.13.2		✓		To Be Coordinated By RPR During Construction
Procedures for coordinating, issuing, maintaining and cancelling by the airport operator of NOTAMS about airport conditions resulting from construction are included.	2.8, 2.13.2, 2.18.3.3.9	✓			
Provision of information on closed or hazardous conditions on airport movement areas by the airport operator to the OCC is specified.	2.13.2	✓			Operations & Tower Are Aware of Work + NOTAMS
Emergency notification procedures for medical, fire fighting, and police	2.13.3	✓			

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
response are addressed.					
Coordination with ARFF personnel for non-emergency issues is addressed.	2.13.4	✓			Part of SPCD of contractor
Notification to the FAA under 14 CFR parts 77 and 157 is addressed.	2.13.5	✓			
Reimbursable agreements for flight checks and/or design and construction for FAA owned NAVAIDs are addressed.	2.13.5.3.2			✓	ROA to coordinate with FAA is RA is needed for closures
Inspection Requirements					
Daily and interim inspections by both the airport operator and contractor are specified.	2.14.1, 2.14.2	✓			
Final inspections at certificated airports are specified when required.	2.14.3	✓			
Underground Utilities					
Procedures for protecting existing underground facilities in excavation areas are described.	2.15	✓			
Penalties					
Penalty provisions for noncompliance with airport rules and regulations and the safety plans are detailed.	2.16	✓			
Special Conditions					
Any special conditions that affect the operation of the airport or require the activation of any special procedures are addressed.	2.17	✓			
Runway and Taxiway Visual Aids - Marking, Lighting, Signs, and Visual NAVAIDs					
The proper securing of temporary airport markings, lighting, signs, and visual NAVAIDs is addressed.	2.18.1	✓			
Frangibility of airport markings, lighting, signs, and visual NAVAIDs is specified.	2.18.1, 2.18.3, 2.18.4.2, 2.20.2.4	✓			

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
The requirement for markings to be in compliance with AC 150/5340-1, *Standards for Airport Markings*, is specified.	2.18.2	✓			
Detailed specifications for materials and methods for temporary markings are provided.	2.18.2			✓	
The requirement for lighting to conform to AC 150/5340-30, *Design and Installation Details for Airport Visual Aids;* AC 150/5345-50, *Specification for Portable Runway and Taxiway Lights;* and AC 150/5345-53, *Airport Lighting Certification Program*, is specified.	2.18.3			✓	No AFL work is included in this project
The use of a lighted X is specified where appropriate.	2.18.2.1.2, 2.18.3.2	✓			Nightly closures require lighted. Extended closure may utilize cloth X.
The requirement for signs to conform to AC 150/5345-44, *Specification for Runway and Taxiway Signs;* AC 50/5340-18, *Standards for Airport Sign Systems;* and AC 150/5345-53, *Airport Lighting Certification Program*, is specified.	2.18.4			✓	No Changes To Signs In Work
Marking and Signs For Access Routes					
The CSPP specifies that pavement markings and signs intended for construction personnel should conform to AC 150/5340-18 and, to the extent practicable, with the MUTCD and/or State highway specifications.	2.18.4.2	✓			
Hazard Marking and Lighting					
Prominent, comprehensible warning indicators for any area affected by construction that is normally accessible to aircraft, personnel, or vehicles are specified.	2.20.1	✓			

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Hazard marking and lighting are specified to identify open manholes, small areas under repair, stockpiled material, and waste areas.	2.20.1	✓			
The CSPP considers less obvious construction-related hazards.	2.20.1	✓			Storage of EMAS blocks/trailers
Equipment that poses the least danger to aircraft but is sturdy enough to remain in place when subjected to typical winds, prop wash and jet blast is specified.	2.20.2.1	✓			
The spacing of barricades is specified such that a breach is physically prevented barring a deliberate act.	2.20.2.1	✓			
Red lights meeting the luminance requirements of the State Highway Department are specified.	2.20.2.2	✓			
Barricades, temporary markers, and other objects placed and left in areas adjacent to any open runway, taxiway, taxi lane, or apron are specified to be as low as possible to the ground, and no more than 18 inch high.	2.20.2.3	✓			
Barricades are specified to indicate construction locations in which no part of an aircraft may enter.	2.20.2.3	✓			
Highly reflective barriers with lights are specified to barricade taxiways leading to closed runways.	2.20.2.5	✓			
Markings for temporary closures are specified.	2.20.2.5	✓			
The provision of a contractor's representative on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades is specified.	2.20.2.7	✓			

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Work Zone Lighting for Nighttime Construction					
If work is to be conducted at night, the CSPP identifies construction lighting units and their general locations and aiming in relationship to the ATCT and active runways and taxiways.	2.21	✓			
Protection of Runway and Taxiway Safety Areas					
The CSPP clearly states that no construction may occur within a safety area while the associated runway or taxiway is open for aircraft operations.	2.22.1.1, 2.22.3.1	✓			
The CSPP specifies that the airport operator coordinates the adjustment of RSA or TSA dimensions with the ATCT and the appropriate FAA Airports Regional or District Office and issues a local NOTAM.	2.22.1.2, 2.22.3.2	✓			
Procedures for ensuring adequate distance for protection from blasting operations, if required by operational considerations, are detailed.	2.22.3.3			✓	No blasting allowed
The CSPP specifies that open trenches or excavations are not permitted within a safety area while the associated runway or taxiway is open, subject to approved exceptions.	2.22.1.4	✓			
Appropriate covering of excavations in the RSA or TSA that cannot be backfilled before the associated runway or taxiway is open is detailed.	2.22.1.4	✓			
The CSPP includes provisions for prominent marking of open trenches and excavations at the construction site.	2.22.1.4	✓			
Grading and soil erosion control to maintain RSA/TSA standards are	2.22.3.5	✓			

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
addressed.					
The CSPP specifies that equipment is to be removed from the ROFA when not in use.	2.22.2	✔			
The CSPP clearly states that no construction may occur within a taxiway safety area while the taxiway is open for aircraft operations.	2.22.3	✔			
Appropriate details are specified for any construction work to be accomplished in a taxiway object free area.	2.22.4	✔			
Measures to ensure that personnel, material, and/or equipment do not penetrate the OFZ or threshold siting surfaces while the runway is open for aircraft operations are included.	2.22.4.3.6	✔			
Provisions for protection of runway approach/departure areas and clearways are included.	2.22.6	✔			Runway 16-34 will be closed and 6-24 will be protected
Other Limitations on Construction					
The CSPP prohibits the use of open flame welding or torches unless adequate fire safety precautions are provided and the airport operator has approved their use.	2.23.1.2	✔			
The CSPP prohibits the use of electrical blasting caps on or within 1,000 ft (300 m) of the airport property.	2.23.1.3	✔			

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TECHNICAL SPECIFICATIONS

SECTION F

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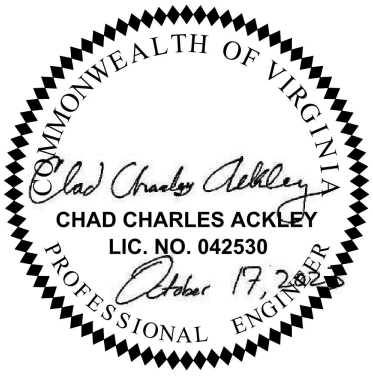

CHANGES TO STANDARD FAA SPECIFICATIONS

**Note: Specification sections have been modified from FAA standards as specified in Advisory Circular 150/5370-10H, *Standards for Specifying Construction of Airports.*

Text that has been deleted is shown using single line strikethrough. (e.g., ~~Sample Text~~)

Text that has been added is shown as blue and highlighted in grey. (e.g., Sample Text)

Text that has been deleted with strikethrough shall be treated as if it is not shown.

Text that has been added in blue and highlighted with grey shall be treated equivalently to any other information or requirements provided in the specifications.

Information selected from choices provided in the standard specification ("engineer notes") is shown as normal text.

The following specification sections have been added to supplement the FAA standard technical specifications:

ITEM X-102 SAFETY AND SECURITY
ITEM C-104 PROJECT STAKEOUT & AS-BUILT SURVEY
ITEM P-555 EMASBLOCKS AND ANCHOR BEAM

SECTION X-102 SAFETY AND SECURITY

GENERAL

102-1.1 The provisions of this safety and security plan and associated procedures are applicable within the boundaries of the Roanoke-Blacksburg Regional Airport. A complete understanding of all procedures and requirements contained herein is required to ensure safety during construction. *The Airport has completed a Construction Safety and Phasing Plan (CSPP), which is included as an appendix of the Project Manual. It is required that the contractor comply with this CSPP at all times during the project.* ***The Contractor shall be required to submit for approval a Safety Plan Compliance Document (SPCD) which details how the contractor will comply with the CSPP.*** This safety plan is a part of this Contract and deviations from the requirements established herein will be sufficient cause for Contract termination.

Required reference material associated with this safety plan includes:

FAA AC 150/5200-18, Airport Safety Self-Inspection
FAA AC 150/5210-5, Painting, Marking and Lighting of Vehicles Used on an Airport
FAA AC 150/5370-2, Operational Safety on Airports During Construction

These documents are available online at http://www.faa.gov/airports/resources/advisory_circulars or can be provided upon request.

CONTRACTOR SAFETY AND SECURITY OFFICER

102-2.1 CONTRACTOR SAFETY AND SECURITY OFFICER (CSSO). The Contractor shall appoint its on-site Construction Superintendent or other qualified individual(s) as its duly authorized representative to serve as Contractor Safety and Security Officer (CSSO) for the duration of the Contract. The CSSO shall thoroughly understand the safety and security requirements of the Contract, the necessity for them and shall have sufficient authority to implement its provisions without significant deviation. The Contractor shall notify the Construction Manager in writing of the name of the individual(s) selected for the assignment.

The CSSO shall represent the Contractor on safety and security requirements compliance. The CSSO shall be especially knowledgeable regarding the requirements of FAA AC's 150/5200-18, Airport Self Inspection Guide and 150/5370-2 Operational Safety on Airports During Construction, latest edition.

102-2.2 RESPONSIBILITIES OF THE CONTRACTOR SAFETY AND SECURITY OFFICER. Prior to the desired date for commencement of any work on the project, the CSSO shall accomplish the following:

a. Develop and submit in writing a detailed work sequence schedule with dates and times specified for all milestone events. This sequence schedule shall be subject to the approval of the Construction Manager. To assure adequate time for coordination, this document shall be submitted at least one week prior to the date of the Pre-construction Conference.

b. Develop and submit in writing a detailed outline of the procedures to be followed to maintain safety and security of both Contractor operations and the integrity of airport landside and airside operations during the prosecution of contract work. This plan shall detail, in addition, the procedures to be followed in the event of an accident or fire involving Contractor personnel and the Contractor's efforts to maintain fire protection and security. These procedures shall be subject to the approval of the Construction Manager and reflect any change as may be deemed necessary.

c. Conduct at least one meeting of all Contractor supervisory personnel prior to the start of

contract work. The purpose of this meeting is to review the approved Work sequence schedule and safety and security procedures. Attendance at this meeting by the CSSO, all Contractor supervisory personnel and the Construction Manager is mandatory. This meeting shall also be open to other employees of the Contractor and others as the Construction Manager may deem appropriate. Minutes of this meeting shall be taken by the CSSO, copies provided to each supervisor and kept on file in the Contractor's construction office for periodic review and updating.

d. Develop a safety and security orientation program and provide a briefing for all employees of the Contractor and subcontractors that will be used on the project. A similar briefing will be given to new employees prior to their use on contract work. In addition, the CSSO shall be responsible for briefing, from time to time, all Contractor personnel on any changes to safety and security measures deemed necessary.

e. Submit a Safety Plan Compliance Document (SPCD) to the airport operator describing how it will comply with the requirements of the CSPP and supplying any details that could not be determined before contract award. The SPCD must include a certification statement by the contractor that indicates it understands the operational safety requirements of the CSPP and it asserts it will not deviate from the approved CSPP and SPCD unless written approval is granted by the airport operator. Any construction practice proposed by the contractor that does not conform to the CSPP and SPCD may impact the airport's operational safety and will require a revision to the CSPP and SPCD and re-coordination with the airport operator and the FAA in advance.

1) **The Safety Plan Compliance Document (SPCD) should include a general statement by the construction contractor that he/she has read and will abide by the CSPP.** In addition, the SPCD must include all supplemental information that could not be included in the CSPP prior to the contract award. The contractor statement should include the name of the contractor, the title of the project CSPP, the approval date of the CSPP, and a reference to any supplemental information (that is, "I , Name of Contractor , have read the Title of Project CSPP, approved on Date , and will abide by it as written and with the following additions as noted:"). The supplemental information in the SPCD should be written to match the format of the CSPP indicating each subject by corresponding CSPP subject number and title. If no supplemental information is necessary for any specific subject, the statement, "No supplemental information," should be written after the corresponding subject title. The SPCD should not duplicate information in the CSPP:

   i. **Coordination**. Discuss details of proposed safety meetings with the airport operator and with contractor employees and subcontractors.

   ii. **Phasing**. Discuss proposed construction schedule elements, including:
      1. Duration of each phase.
      2. Daily start and finish of construction, including "night only" construction.
      3. Duration of construction activities during:

   iii. **Areas and operations affected by the construction activity**. These areas and operations should be identified in the CSPP and should not require an entry in the SPCD.

   iv. **Protection of NAVAIDs**. Not applicable.

   v. **Contractor access**. Provide the following:
      1. Details on how the contractor will maintain the integrity of the airport security fence (gate guards, daily log of construction personnel, and other).
      2. Details on how the contractor will escort material delivery vehicles.

   vi. **Wildlife management**. Discuss the following:
      1. Methods and procedures to prevent wildlife attraction.
      2. Wildlife reporting procedures.

vii. **Foreign Object Debris (FOD) management**. Discuss equipment and methods for control of FOD, including construction debris and dust.

viii. **Hazardous material (HAZMAT) management**. Discuss equipment and methods for responding to hazardous spills.

ix. **Notification of construction activities**. Provide the following:

1. Contractor points of contact.
2. Contractor emergency contact.
3. Listing of tall or other requested equipment proposed for use on the airport and the timeframe for submitting 7460-1 forms not previously submitted by the airport operator.

x. **Inspection requirements**. Discuss daily (or more frequent) inspections and special inspection procedures.

xi. **Underground utilities**. Discuss proposed methods of identifying and protecting underground utilities.

xii. **Penalties**. Any penalties are identified in the CSPP.

xiii. **Special conditions**. Discuss proposed actions for each special condition identified in the CSPP.

xiv. **Runway and taxiway visual aids**. Not applicable.

xv. **Marking and signs for access routes**. Discuss proposed methods of demarcating access routes for vehicle drivers.

xvi. **Hazard marking and lighting**. Discuss proposed equipment and methods for identifying excavation areas.

xvii. **Protection of runway and taxiway safety areas, including object free areas, obstacle free zones, and approach/departure surfaces.** Not applicable.

xviii. **Other limitations on construction** should be identified in the CSPP and should not require an entry in the SPCD.

2) Have available at all times copies of the CSPP and SPCD for reference by the airport operator and its representatives, and by subcontractors and contractor employees.

3) Ensure that construction personnel are familiar with safety procedures and regulations on the airport. Provide a point of contact who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport. Contractor shall provide 24-hour coverage.

4) Identify in the SPCD the contractor's on-site employees responsible for monitoring compliance with the CSPP and SPCD during construction. At least one of these employees must be on-site whenever active construction is taking place.

5) Conduct inspections sufficiently frequently to ensure construction personnel comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards.

6) Restrict movement of construction vehicles and personnel to permitted construction areas by flagging, barricading, erecting temporary fencing, or providing escorts, as appropriate and as specified in the CSPP and SPCD.

7) Ensure that no contractor employees, employees of subcontractors or suppliers, or other persons enter any part of the air operations area (AOA) from the construction site unless authorized.

8) The Contractor shall submit and receive approval of SPCD prior to issuance of Notice to Proceed.

CONSTRUCTION SEQUENCING

102-3.1 CONSTRUCTION SEQUENCE. The Contractor shall prepare a construction schedule and submit to the Construction Manager within 15 days from the date of award of the Contract.

MARKING AND LIGHTING

102-4.1 Proper marking and lighting of areas on the airfield associated with the construction shall be the responsibility of the Contractor and shall be described by the SPCD. This will include properly marking and lighting closed runways, taxiways, taxilanes, and aprons, the limits of construction, material storage areas, equipment storage areas, haul routes, parking areas and other areas defined as required for the Contractor's exclusive use. The Contractor shall erect and maintain around the perimeter of these areas suitable marking and warning devices visible for day and night use. Temporary barricades, flagging, and flashing warning lights shall be required at critical access points. The type and location of marking and warning devices will be approved by the Construction Manager.

Special emphasis shall be given to open trenches, excavations, heavy equipment marshalling areas, and stockpiled material located in the airport operations area, which shall be predominantly marked by the Contractor with flags and lighted by approved light units during hours of restricted visibility and darkness. All marking shall be in accordance with FAA Advisory Circular (AC) 150/5340-1, latest edition.

TRAFFIC CONTROL

102-5.1 VEHICLE IDENTIFICATION. The Contractor shall establish and maintain a list of Contractor and subcontractor vehicles authorized to operate on the site. Contractor employee vehicles shall be restricted to the Contractor’s staging area and are not allowed in the Airport Operations Area (AOA) at any time. To be authorized to operate on the airport, each Contractor or subcontractor’s vehicle shall:

a. be marked/flagged for high daytime visibility and lighted for nighttime operations. Vehicles that are not marked and/or lighted shall be escorted by a vehicle appropriately marked and/or lighted. Vehicles requiring escort shall be identified on the list.

b. be identified with the name and/or logo of the Contractor and be of sufficient size to be identified at a distance. Vehicles needing intermittent identification could be marked with tape or with commercially available magnetically attached markers. Vehicles that are not appropriately identified shall be escorted by a vehicle that conforms to this requirement. Vehicles requiring escort shall be identified on the list.

c. be operated in a manner that does not compromise the safety of either landside or airside airport operations. If, in the opinion of the Construction Manager, any vehicle is operated in a manner not fully consistent with this requirement, the Construction Manager has the right to restrict operation of the vehicle or prohibit its use on the airport.

102-5.2 ACCESS TO THE SITE OF CONSTRUCTION. The Contractor's access to the site shall be as shown on the Contract Layout Plan. No other access points shall be allowed unless approved by the Construction Manager. All Contractor traffic authorized to enter the site shall be experienced in the route or guided by Contractor personnel. The Contractor shall be responsible for traffic control to and from the various construction areas on the site, and for the operation and security of the access gate to the site. A Contractor's flagman or traffic control person shall monitor and coordinate all Contractor traffic at the access gate with Airport Security. The Contractor shall not permit any unauthorized construction personnel or traffic on the site. Access gates to the site shall be locked and secured at all times when not attended by the Contractor. If the Contractor chooses to leave any access gate open, it shall be attended by Contractor personnel who are familiar with the requirements of the Airport Security Program. The Contractor is responsible for the immediate cleanup of any debris deposited along the access route as a result of his construction traffic. Directional signing from the access gate along the delivery route to the storage area, plant site or work site shall be as directed by the Construction Manager. In addition, the following requirements are applicable:

a. All Contractor traffic authorized to travel on the airport shall have been briefed as part of the Contractor's construction safety and security orientation program, be thoroughly familiar with the access procedures and route for travel or be escorted by personnel authorized by the Contractor Safety and Security Officer (CSSO).

b. The Contractor shall install work site identification signs at the authorized access point(s). If, in the opinion of the Construction Manager, directional signs are needed for clarity, they shall be installed along the route authorized for access to each construction site.

c. Under no circumstance will Contractor personnel be permitted to drive their individually owned vehicles to any construction site on the airport. All vehicles must be parked in the area designated for employee parking and out of secured airport property.

d. In addition to the inspection and cleanup required at the end of each shift, the Contractor is responsible for the immediate cleanup of any debris generated along the construction site access route(s) as a result of construction related traffic or operations whether or not created by Contractor personnel.

102-5.3 MATERIAL SUPPLIERS. All material suppliers, subcontractors and visitors to the work site are obligated to follow the same safety and security operating procedures as the Contractor. All material suppliers shall make their deliveries using the same access points and routes as the Contractor and shall be advised of the appropriate delivery procedures at the time the materials order is placed. The Contractor shall not use the Airport address for any delivery but shall use the street address appropriate to the location of the entrance of the work site. If it is not practical to conform to the vehicle identification requirements of Section 102-5.1 and the safety and security operations program requirements of Section 102-2.2, the Contractor shall be prepared to escort all suppliers, subcontractors and visitors while they are on the airport.

102-5.4 PERSONNEL IDENTIFICATION. All employees, agents, vendors, invitees, etc. of the Contractor or subcontractors requiring access to the construction site shall, conform to the Security Program.

GENERAL SAFETY REQUIREMENTS

102-6.1 All Contractor vehicles that are authorized to operate on the airport outside of the designated construction area limits or haul routes as defined herein shall display in full view above the vehicle a flashing amber (yellow) dome-type light or a three-foot by three-foot, or larger, orange and white checkerboard flag, each checkerboard color being one-foot square. Vehicles must be under control of a Contractor mobile (two-way) radio operator (flagmen) monitoring the Airport frequency. Vehicle operators must be vigilant for conflict with any aircraft and give way to any operating aircraft.

All Contractor vehicles that are required to operate outside of the construction area limits as defined herein and cross active runways, taxiways, aprons, or runway approach clear zones shall do so under the direct control of a flagman who is monitoring the Airport frequency. Flagmen and two-way radios shall be furnished by the Contractor. Flagmen shall be instructed in the use of two-way radios prior to use. All aircraft traffic on runways, taxiways and aprons shall have priority over Contractor's traffic.

Construction vehicles not in use for extended periods during the work day, or during nights and weekends (nonwork periods) shall be parked away from active runways, taxiways, and aprons in designated vehicle marshalling areas.

102-6.2 In order to protect all aircraft traffic, aviation related businesses, terminal apron areas, etc. from potential damage caused by foreign object debris (FOD) generated by construction activities, the Contractor shall provide a vacuum truck as required at the startup of construction to daily vacuum all pavements affected by construction. The vacuum truck shall remain on-site for the duration of the project and shall be available at the discretion of the Owner to vacuum pavement areas adjacent to the construction areas to ensure no FOD is present on pavements within 500 feet of any construction area. Protecting the aircraft, airport tenants, users, public, etc. against FOD is a critical safety issue therefore the cost of the vacuum truck will be included in the cost established for this specification item.

CONSTRUCTION CONTROL

102-7.1 A primary and alternate responsible Contractor's representative shall be designated by the Contractor. The Contractor's representatives shall be available locally on a 24-hour basis. Names of the primary and alternate, including phone number, shall be made available to the Construction Manager by the Contractor. The Contractor shall insure that the names and phone numbers are kept current and made available to the Construction Manager.

CONSTRUCTION TECHNIQUES

102-8.1 Construction shall be planned and conducted throughout this project in such a manner as to allow the maintenance of completely safe airport operations. Every effort shall be made to reduce the impact of construction activity on overall airport operations. To this end the Contractor's activities shall be conducted in such a manner so as to preclude, except where absolutely required, open excavations, trenches, ditches and above ground obstacles such as booms on cranes or obstacle markers such as wooden saw horses. The primary responsibility for assuring that the safest possible construction techniques are followed rests with the Contractor Safety and Security Officer (CSSO).

METHOD OF MEASUREMENT

102-9.1 Based upon the contract lump sum price for “Safety and Security” partial payments will be allowed as follows:

a. A negotiated percentage based on documentable costs will be paid with the first pay request. The amount will be negotiated between the Owner, Contractor and Engineer prior to the first pay request.

b. Each subsequent pay request will include equal payments derived as follows: 100% less the negotiated initial payment divided by the total duration of the project in months.

c. The final equal installment will be paid after final inspection and delivery of all project close-out materials as outlined in the Contract Documents is complete.

The Owner reserves the right to adjust the above payment schedule if agreed to by the Owner, Contractor and Engineer. Should a payment adjustment occur, the remaining Safety and Security cost will be adjusted such that it is paid in equal installments spread over the remainder of the project duration.

The item of Safety and Security shall be measured as a lump sum item when required and furnished for the life of the Contract.

BASIS OF PAYMENT

102-10. Payment shall be made for airport safety and security measures for personnel or materials related to this specification item and incidentally required to satisfy the specified objective(s) under item X-102, Safety and Security. This compensation shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment shall be made under:

Item X-102-10.1	Safety and Security - per lump sum

In the event the contract completion date is extended or additional work is added to the project, no additional payment will be made for safety and security unless otherwise addressed by change order.

END OF SECTION X-102

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Item C-100 Contractor Quality Control Program (CQCP)

100-1 General. Quality is more than test results. Quality is the combination of proper materials, testing, workmanship, equipment, inspection, and documentation of the project. Establishing and maintaining a culture of quality is key to achieving a quality project. The Contractor shall establish, provide, and maintain an effective Contractor Quality Control Program (CQCP) that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified here and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The Contractor shall establish a CQCP that will:

a. Provide qualified personnel to develop and implement the CQCP.

b. Provide for the production of acceptable quality materials.

c. Provide sufficient information to assure that the specification requirements can be met.

d. Document the CQCP process.

The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the CQCP has been reviewed and approved by the Resident Project Representative (RPR). No partial payment will be made for materials subject to specific quality control (QC) requirements until the CQCP has been reviewed and approved.

The QC requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the quality assurance (QA) testing requirements. QA testing requirements are the responsibility of the RPR or Contractor as specified in the specifications.

A Quality Control (QC)/Quality Assurance (QA) workshop with the Engineer, Resident Project Representative (RPR), Contractor, subcontractors, testing laboratories, and Owner's representative must be held prior to start of construction. The QC/QA workshop will be facilitated by the Contractor. The Contractor shall coordinate with the Airport and the RPR on time and location of the QC/QA workshop. Items to be addressed, at a minimum, will include:

a. Review of the CQCP including submittals, QC Testing, Action & Suspension Limits for Production, Corrective Action Plans, Distribution of QC reports, and Control Charts.

b. Discussion of the QA program.

c. Discussion of the QC and QA Organization and authority including coordination and information exchange between QC and QA.

d. Establish regular meetings to discuss control of materials, methods and testing.

e. Establishment of the overall QC culture.

100-2 Description of program.

a. General description. The Contractor shall establish a CQCP to perform QC inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. The CQCP shall ensure conformance to applicable specifications and plans with respect to materials, off-site fabrication, workmanship, construction, finish, and functional performance. The CQCP shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of QC.

b. Contractor Quality Control Program (CQCP). The Contractor shall describe the CQCP in a written document that shall be reviewed and approved by the RPR prior to the start of any production, construction, or off-site fabrication. The written CQCP shall be submitted to the RPR for review and approval at least 10 calendar days before the CQCP Workshop. The Contractor's CQCP and QC testing laboratory must be approved in writing by the RPR prior to the Notice to Proceed (NTP).

The CQCP shall be organized to address, as a minimum, the following:

1. QC organization and resumes of key staff
2. Project progress schedule
3. Submittals schedule
4. Inspection requirements
5. QC testing plan
6. Documentation of QC activities and distribution of QC reports
7. Requirements for corrective action when QC and/or QA acceptance criteria are not met
8. Material quality and construction means and methods. Address all elements applicable to the project that affect the quality of the pavement structure including subgrade, subbase, base, and surface course. Some elements that must be addressed include, but is not limited to mix design, aggregate grading, stockpile management, mixing and transporting, placing and finishing, quality control testing and inspection, smoothness, laydown plan, equipment, and temperature management plan.

The Contractor must add any additional elements to the CQCP that is necessary to adequately control all production and/or construction processes required by this contract.

100-3 CQCP organization. The CQCP shall be implemented by the establishment of a QC organization. An organizational chart shall be developed to show all QC personnel, their authority, and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all QC staff by name and function, and shall indicate the total staff required to implement all elements of the CQCP, including inspection and testing for each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the CQCP, the personnel assigned shall be subject to the qualification requirements of paragraphs 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The QC organization shall, as a minimum, consist of the following personnel:

a. Program Administrator. The Contractor Quality Control Program Administrator (CQCPA) must be a full-time on-site employee of the Contractor, or a consultant engaged by the Contractor. The CQCPA must have a minimum of five (5) years of experience in QC pavement construction with prior QC experience on a project of comparable size and scope as the contract.

Included in the five (5) years of paving/QC experience, the CQCPA must meet at least one of the following requirements:

(1) Professional Engineer with one (1) year of airport paving experience.

(2) Engineer-in-training with two (2) years of airport paving experience.

(3) National Institute for Certification in Engineering Technologies (NICET) Civil Engineering Technology Level IV with three (3) years of airport paving experience.

(4) An individual with four (4) years of airport paving experience, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

The CQCPA must have full authority to institute any and all actions necessary for the successful implementation of the CQCP to ensure compliance with the contract plans and technical specifications. The CQCPA authority must include the ability to immediately stop production until materials and/or processes are in compliance with contract specifications. The CQCPA must report directly to a principal officer of the construction firm. The CQCPA may supervise the Quality Control Program on more than one project provided that person can be at the job site within two (2) hours after being notified of a problem.

b. QC technicians. A sufficient number of QC technicians necessary to adequately implement the CQCP must be provided. These personnel must be either Engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II in Civil Engineering Technology or higher, and shall have a minimum of two (2) years of experience in their area of expertise.

The QC technicians must report directly to the CQCPA and shall perform the following functions:

(1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by paragraph 100-6.

(2) Performance of all QC tests as required by the technical specifications and paragraph100-8.

(3) Performance of tests for the RPR when required by the technical specifications.

Certification at an equivalent level of qualification and experience by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

c. Staffing levels. The Contractor shall provide sufficient qualified QC personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The CQCP shall state where different technicians will be required for different work elements.

100-4 Project progress schedule. Critical QC activities must be shown on the project schedule ~~as required by Section 80, paragraph 80-03, *Execution and Progress*.~~

100-5 Submittals schedule. The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include as a minimum:

a. Specification item number

b. Item description

c. Description of submittal

d. Specification paragraph requiring submittal

e. Scheduled date of submittal

100-6 Inspection requirements. QC inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by paragraph 100-9.

Inspections shall be performed as needed to ensure continuing compliance with contract requirements until completion of the particular feature of work. Inspections shall include the following minimum requirements:

a. During plant operation for material production, QC test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The CQCP shall detail how these and other QC functions will be accomplished and used.

b. During field operations, QC test results and periodic inspections shall be used to ensure the quality of all materials and workmanship. All equipment used in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in

conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The CQCP shall document how these and other QC functions will be accomplished and used.

100-7 Contractor QC testing facility.

a. For projects that include Item P-401, Item P-403, and Item P-404, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM D3666, *Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials*:

- 8.1.3 Equipment Calibration and Checks;
- 8.1.9 Equipment Calibration, Standardization, and Check Records;
- 8.1.12 Test Methods and Procedures

b. For projects that include P-501, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM C1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation:

- 7 Test Methods and Procedures
- 8 Facilities, Equipment, and Supplemental Procedures

100-8 QC testing plan. As a part of the overall CQCP, the Contractor shall implement a QC testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional QC tests that the Contractor deems necessary to adequately control production and/or construction processes.

The QC testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

a. Specification item number (e.g., P-401)

b. Item description (e.g., Hot Mix Asphalt Pavements)

c. Test type (e.g., gradation, grade, asphalt content)

d. Test standard (e.g., ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)

e. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated)

f. Responsibility (e.g., plant technician)

g. Control requirements (e.g., target, permissible deviations)

The QC testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D3665. The RPR shall be provided the opportunity to witness QC sampling and testing.

All QC test results shall be documented by the Contractor as required by paragraph 100-9.

100-9 Documentation. The Contractor shall maintain current QC records of all inspections and tests performed. These records shall include factual evidence that the required QC inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the RPR daily. The records shall cover

all work placed subsequent to the previously furnished records and shall be verified and signed by the CQCPA.

Contractor QC records required for the contract shall include, but are not necessarily limited to, the following records:

a. Daily inspection reports. Each Contractor QC technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. These technician's daily reports shall provide factual evidence that continuous QC inspections have been performed and shall, as a minimum, include the following:

(1) Technical specification item number and description

(2) Compliance with approved submittals

(3) Proper storage of materials and equipment

(4) Proper operation of all equipment

(5) Adherence to plans and technical specifications

(6) Summary of any necessary corrective actions

(7) Safety inspection.

(8) Photographs and/or video

The daily inspection reports shall identify all QC inspections and QC tests conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible QC technician and the CQCPA. The RPR shall be provided at least one copy of each daily inspection report on the work day following the day of record. When QC inspection and test results are recorded and transmitted electronically, the results must be archived.

b. Daily test reports. The Contractor shall be responsible for establishing a system that will record all QC test results. Daily test reports shall document the following information:

(1) Technical specification item number and description

(2) Test designation

(3) Location

(4) Date of test

(5) Control requirements

(6) Test results

(7) Causes for rejection

(8) Recommended remedial actions

(9) Retests

Test results from each day's work period shall be submitted to the RPR prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical QC charts. When QC daily test results are recorded and transmitted electronically, the results must be archived.

100-10 Corrective action requirements. The CQCP shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the CQCP as a whole, and for individual items of work contained in the technical specifications.

The CQCP shall detail how the results of QC inspections and tests will be used for determining the need for corrective action and shall contain clear rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and use statistical QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

100-11 Inspection and/or observations by the RPR. All items of material and equipment are subject to inspection and/or observation by the RPR at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate QC system in conformance with the requirements detailed here and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to inspection and/or observation by the RPR at the site for the same purpose.

Inspection and/or observations by the RPR does not relieve the Contractor of performing QC inspections of either on-site or off-site Contractor's or subcontractor's work.

100-12 Noncompliance.

a. The Resident Project Representative (RPR) will provide written notice to the Contractor of any noncompliance with their CQCP. After receipt of such notice, the Contractor must take corrective action.

b. When QC activities do not comply with either the CQCP or the contract provisions or when the Contractor fails to properly operate and maintain an effective CQCP, and no effective corrective actions have been taken after notification of non-compliance, the RPR will recommend the Owner take the following actions:

(1) Order the Contractor to replace ineffective or unqualified QC personnel or subcontractors and/or

(2) Order the Contractor to stop operations until appropriate corrective actions are taken.

METHOD OF MEASUREMENT

100-13 Basis of measurement and payment. Contractor Quality Control Program (CQCP) is for the personnel, tests, facilities and documentation required to implement the CQCP. The CQCP will be paid as a lump sum with the following schedule of partial payments:

a. With first pay request, 25% with approval of CQCP and completion of the Quality Control (QC)/Quality Assurance (QA) workshop.

b. When 25% or more of the original contract is earned, an additional 25%.

c. When 50% or more of the original contract is earned, an additional 20%.

d. When 75% or more of the original contract is earned, an additional 20%

e. After final inspection and acceptance of project, the final 10%.

BASIS OF PAYMENT

100-14 Payment will be made under:

Item C-100-14.1 Contractor Quality Control Program (CQCP) – per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

National Institute for Certification in Engineering Technologies (NICET)

ASTM International (ASTM)

ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

END OF ITEM C-100

Item C-102 Temporary Air and Water Pollution, Soil Erosion, and Siltation Control

DESCRIPTION

102-1. This item shall consist of temporary control measures as shown on the plans or as ordered by the Resident Project Representative (RPR) during the life of a contract to control pollution of air and water, soil erosion, and siltation through the use of silt fences, berms, dikes, dams, sediment basins, fiber mats, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

Temporary erosion control shall be in accordance with the approved erosion control plan; the approved Construction Safety and Phasing Plan (CSPP) and AC 150/5370-2, *Operational Safety on Airports During Construction*. The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

Temporary control measures shall be designed, installed and maintained to minimize the creation of wildlife attractants that have the potential to attract hazardous wildlife on or near public-use airports.

MATERIALS

102-2.1 Grass. Grass that will not compete with the grasses sown later for permanent cover per Item T-901shall be a quick-growing species (such as ryegrass, Italian ryegrass, or cereal grasses) suitable to the area providing a temporary cover. Selected grass species shall not create a wildlife attractant.

102-2.2 Mulches. Mulches may be hay, straw, fiber mats, netting, bark, wood chips, or other suitable material reasonably clean and free of noxious weeds and deleterious materials per Item T-908. Mulches shall not create a wildlife attractant.

102-2.3 Fertilizer. Fertilizer shall be a standard commercial grade and shall conform to all federal and state regulations and to the standards of the Association of Official Agricultural Chemists.

102-2.4 Slope drains. Slope drains may be constructed of pipe, fiber mats, rubble, concrete, asphalt, or other materials that will adequately control erosion.

102-2.5 Silt fence. Silt fence shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life. Silt fence shall meet the requirements of ASTM D6461.

102-2.6 Other. All other materials shall meet commercial grade standards and shall be approved by the RPR before being incorporated into the project.

CONSTRUCTION REQUIREMENTS

102-3.1 General. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The RPR shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

102-3.2 Schedule. Prior to the start of construction, the Contractor shall submit schedules in accordance with the approved Construction Safety and Phasing Plan (CSPP) and the plans for accomplishment of temporary and permanent erosion control work for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the RPR.

102-3.3 Construction details. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the plans and approved CSPP. Except where future construction operations will damage slopes, the Contractor shall perform the permanent seeding and mulching and other specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion may be a problem, schedule and perform clearing and grubbing operations so that grading operations and permanent erosion control features can follow immediately if project conditions permit. Temporary erosion control measures are required if permanent measures cannot immediately follow grading operations. The RPR shall limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current with

the accepted schedule. If seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified as directed by the RPR.

The Contractor shall provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment as directed by the RPR. If temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or directed by the RPR, the work shall be performed by the Contractor and the cost shall be incidental to this item.

The RPR may increase or decrease the area of erodible earth material that can be exposed at any time based on an analysis of project conditions.

The erosion control features installed by the Contractor shall be maintained by the Contractor during the construction period.

Provide temporary structures whenever construction equipment must cross watercourses at frequent intervals. Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from concrete mixing operations, and other harmful materials shall not be discharged into any waterways, impoundments or into natural or manmade channels.

102-3.4 Installation, maintenance and removal of silt fence. Silt fences shall extend a minimum of 16 inches (41 cm) and a maximum of 34 inches (86 cm) above the ground surface. Posts shall be set no more than 10 feet (3 m) on center. Filter fabric shall be cut from a continuous roll to the length required minimizing joints where possible. When joints are necessary, the fabric shall be spliced at a support post with a minimum 12-inch (300-mm) overlap and securely sealed. A trench shall be excavated approximately 4 inches (100 mm) deep by 4 inches (100 mm) wide on the upslope side of the silt fence. The trench shall be backfilled and the soil compacted over the silt fence fabric. The Contractor shall remove and dispose of silt that accumulates during construction and prior to establishment of permanent erosion control. The fence shall be maintained in good working condition until permanent erosion control is established. Silt fence shall be removed upon approval of the RPR.

METHOD OF MEASUREMENT

102-4.1 Temporary erosion and pollution control work required will be performed as scheduled or directed by the RPR. Completed and accepted work will be measured as follows:

a. Rock construction entrances will be measured per each

b. Installation and removal of silt fence will be measured by the linear foot.

102-4.2 Control work performed for protection of construction areas outside the construction limits, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor.

BASIS OF PAYMENT

102-5.1 Accepted quantities of temporary water pollution, soil erosion, and siltation control work ordered by the RPR and measured as provided in paragraph 102-4.1 will be paid for under:

Item C-102-5.1a Silt Fence – per linear foot

Item C-102-5.1b Rock Construction Entrance- per each

Where other directed work falls within the specifications for a work item that has a contract price, the units of work shall be measured and paid for at the contract unit price bid for the various items.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5200-33 *Hazardous Wildlife Attractants on or Near Airports*

AC 150/5370-2 *Operational Safety on Airports During Construction*

ASTM International (ASTM)

ASTM D6461 *Standard Specification for Silt Fence Materials*

United States Department of Agriculture (USDA)

FAA/USDA Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM C-102

ITEM C-104 PROJECT STAKEOUT AND AS-BUILT SURVEY

DESCRIPTION

104-1.1 GENERAL. Under this item, the Contractor shall do all necessary surveying and project stakeout required to construct all elements of the Project as shown on the Contract Drawings and specified in the Specifications. This shall include but not be limited to stakeout, layout and elevations for excavations, embankments, pavements, structures, forms and appurtenances as shown and required, consistent with the current practices and shall be performed by a Commonwealth of Pennsylvania licensed professional land surveyor. The stakeout survey shall proceed immediately following the Notice to Proceed or as soon as authorized by the Construction Manager in accordance with the phasing of the construction and shall be expeditiously progressed to completion in a manner and at a rate satisfactory to the Construction Manager and/or Engineer. The Contractor shall keep the Construction Manager fully informed as to the progress of the stakeout survey.

All survey work shall be provided under the direction of a Commonwealth of Pennsylvania licensed professional land surveyor or approved equal.

104-1.2 SITE CONDITIONS. At least fifteen (15) working days prior to commencing construction operations in an area which may involve crossing existing underground utility facilities, the Contractor shall notify the RPR of each underground utility facility shown on the plans.

When coordinated through the RPR, the FAA will assist the Contractor in locating existing FAA cables, the Contractor shall provide marking paint, and flags or stakes for identification of existing underground systems.

The existence of any known buried wires, conduits, junction boxes, ducts, or other facilities is shown in a general way only. It will be the duty of the Contractor, to visit the site and make an exact determination of the existence and location of any facilities prior to commencing any work.

Immediately prior to the initiation of excavation, the Contractors shall engage the service of a utility locating service (via local “One Call” or similar services) and marking of utilities on-site. Periodic updates to the locating and marking shall be performed as required to maintain the locations or to expand the work area.

The Contractor will be responsible for making the exact determination of the location and condition of such facilities and any costs shall be paid for locating services by the Contractor if fees apply. In all areas where existing system are in close proximity (within 10’) to new installations, the Contractor shall soft dig (pothole/vacuum excavation/hand-dig) to identify the exact location of existing infrastructure. Contractor shall soft dig six (6) feet on either side of the marked obstruction (12’ total width) on 250’ intervals or at mid points between manholes/handholes. The contractor shall identify (locations and depth) and protect existing systems prior to the initiation of any new installation.

MATERIALS

104-2.1 All instruments, equipment, stakes and any other material necessary to perform the work satisfactorily shall be provided by the Contractor.

All stakes used shall be of a type approved by the Construction Manager. It shall be the Contractor’s responsibility to maintain these stakes in their proper position and location at all times.

CONSTRUCTION METHODS

The Contractor may obtain from the RPR, copies of contract drawings from previous construction projects, examine these drawings, and verify at the site the location of below grade utilities in the vicinity of work performed under this Contract.

104-3.1 DAMAGE TO EXISTING SYSTEMS. Should the Contractor come into contact with and/or damage existing underground system including but not limited to, sanitary sewers, drainage, gas, electrical utilities, airfield electrical system, FAA systems, aviation fuel, communications lines, domestic water, etc. the Contractor shall immediately stop work until the extent of the damage can be assessed. Any damage caused to any existing utilities by the Contractor shall be repaired to the satisfaction of the owner at no cost to the utility owner.

If damage has occurred, the Contractor shall coordinate repairs with the respective agency. Items damaged by the Contractor's workers or equipment or his subcontractors shall be repaired or replaced immediately at the Contractor's expense.

If FAA systems are damaged, the Contractor shall notify the FAA immediately. The Contractor shall purchase the specific materials required by the FAA to completely repair the damaged system. If the FAA deems the system "sensitive" the FAA may elect to perform the repair with internal FAA Tech Ops staff with the assistance of the Contractor's staff. The Contractor shall provide all required material to the FAA staff.

If the damage to existing system is extensive, the Contractor may be required to relocate crews to alternate work areas on site to allow productive project work while the repairs to the damaged system are being performed. If the relocation of work is required as the result of damage caused by the Contractor, the Contractor shall relocate to an alternate work site and shall be entitled to no compensation.

104-3.2 INTERRUPTIONS. Interruptions of existing drainage systems may be necessary during construction. The Contractor shall provide reliable connections to provide temporary continuity of flow during construction where required.

104-3.3 The Contractor shall trim trees, brush and other interfering objects, not inconsistent with the Contract Drawings, from survey lines in advance of all survey work to permit accurate and unimpeded work by his stakeout survey crews.

The exact position of all work shall be established from control points, baseline transit points or other points of similar nature which are shown on the Contract Drawings and/or modified by the Engineer. Prior to any layout of works to be constructed, the Contractor shall verify the location and accuracy of all control points provided in the plans. Any error, apparent discrepancy or absence in or of data shown or required for accurately accomplishing the stakeout survey shall be referred to the Construction Manager and Engineer for interpretation or furnishing when such is observed or required.

The Contractor shall, at a minimum, place two offset stakes or references at 100-foot intervals at each centerline station and at such intermediate locations as the Construction Manager may direct. From computations and measurements made by the Contractor, these stakes shall be clearly and legibly marked with the correct centerline station number, offset and cut or fill so as to permit the establishment of the exact centerline location and elevation during construction. If markings become faded or blurred for any reason, the markings shall be restored by the Contractor at the request of the Construction Manager. He shall locate and place all cut, fill, slope, fine grade or other stakes and points, as the engineer may direct, for the proper progress of the work. All control points shall be properly guarded and flagged for easy identification.

Drainage structures shall be staked out by the Contractor at the locations and elevations shown on the Contract Drawings or specified by the Engineer thru the Construction Manager.

Alignments for installation of visual barriers (i.e., orange safety fence) along the runway/taxiway safety and

object free areas shall be staked out by the Contractor at the locations shown on the Contract Drawings or as directed by the Construction Manager.

Reference points, baselines, stakes and benchmarks for stockpiles shall be established by the Contractor.

The Contractor shall be responsible for the accuracy of his work and shall maintain all reference points, stakes, etc., throughout the life of the Contract. Damaged or destroyed points, benchmarks or stakes, or any reference points made inaccessible by the progress of the construction, shall be replaced or transferred by the Contractor. Any of the above points which may be destroyed or damaged shall be transferred by the Contractor before they are damaged or destroyed. All control points shall be referenced by ties to acceptable objects and recorded. Any alterations or revisions in the ties shall be so noted and the information furnished to the Construction Manager immediately. All stakeout survey work shall be referenced to the centerlines shown on the Contract Drawings. All computations necessary to establish the exact position of the work from control points shall be made and preserved by the Contractor. All computations, survey notes and other records shall be made available to the Construction Manager and/or Engineer upon request and shall become the property of the Owner and delivered to the Construction Manager no later than the date of acceptance of the Contract.

The Contractor shall furnish, at his expense, all horizontal and vertical control, all staking and layout of construction work called for on the plans. The Construction Manager, Engineer and Owner shall not be responsible for such work. However, the Owner and Engineer reserve the right to check all said lines, grades, and measurements with their appointed surveyor. Should the Owner's surveyor detect errors in said lines, grades, and measurements, the contractor shall pay for all said surveying costs and subsequent surveying costs performed to verify correction of errors found in said lines, grades and measurements. Definition of an error shall be a discrepancy of ¼" or more. In the case of a discrepancy between the technical specifications and this defined tolerance, the more severe tolerance shall govern.

During the progress of the construction work, the Contractor will be required to furnish all of the surveying and stakeout incidental to the proper location by line and grade for each phase of the work. For paving and any other operation requiring extreme accuracy, the Contractor will re-stake with pins or other acceptable hubs located directly adjacent to the work at a spacing directed by the Construction Manager.

Any existing stakes, iron pins, survey monuments or other markers defining property lines which may be disturbed during construction shall be properly tied into fixed reference points before being disturbed and accurately reset in their proper position upon completion of the work.

Just prior to completion of the Contract, the Contractor shall reestablish, if necessary, and retie all control points as permanently as possible and to the satisfaction of the Construction Manager.

104-3.2 The Contractor shall be required to submit cross sectional data to the Engineer prior to the Contractor submittal of the monthly application for payment so that the Engineer can verify the quantities of various earthwork and materials volumes for payment. All cross sectional data provided at any time will be in AutoCAD V2016 or higher format only. No other formats will be accepted. If the data is submitted in another format other than AutoCAD, no earthwork or other materials volumes will be calculated and approved for payment. The earthwork shall include, but not be limited to, unclassified excavation, embankment, new or existing subbase courses, new or existing base courses, sand/asphalt subgrade, topsoil, etc.

104-3.3 AS-BUILT SURVEY. Upon completion of the work, after Substantial Completion and before Final Acceptance, the Contractor shall supply to the Construction Manager a complete as-built survey of the entire limits of the project, including repair limits. All survey points, including horizontal and vertical control, property corners, section corner and reference (hereinafter referred to as "survey point") shall be clearly marked and referenced prior to construction. These survey points must be sufficiently referenced so that they can be reestablished after construction if they are disturbed. All survey data shall be state plane coordinates, NAD 83 datum. Elevations shall be provided in NAVD 88 datum unless otherwise noted by the Construction Manager.

This as-built survey will be a complete physical features survey of the entire project site. If any work is done

outside the limits of construction for any reason, this limit of survey will be increased to include this area plus 10 feet. This survey shall be certified by a Pennsylvania Licensed Professional Land Surveyor as meeting the minimum Technical Standards for topographic surveys as set forth in Pennsylvania code. The survey data must be supplied as a signed and sealed drawing (11" x 17" maximum size) at a minimum scale of 1"=50' and be electronically submitted in AutoCAD V2016 or later on electronic media. Signed and sealed copies of all field notes, sketches and calculations must be submitted concurrently with the as-built survey. Larger scale details shall be provided to clarify any complicated or complex areas. A separate point database file shall be electronically submitted in TXT or ASCII format, with each point on a single row with comma delimited columns with data ordered as follows: point number, northing, easting, elevation, and description.

The as-built survey is to be supplied to the Construction Manager for review and approval not more than thirty (30) calendar days after substantial completion for the project has been given. If the acceptable as-built survey is not supplied within the required time, the Owner reserves the right to perform the required survey and bill the Contractor for this work.

METHOD OF MEASUREMENT

104-4.1 Payment will be made at the lump sum price bid for this item.

BASIS OF PAYMENT

104-5.1 Verification of existing underground utilities shall be paid for at the contract unit price for Project Survey and Stakeout. Prior the initiation of construction, the Contractor shall be responsible for the verification of existing conditions, including airfield drainage investigation. The Project Survey and Stakeout pay item shall be inclusive of all cost and efforts to locate, identify, trace, expose and protect the existing systems and cabling that are located with the area of work. This item also includes the preparation of a detailed report of the investigations depicting all the locations of existing utilities in the project area. The Contractor shall coordinate all locating efforts with the DOA & FAA, local utilities, and others deemed necessary. This pay item shall be inclusive of marking and staking of all existing conditions that impact or are potentially in conflict with the proposed installation. In all areas where existing system are in close proximity to new installations, the Contractor shall soft dig (Pothole) to identify the exact location of existing infrastructure or cabling on the intervals identified above. The Contractor shall identify locations and depth of these conditions prior to the initiation of any new installation. This price shall be full compensation for furnishing all materials, equipment, subcontracts, preparation of report and for all preparation, maintenance and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Seventy-five percent (75%) of this item will be paid based on the percentage of work paid for a month vs. the total project cost. The remaining twenty-five percent (25%) will be paid after the as-built survey has been given the Construction Manager and approved.

This item will not be increased or decreased based on changes to the total contract amount.

Payment will be made under:

Item C-104-5.1 Project Survey and Stakeout – per lump sum

In the event the contract completion date is extended or additional work is added to the project, no additional payment will be made for the survey and stakeout unless otherwise addressed by change order.

END OF SECTION C-104

Item C-105 Mobilization

105-1 Description. This item of work shall consist of, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

105-2 Mobilization limit. Mobilization shall be limited to 10 percent of the total project cost.

105-3 Posted notices. Prior to commencement of construction activities, the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster "Equal Employment Opportunity is the Law" in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL "Notice to All Employees" Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

105-4 Engineer/RPR field office. The Contractor shall provide dedicated space for the use of the field RPR and inspectors, as a field office for the duration of the project. This space shall be located conveniently near the construction and shall be separate from any space used by the Contractor. The Contractor shall furnish water, sanitary facilities, heat, air conditioning, and electricity in accordance with local building codes.

METHOD OF MEASUREMENT

105-5 Basis of measurement and payment. Based upon the contract lump sum price for "Mobilization" partial payments will be allowed as follows:

a. With first pay request, 25%.

b. When 25% or more of the original contract is earned, an additional 25%.

c. When 50% or more of the original contract is earned, an additional 40%.

d. After Final Inspection, Staging area clean-up and delivery of all Project Closeout materials ~~as required by Section 90, paragraph 90-11, *Contractor Final Project Documentation,*~~ the final 10%.

BASIS OF PAYMENT

105-6 Payment will be made under:

Item C-105-6.1 Mobilization – per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Office of Federal Contract Compliance Programs (OFCCP)

Executive Order 11246, as amended

EEOC-P/E-1 – Equal Employment Opportunity is the Law Poster

United States Department of Labor, Wage and Hour Division (WHD)

WH 1321 – Employee Rights under the Davis-Bacon Act Poster

END OF ITEM C-105

Item C-110 Method of Estimating Percentage of Material Within Specification Limits (PWL)

110-1 General. When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (X) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index, Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

It is the intent of this section to inform the Contractor that, in order to consistently offset the Contractor's risk for material evaluated, production quality (using population average and population standard deviation) must be maintained at the acceptable quality specified or higher. In all cases, it is the responsibility of the Contractor to produce at quality levels that will meet the specified acceptance criteria when sampled and tested at the frequencies specified.

110-2 Method for computing PWL. The computational sequence for computing PWL is as follows:

a. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.

b. Locate the random sampling position within the sublot in accordance with the requirements of the specification.

c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.

d. Find the sample average (X) for all sublot test values within the lot by using the following formula:

$$\mathbf{X = (x_1 + x_2 + x_3 + \ldots x_n) / n}$$

Where: X = Sample average of all sublot test values within a lot

$x_1, x_2, \ldots x_n$ = Individual sublot test values

n = Number of sublot test values

e. Find the sample standard deviation (S_n) by use of the following formula:

$$S_n = [(d_1^2 + d_2^2 + d_3^2 + \ldots d_n^2)/(n-1)]^{1/2}$$

Where: S_n = Sample standard deviation of the number of sublot test values in the set

$d_1, d_2, \ldots d_n$ = Deviations of the individual sublot test values $x_1, x_2, \ldots$ from the average value X

that is: $d_1 = (x_1 - X)$, $d_2 = (x_2 - X) \ldots d_n = (x_n - X)$

n = Number of sublot test values

f. For single sided specification limits (i.e., L only), compute the Lower Quality Index Q_L by use of the following formula:

$$Q_L = (X - L) / S_n$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L, using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

g. For double-sided specification limits (i.e., L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$$Q_L = (X - L) / S_n$$
and
$$Q_U = (U - X) / S_n$$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U, using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U. Determine the PWL by use of the following formula:

$$PWL = (P_U + P_L) - 100$$

Where: P_L = percent within lower specification limit

P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project

Test Item: Item P-401, Lot A.

A. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

A-1 = 96.60
A-2 = 97.55
A-3 = 99.30
A-4 = 98.35
n = 4

2. Calculate average density for the lot.

$X = (x_1 + x_2 + x_3 + \ldots x_n) / n$
$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$
X = 97.95% density

3. Calculate the standard deviation for the lot.

$S_n = [((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2)) / (4 - 1)]^{1/2}$
$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$
$S_n = 1.15$

4. Calculate the Lower Quality Index Q_L for the lot. (L=96.3)

$Q_L = (X - L) / S_n$
$Q_L = (97.95 - 96.30) / 1.15$
$Q_L = 1.4348$

5. Determine PWL by entering Table 1 with Q_L= 1.44 and n= 4.

PWL = 98

B. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

A-1 = 5.00
A-2 = 3.74
A-3 = 2.30
A-4 = 3.25

2. Calculate the average air voids for the lot.

$X = (x_1 + x_2 + x_3 \ldots n) / n$
$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$
X = 3.57%

3. Calculate the standard deviation S_n for the lot.

$S_n = [((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)]^{1/2}$
$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$
$S_n = 1.12$

4. Calculate the Lower Quality Index Q_L for the lot. (L= 2.0)

$Q_L = (X - L) / S_n$

$Q_L = (3.57 - 2.00) / 1.12$

$Q_L = 1.3992$

5. Determine P_L by entering Table 1 with $Q_L = 1.41$ and n = 4.

$P_L = 97$

6. Calculate the Upper Quality Index Q_U for the lot. (U= 5.0)

$Q_U = (U - X) / S_n$

$Q_U = (5.00 - 3.57) / 1.12$

$Q_U = 1.2702$

7. Determine P_U by entering Table 1 with $Q_U = 1.29$ and n = 4.

$P_U = 93$

8. Calculate Air Voids PWL

$PWL = (P_L + P_U) - 100$

$PWL = (97 + 93) - 100 = 90$

EXAMPLE OF OUTLIER CALCULATION (REFERENCE ASTM E178)

Project: Example Project

Test Item: Item P-401, Lot A.

A. Outlier Determination for Mat Density.

1. Density of four random cores taken from Lot A arranged in descending order.

A-3 = 99.30

A-4 = 98.35

A-2 = 97.55

A-1 = 96.60

2. From ASTM E178, Table 1, for n=4 an upper 5% significance level, the critical value for test criterion = 1.463.

3. Use average density, standard deviation, and test criterion value to evaluate density measurements.

a. For measurements greater than the average:

If (measurement - average)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-3, check if (99.30 - 97.95) / 1.15 is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

b. For measurements less than the average:

If (average - measurement)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-1, check if (97.95 - 96.60) / 1.15 is greater than 1.463.

Since 1.435 is less than 1.463, the value is not an outlier.

Note: In this example, a measurement would be considered an outlier if the density were:

Greater than (97.95 + 1.463 × 1.15) = 99.63%

OR

less than (97.95 - 1.463 × 1.15) = 96.27%.

Table 1. Table for Estimating Percent of Lot Within Limits (PWL)

Percent Within Limits (P_L and P_U)	Positive Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537
66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829

Percent Within Limits (P_L and P_U)	Positive Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Percent Within Limits (P_L and P_U)	Negative Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990
15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789

Percent Within Limits (P_L and P_U)	Negative Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
13	-1.0597	-1.1100	-1.1173	-1.1192	-1.1199	-1.1204	-1.1208	-1.1212
12	-1.0736	-1.1400	-1.1537	-1.1587	-1.1613	-1.1630	-1.1643	-1.1653
11	-1.0864	-1.1700	-1.1909	-1.1995	-1.2043	-1.2075	-1.2098	-1.2115
10	-1.0982	-1.2000	-1.2290	-1.2419	-1.2492	-1.2541	-1.2576	-1.2602
9	-1.1089	-1.2300	-1.2683	-1.2860	-1.2964	-1.3032	-1.3081	-1.3118
8	-1.1184	-1.2600	-1.3088	-1.3323	-1.3461	-1.3554	-1.3620	-1.3670
7	-1.1269	-1.2900	-1.3508	-1.3810	-1.3991	-1.4112	-1.4199	-1.4265
6	-1.1342	-1.3200	-1.3946	-1.4329	-1.4561	-1.4717	-1.4829	-1.4914
5	-1.1405	-1.3500	-1.4407	-1.4887	-1.5181	-1.5381	-1.5525	-1.5635
4	-1.1456	-1.3800	-1.4897	-1.5497	-1.5871	-1.6127	-1.6313	-1.6454
3	-1.1496	-1.4100	-1.5427	-1.6181	-1.6661	-1.6993	-1.7235	-1.7420
2	-1.1524	-1.4400	-1.6016	-1.6982	-1.7612	-1.8053	-1.8379	-1.8630
1	-1.1541	-1.4700	-1.6714	-1.8008	-1.8888	-1.9520	-1.9994	-2.0362

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM E178 Standard Practice for Dealing with Outlying Observations

END OF ITEM C-110

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Item P-101 Preparation/Removal of Existing Pavements

DESCRIPTION

101-1 This item shall consist of preparation of existing pavement surfaces for overlay, surface treatments, removal of existing pavement, and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable plans.

EQUIPMENT AND MATERIALS

101-2 All equipment and materials shall be specified here and in the following paragraphs or approved by the Resident Project Representative (RPR). The equipment shall not cause damage to the pavement to remain in place.

CONSTRUCTION

101-3.1 Removal of existing pavement.

The Contractor's removal operation shall be controlled to not damage adjacent pavement structure, and base material, cables, utility ducts, pipelines, or drainage structures which are to remain under the pavement.

No pavement removal shall be started until the work has been surveyed by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original survey are accurate or agree to any adjustments made to the original ground lines.

Prior to paving, the Contractor shall complete a survey the milled surface. The RPR will provide the design milled surface data and original field survey data, to the Contractor for the verification process. For the area beneath the existing EMAS blocks, existing survey data could not be obtained. The Contractor shall recognize that, due to the interpolation process, the actual ground surface at any particular location may differ somewhat from the interpolated surface shown on the design cross sections or obtained from the DTM's. The Contractor's verification of the original and milled surface, however, shall be limited to verification of available spot elevations as indicated herein, and no adjustments will be made to the ground surface unless the Contractor demonstrates that spot elevations shown are incorrect. For this purpose, spot elevations which are within 0.1 foot (30 mm) of the stated elevations for ground surfaces, or within 0.04 foot (12 mm) for hard surfaces (pavements, building, foundations, structures, etc.) shall be considered "no change." Only deviations in excess of these will be considered for adjustment of the available ground surface.

If the Contractor's verification identifies discrepancies in the existing surface data, the Contractor shall notify the RPR in writing at least one week before disturbance of existing grade/milling to allow sufficient time to verify the submitted information and make adjustments to the design cross sections or DTM's. Disturbance of existing grade in any area shall constitute acceptance by the Contractor of the accuracy of the original elevations shown on the topographic map for that area.

a. Concrete pavement removal. ~~Full depth saw cuts shall be made perpendicular to the slab surface. The Contractor shall saw through the full depth of the slab including any dowels at the joint, removing the pavement and installing new dowels as shown on the plans and per the specifications. Where the perimeter of the removal limits is not located on the joint and there are no dowels present, the~~

~~perimeter shall be saw cut the full depth of the pavement. The pavement inside the saw cut shall be removed by methods which will not cause distress in the pavement which is to remain in place.~~ The material shall be responsibly disposed of off Airport property. ~~If the material is to be wasted on the airport site, it shall be reduced to a maximum size of [ ]. Concrete slabs that are damaged by under breaking shall be repaired or removed and replaced as directed by the RPR.~~

The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Spall and underbreak repair shall be in accordance with the plans. Any underlaying material that is to remain in place, shall be recompacted and/or replaced as shown on the plans. Adjacent areas damaged during repair shall be repaired or replaced at the Contractor's expense.

b. Asphalt pavement removal. Asphalt pavement to be removed shall be saw cut to the full depth of the asphalt pavement around the perimeter of the area to be removed. The material shall be responsibly disposed of off Airport property. ~~If the material is to be [wasted on the airport site] [incorporated into embankment], it shall be [broken to a maximum size of [ ] inches (mm).] [meet the following gradation: [ ].~~

c. Repair or removal of Base, Subbase, and/or Subgrade. All failed material including surface, base course, subbase course, and subgrade shall be removed and repaired as shown on the plans or as directed by the RPR. Materials and methods of construction shall comply with the applicable sections of these specifications. Any damage caused by Contractor's removal process shall be repaired at the Contractor's expense.

101-3.2 Preparation of joints and cracks prior to overlay/surface treatment. Remove all vegetation and debris from cracks to a minimum depth of 1 inch (25 mm). If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the RPR. Fill all cracks greater than 1/4 inch (6 mm) wide) with a crack sealant per ASTM D6690. The crack sealant, preparation, and application shall be compatible with the surface treatment/overlay to be used. To minimize contamination of the asphalt with the crack sealant, underfill the crack sealant a minimum of 1/8 inch (3 mm), not to exceed ¼ inch (6 mm). Any excess joint or crack sealer shall be removed from the pavement surface.

~~Wider~~ Cracks ~~(over 1-1/2 inch wide (38 mm))~~, along with soft or sunken spots, indicate that the pavement or the pavement base should be repaired or replaced as stated below.

Cracks and joints may be filled with a mixture of emulsified asphalt and aggregate. The aggregate shall consist of limestone, volcanic ash, sand, or other material that will cure to form a hard substance. The combined gradation shall be as shown in the following table.

Gradation

Sieve Size	Percent Passing
No. 4 (4.75 mm)	100
No. 8 (2.36 mm)	90-100
No. 16 (1.18 mm)	65-90
No. 30 (600 µm)	40-60
No. 50 (300 µm)	25-42
No. 100 (150 µm)	15-30
No. 200 (75 µm)	10-20

Up to 3% cement can be added to accelerate the set time. The mixture shall not contain more than 20% natural sand without approval in writing from the RPR.

The proportions of asphalt emulsion and aggregate shall be determined in the field and may be varied to facilitate construction requirements. Normally, these proportions will be approximately one part asphalt emulsion to five parts aggregate by volume. The material shall be poured or placed into the joints or cracks and compacted to form a voidless mass. The joint or crack shall be filled to within +0 to -1/8 inches

(+0 to -3 mm) of the surface. Any material spilled outside the width of the joint shall be removed from the pavement surface prior to constructing the overlay. Where concrete overlays are to be constructed, only the excess joint material on the pavement surface and vegetation in the joints need to be removed.

101-3.3 Removal of Foreign Substances/contaminates prior to overlay or remarking. Removal of foreign substances/contaminates from existing pavement that will affect the bond of the new treatment shall consist of removal of rubber, fuel spills, oil, crack sealer, at least 90% of paint, and other foreign substances from the surface of the pavement. Areas that require removal are designated on the plans and as directed by the RPR in the field during construction.

High-pressure water or rotary grinding may be used. ~~If chemicals are used, they shall comply with the state's environmental protection regulations.~~ Removal methods used shall not cause major damage to the pavement, or to any structure or utility within or adjacent to the work area. Major damage is defined as changing the properties of the pavement, removal of asphalt causing the aggregate to ravel, or removing pavement over 1/8 inch (3 mm) deep. If it is deemed by the RPR that damage to the existing pavement is caused by operational error, such as permitting the application method to dwell in one location for too long, the Contractor shall repair the damaged area without compensation and as directed by the RPR.

Removal of foreign substances shall not proceed until approved by the RPR. Water used for high-pressure water equipment shall be provided by the Contractor at the Contractor's expense. No material shall be deposited on the pavement shoulders. All wastes shall be disposed of in areas indicated in this specification or shown on the plans.

101-3.4 Concrete spall or failed asphaltic concrete pavement repair.

a. Repair of concrete spalls in areas to be overlaid with asphalt. The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The perimeter of the repair shall be saw cut a minimum of 2 inches (50 mm) outside the affected area and 2 inches (50 mm) deep. The deteriorated material shall be removed to a depth where the existing material is firm or cannot be easily removed with a geologist pick. The removed area shall be filled with asphalt mixture with aggregate sized appropriately for the depth of the patch. The material shall be compacted with equipment approved by the RPR until the material is dense and no movement or marks are visible. The material shall not be placed in lifts over 4 inches (100 mm) in depth. This method of repair applies only to pavement to be overlaid.

b. Asphalt pavement repair. The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The failed areas shall be removed as specified in paragraph 101-3.1b. All failed material including surface, base course, subbase course, and subgrade shall be removed. Materials and methods of construction shall comply with the applicable sections of these specifications.

101-3.5 Cold milling. Milling shall be performed with a power-operated milling machine or grinder, capable of producing a uniform finished surface. The milling machine or grinder shall operate without tearing or gouging the underlaying surface. The milling machine or grinder shall be equipped with grade and slope controls, and a positive means of dust control. All millings shall be removed and disposed off Airport property. If the Contractor mills or grinds deeper or wider than the plans specify, the Contractor shall replace the material removed with new material at the Contractor's Expense.

a. Patching. The milling machine shall be capable of cutting a vertical edge without chipping or spalling the edges of the remaining pavement and it shall have a positive method of controlling the depth of cut. The RPR shall layout the area to be milled with a straightedge in increments of 1-foot (30 cm) widths. The area to be milled shall cover only the failed area. Any excessive area that is milled because the Contractor doesn't have the appropriate milling machine, or areas that are damaged because of his negligence, shall be repaired by the Contractor at the Contractor's Expense.

b. Profiling, grade correction, or surface correction. The milling machine shall have a minimum width of 7 feet and it shall be equipped with electronic grade control devices that will cut the surface to the grade specified. The tolerances shall be maintained within +0 inch and -1/4 inch (+0 mm and -6mm) of the specified grade. The machine must cut vertical edges and have a positive method of dust control. The machine must have the ability to remove the millings or cuttings from the pavement and load them into a truck. All millings shall be removed and disposed of off the airport.

c. Clean-up. The Contractor shall sweep the milled surface daily and immediately after the milling until all residual materials are removed from the pavement surface. Prior to paving, the Contractor shall wet down the milled pavement and thoroughly sweep and/or blow the surface to remove loose residual material. Waste materials shall be collected and removed from the pavement surface and adjacent areas by sweeping or vacuuming. Waste materials shall be removed and disposed off Airport property.

101-3.6. Preparation of asphalt pavement surfaces prior to surface treatment. Existing asphalt pavements to be treated with a surface treatment shall be prepared as follows:

a. Patch asphalt pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt pavement similar to that of the existing pavement in accordance with paragraph 101-3.4b.

b. Repair joints and cracks in accordance with paragraph 101-3.2.

c. Remove oil or grease that has not penetrated the asphalt pavement by scrubbing with a detergent and washing thoroughly with clean water. After cleaning, treat these areas with an oil spot primer.

d. Clean pavement surface immediately prior to placing the surface treatment so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film.

101-3.7 Maintenance. The Contractor shall perform all maintenance work necessary to keep the pavement in a satisfactory condition until the full section is complete and accepted by the RPR. The surface shall be kept clean and free from foreign material. The pavement shall be properly drained at all times. If cleaning is necessary or if the pavement becomes disturbed, any work repairs necessary shall be performed at the Contractor's expense.

101-3.8 Preparation of Joints in Rigid Pavement prior to resealing. Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the joint and does not damage the joint.

101-3.8.1 Removal of Existing Joint Sealant. All existing joint sealants will be removed by plowing or use of hand tools. Any remaining sealant and or debris will be removed by use of wire brushes or other tools as necessary. Resaw joints removing no more than 1/16 inch (2 mm) from each joint face. Immediately after sawing, flush out joint with water and other tools as necessary to completely remove the slurry.

101-3.8.2 Cleaning prior to sealing. Immediately before sealing, joints shall be cleaned by removing any remaining laitance and other foreign material. Allow sufficient time to dry out joints prior to sealing. Joint surfaces will be surface-dry prior to installation of sealant.

101-3.8.3 Joint sealant. Joint material and installation will be in accordance with Item P-605.

101-3.9 Preparation of Cracks in Flexible Pavement prior to sealing. Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the cracks and does not damage the pavement.

101-3.9.1 Preparation of Crack. Widen crack with router or random crack saw by removing a minimum of 1/16 inch (2 mm) from each side of crack. Immediately before sealing, cracks will be blown out with a hot air lance combined with oil and water-free compressed air.

101-3.9.2 Removal of Existing Crack Sealant. Existing sealants will be removed by routing or random crack saw. Following routing or sawing any remaining debris will be removed by use of a hot lance combined with oil and water-free compressed air.

101-3.9.3 Crack Sealant. Crack sealant material and installation will be in accordance with Paragraph 101-3.2 ~~Item P-605~~.

101-3.9.4 Removal of Pipe and other Buried Structures.

a. Removal of Existing Pipe Material. Remove the types of pipe as indicated on the plans. The pipe material shall be legally disposed of off-site in a timely manner following removal. Trenches shall be

backfilled with material equal to or better in quality than adjacent embankment. Trenches under paved areas must be compacted to 95% of ASTM D1557 or D698.

b. Removal of Inlets/Manholes. Not used.

~~**c.** Removal of **[ ]**.~~

METHOD OF MEASUREMENT

101-4.1 Pavement removal. The unit of measurement for pavement removal shall be the number of square yards (square meters) removed by the Contractor and shall include full depth removal of pavement and base, regardless of pavement depth variations in existing conditions. Any pavement removed outside the limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement or payment shall be made for saw cutting. Saw cutting shall be incidental to pavement removal. Dowel bar installation shall be incidental to pavement removal.

101-4.2 Joint and crack repair. No separate measurement will be made. The work covered by this section shall be considered a subsidiary obligation of the Contractor and covered under the other contract items. ~~The unit of measurement for joint and crack repair shall be the linear foot (meter) of joint.~~

101-4.3 Removal of Foreign Substances/contaminates. The unit of measurement for foreign Substances/contaminates removal shall be the square foot (meter).

101-4.4 Spalled and failed asphalt pavement repair. The unit of measure for failed asphalt pavement repair shall be square foot (square meter).

101-4.5 Concrete Spall Repair. The unit of measure for concrete spall repair shall be the number of square feet (square meter). The location and average depth of the patch shall be determined and agreed upon by the RPR and the Contractor.

101-4.6 Cold milling. The unit of measure for cold milling shall be **[ ]** ~~inches of milling~~ per square yard ~~(square meter)~~. The location and average depth of the cold milling shall be as shown on the plans. If the initial cut does not correct the condition, the Contractor shall re-mill the area and will be paid for the total depth of milling.

101-4.7 Removal of Pipe and other Buried Structures. No separate measurement for payment will be made. The work covered by this section shall be considered as a subsidiary obligation of the Contractor and covered under the other contract items.

BASIS OF PAYMENT

101-5.1 Payment. Payment shall be made at contract unit price for the unit of measurement as specified above. This price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

Item P-101-5.1a	Asphalt Access Road Removal (full depth) – per square yard
Item P-101-5.1b	Aggregate Access Road Removal (full depth) – per square yard
Item P-101-5.1c	Aggregate Access Road Trimming – per square yard
Item P-101-5.1d	Aggregate Base Material Removal (three-inch depth) – per square yard
Item P 101-5.2	Asphalt Crack Repair – per linear foot
Item P-101-5.4	Spalled and Failed Asphalt Pavement Repair (undistributed) - per square yard
Item P-101-5.6a	Cold Milling (2”) – per square yard

Item P-101-5.6b	Cold Milling (5”) – per square yard
Item P-101-5.7	Remove Existing EMAS Reflectors – per lump sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

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

ASTM International (ASTM)

ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

END OF ITEM P-101

Item P-152 Excavation, Subgrade, and Embankment

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

152-1.2 Classification. All material excavated shall be classified as defined below:

a. Unclassified excavation. Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature. Unclassified excavation shall become property of the contractor and disposed of off the site.

152-1.3 Unsuitable excavation. Unsuitable material shall become property of the contractor and disposed of off the site. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR.

CONSTRUCTION METHODS

152-2.1 General. The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified ~~per Section 70, paragraph 70-20.~~ At the direction of the RPR, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (100 mm), to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches (100 mm) in their greatest dimension will not be permitted in the top 6 inches (150 mm) of the subgrade.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

a. Blasting. Blasting shall not be allowed.

152-2.2 Excavation. No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

Digital terrain model (DTM) files of the existing surfaces, finished surfaces and other various surfaces were used to develop the design plans.

Volumetric quantities were calculated by comparing DTM files of the applicable design surfaces and generating Triangle Volume Reports. Electronic copies of DTM files and a paper copy of the original topographic map will be issued to the successful bidder.

Existing grades on the design cross sections or DTM's, where they do not match the locations of actual spot elevations shown on the topographic map, were developed by computer interpolation from those spot elevations. Prior to disturbing original grade, Contractor shall verify the accuracy of the existing ground surface by verifying spot elevations at the same locations where original field survey data was obtained as indicated on the topographic map. Contractor shall recognize that, due to the interpolation process, the actual ground surface at any particular location may differ somewhat from the interpolated surface shown on the design cross sections or obtained from the DTM's. Contractor's verification of original ground surface, however, shall be limited to verification of spot elevations as indicated herein, and no adjustments will be made to the original ground surface unless the Contractor demonstrates that spot elevations shown are incorrect. For this purpose, spot elevations which are within 0.1 foot (30 mm) of the stated elevations for ground surfaces, or within 0.04 foot (12 mm) for hard surfaces (pavements, buildings, foundations, structures, etc.) shall be considered "no change". Only deviations in excess of these will be considered for adjustment of the original ground surface. If Contractor's verification identifies discrepancies in the topographic map, Contractor shall notify the RPR in writing at least two weeks before disturbance of existing grade to allow sufficient time to verify the submitted information and make adjustments to the design cross sections or DTM's. Disturbance of existing grade in any area shall constitute acceptance by the Contractor of the accuracy of the original elevations shown on the topographic map for that area.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes **as** shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

a. Selective grading. When selective grading is indicated on the plans, the more suitable material designated by the RPR shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas until it can be placed. The more suitable material shall then be placed and compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches (300 mm) below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed off the airport. The cost is incidental to this item. This excavated material shall be paid for at the contract unit price per cubic yard (per cubic meter) for unclassified excavation. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans. Undercutting will be paid as unclassified excavation.

c. Over-break. Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the RPR. All over-break shall be graded or removed by the Contractor and disposed of as directed by the RPR. The RPR shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be

made for the removal and disposal of over-break that the RPR determines as avoidable. Unavoidable over-break will be classified as “Unclassified Excavation.”

d. Removal of utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet (60 cm) below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the RPR. All foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

152-2.3 Borrow excavation. There are no borrow sources within the boundaries of the airport property. The Contractor shall locate and obtain borrow sources, subject to the approval of the RPR. The Contractor shall notify the RPR at least 15 days prior to beginning the excavation so necessary measurements and tests can be made by the RPR. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.

152-2.4 Drainage excavation. Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches~~; or other types as shown on the plans~~. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as directed by the RPR. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

152-2.5 Preparation of cut areas or areas where existing pavement has been removed. In those areas on which a subbase or base course is to be placed, the top 12 inches (300 mm) of subgrade shall be compacted to not less than 100 % of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D1557. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

152-2.6 Preparation of embankment area. All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches (150 mm) and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches (300 mm) and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-2.7 Control Strip. Not required.

152-2.8 Formation of embankments. The material shall be constructed in lifts as established in the control strip, but not less than 6 inches (150 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

The lifts shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the RPR. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed

in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each lift shall be within ±2% of optimum moisture content before rolling to obtain the prescribed compaction. The material shall be moistened or aerated as necessary to achieve a uniform moisture content throughout the lift. Natural drying may be accelerated by blending in dry material or manipulation alone to increase the rate of evaporation.

The Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

The Contractor will take samples of excavated materials which will be used in embankment for testing and develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with D 1557. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the Contractor] for every 3,000 square yards of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the RPR.

If the material has greater than 30% retained on the 3/4-inch (19.0 mm) sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

Rolling operations shall be continued until the embankment is compacted to not less than 100% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D1557. Under all areas to be paved, the embankments shall be compacted to a depth of 12 inches and to a density of not less than 95 percent of the maximum density as determined by ASTM D1557. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches (100 mm) which shall be prepared for a seedbed in accordance with Item T-901.

The in-place field density shall be determined in accordance with ASTM 6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. The Contractor’s laboratory shall perform all density tests in the RPR’s presence and provide the test results upon completion to the RPR for acceptance. If the specified density is not attained, the area represented by the test or as designated by the RPR shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

Compaction areas shall be kept separate, and no lift shall be covered by another lift until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

When rock, concrete pavement, asphalt pavement, and other embankment material are excavated at approximately the same time as the subgrade, the material shall be incorporated into the outer portion of the embankment and the subgrade material shall be incorporated under the future paved areas. Stones, fragmentary rock, and recycled pavement larger than 4 inches (100 mm) in their greatest dimensions will not be allowed in the top 12 inches (300 mm) of the subgrade. Rockfill shall be brought up in lifts as specified or as directed by the RPR and the finer material shall be used to fill the voids forming a dense, compact mass. Rock, cement concrete pavement, asphalt pavement, and other embankment material shall not be disposed of except at places and in the manner designated on the plans or by the RPR.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in lifts of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in lifts not exceeding 2 feet (60 cm) in thickness. Each lift shall be leveled and smoothed with suitable equipment by distribution of spalls

and finer fragments of rock. The lift shall not be constructed above an elevation 4 feet (1.2 m) below the finished subgrade.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in lifts, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation, borrow, or other items.

152-2.9 Proof rolling. The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. After compaction is completed, the subgrade area shall be proof rolled with a 20 ton (18.1 metric ton) Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to 80 psi (0.551 MPa) in the presence of the RPR. Apply a minimum of 10% coverage, or as specified by the RPR, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch (25 mm) or show permanent deformation greater than 1 inch (25 mm) shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

152-2.10 Compaction requirements. The subgrade under areas to be paved shall be compacted to a depth of 12 inches (300 mm) and to a density of not less than 100 percent of the maximum dry density as determined by ASTM D1557. The subgrade in areas outside the limits of the pavement areas shall be compacted to a depth of 12 inches (300 mm) and to a density of not less than 95 percent of the maximum density as determined by ASTM D698.

The material to be compacted shall be within ±2% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, follow the methods in ASTM D1557. Tests for moisture content and compaction will be taken at a minimum of 3,000 S.Y. of subgrade. All quality assurance testing shall be done by the RPR.

The in-place field density shall be determined in accordance with ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the RPR and the finished subgrade shall be maintained.

152-2.11 Finishing and protection of subgrade. Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

152-2.12 Haul. All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

152-2.13 Surface Tolerances. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

a. Smoothness. The finished surface shall not vary more than +/- ½ inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +/- 0.05 feet (15 mm) of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to placed, grade shall not vary more than 0.10 feet (30 mm) from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-2.14 Topsoil. When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans and as required in Item T-905. Topsoil shall be paid for as provided in Item T-905. No direct payment will be made for topsoil under Item P-152.

METHOD OF MEASUREMENT

152-3.1 Measurement for payment specified by the cubic yard (cubic meter) shall be computed by the comparison of digital terrain model (DTM) surfaces for computation of neat line design quantities. The end area is that bound by the original ground line established by field cross-sections and the final theoretical pay line established by cross-sections shown on the plans, subject to verification by the RPR.

152-3.1 The quantity of unclassified excavation to be paid for shall be the number of cubic yards (cubic meters) measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed. No additional payment shall be made for topsoil storage and placement.

BASIS OF PAYMENT

152-4.1 Unclassified excavation payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-152-4.1 Unclassified Excavation - per cubic yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T-180	Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

ASTM International (ASTM)

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Advisory Circulars (AC)

AC 150/5370-2	Operational Safety on Airports During Construction Software

Software

FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation

FAA RD-76-66	Design and Construction of Airport Pavements on Expansive Soils

END OF ITEM P-152

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*Item P-209 Crushed Aggregate Base Course

*This specification has been edited to include VDOT criteria for materials and placement

DESCRIPTION

209-1.1 This item consists of a base course composed of crushed aggregate base constructed on a prepared course in accordance with these specifications and in conformity to the dimensions and typical cross-sections shown on the plans.

MATERIALS

209-2.1 Crushed aggregate base. Crushed aggregate base material will be designated as Type I or II as follows:

Type I shall consist of crushed stone, crushed slag, or crushed gravel, with or without soil mortar or other admixtures. Crushed gravel shall consist of particles of which at least 90 percent by weight of the material retained on the No. 10 sieve shall have at least one face fractured by artificial crushing.

Type II shall consist of gravel, stone, or slag screenings; fine aggregate and crushed coarse aggregate; sand-clay-gravel mixtures; or any combination of these materials; with or without soil mortar or other admixtures.

209-2.2 Requirements.

a. Grading. Grading shall conform to the requirements of the job-mix formula selected from within the design range specified in Table 1, subject to the applicable tolerances specified in Table 2 when tested to verify acceptance in accordance with VTM-25.

Table 1
Design Range for Dense-Graded Aggregates

Amounts Finer Than Each Laboratory Sieve (Square Openings[1]) (% by Weight)							
Sieve No.	**2 in**	**1 in**	**3/8 in**	**No. 10**	**No. 40**	**No. 200**	**ASTM D4791 Flat & Elongated 5:1**
21A	100	94-100	63-72	32-41	14-24	6-12	30% max.
~~21B~~	~~100~~	~~85-95~~	~~50-69~~	~~20-36~~	~~9-19~~	~~4-7~~	~~30% max.~~
~~22~~	~~--~~	~~100~~	~~62-78~~	~~39-56~~	~~23-32~~	~~8-12~~	~~30% max.~~

[1] In inches, except where otherwise indicated. Numbered sieves are those of the U.S. Standard Sieve Series.

Table 2
Process Tolerances for Each Laboratory Sieve (%)

No. Tests	Top Size	1 in	3/4 in	3/8 in	No. 10	No. 40	No. 200
1	0.0	±10.0	±14.0	±19.0	±14.0	±8.0	±4.0
2	0.0	±7.1	±10.0	±13.6	±10.0	±5.7	±2.9
3	0.0	±5.6	±7.8	±10.6	±7.8	±4.4	±2.2
4	0.0	±5.0	±7.0	±9.5	±7.0	±4.0	±2.0
8	0.0	±3.6	±5.0	±6.8	±5.0	±2.9	±1.4

b. Atterberg Limits. Atterberg limits shall conform to Table 3 when tested to verify acceptance in accordance with VTM-7.

Table 3
Atterberg Limits

Max. Liquid Limit		Max. Plasticity Index	
No. Tests	Subbase and Aggregate Base Type I and II	Subbase Sizes No. 21A, 22, and Aggregate Base Type II	Aggregate Base Type I and Subbase Size No. 19
1	25.0	6.0	3.0
2	23.9	5.4	2.4
3	23.2	5.1	2.1
4	23.0	5.0	2.0
8	22.4	4.7	1.7

c. Soundness. Soundness shall conform to the requirements of Table II-4 in VDOT 2020 Road and Bridge Specifications when tested to verify acceptance in accordance with AASHTO T103 or T104.

d. Abrasion Loss. Abrasion loss shall be not more than 45 percent when tested to verify acceptance in accordance with AASHTO T96.

e. Optimum Moisture. Material shall be produced at optimum moisture ±2 percentage points.

f. Flat and Elongated Particles. Subbase and aggregate base materials to be used as a temporary riding surface during construction activities or as the final riding surface after construction shall contain not more than 30 percent by mass of aggregate particles retained on and above the 3/8-inch sieve having a maximum to minimum dimensional ratio greater than 5 as determined in accordance with the testing requirements of ASTM D4791.

COMPOSITION

209-2.3 Job Mix Formula.

The Contractor shall submit, or shall have the source of supply submit a job-mix formula for each mixture for the Engineer's approval through the "Producer Lab Analysis and Information Detail" (PLAID) website https://plaid.vdot.virginia.gov prior to starting work. The formula shall be within the design range specified in Table 1. If unsatisfactory results or other conditions make it necessary, the Contractor shall prepare and submit a new job-mix formula for approval.

209-2.4 Mixing. Subbase or aggregate base materials shall be mixed in an approved central mixing plant of a pugmill or other mechanical type. Materials shall be blended prior to or during mechanical mixing in a manner that will ensure conformance to the specified requirements. Preparation of subbase and aggregate base material will be subject to Department inspection at the plant. The Contractor shall provide a laboratory as specified in Section 106.07 in VDOT 2020 Road and Bridge Specifications.

During the initial setup and subsequent production, the Contractor shall have a certified Central Mix Aggregate Technician present at the plant.

209-2.5 Sampling and Testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraph 209-2.1. This sampling and testing will be the basis for approval of the aggregate base quality requirements.

b. Gradation requirements. The Contractor shall take at least two aggregate base samples per day in the presence of the Resident Project Representative (RPR) to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 209-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

209-2.6 Separation Geotextile. Not used.

CONSTRUCTION METHODS

209-3.1 Control strip. ~~The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.~~

~~Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the RPR.~~

209-3.2 Preparing underlying subgrade and/or subbase. The underlying subgrade and/or subbase shall be checked and accepted by the RPR before base course placing and spreading operations begin. Re-proof rolling of the subgrade or proof rolling of the subbase in accordance with Item P-152, at the Contractor's expense, may be required by the RPR if the Contractor fails to ensure proper drainage or protect the subgrade and/or subbase. Any ruts or soft, yielding areas due to improper drainage conditions, hauling, or any other cause, shall be corrected before the base course is placed. To ensure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

209-3.3 Production. The aggregate shall be uniformly blended and, when at a satisfactory moisture content per paragraph 209-3.5, the approved material may be transported directly to the placement.

209-3.4 Placement. The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The base course shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications at the Contractor's expense.

209-3.5 Compaction. Immediately after completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least 100% of the maximum density of laboratory specimens prepared from samples of the base material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with ASTM D1557. The moisture content of the material during placing operations shall be within ±2 percentage points of the optimum moisture content as determined by ASTM D698. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

209-3.6 Weather limitations. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

209-3.7 Maintenance. The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at the Contractor's expense.

209-3.8 Surface tolerances. After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and recompacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

a. Smoothness. The finished surface shall not vary more than 3/8-inch (9 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +0 and -1/2 inch (12 mm) of the specified grade.

209-3.9 Acceptance sampling and testing. Crushed aggregate base course shall be accepted for density and thickness on an area basis. Two tests shall be made for density and thickness for each 1200 square yds (1000 m^2). Sampling locations will be determined on a random basis per ASTM D3665

a. Density. The Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance.

Each area shall be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens compacted and tested per ASTM D698. The in-place field density shall be determined per ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. If the specified density is not attained, the area represented by the failed

test must be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. Depth tests shall be made by test holes at least 3 inches (75 mm) in diameter that extend through the base. The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

MATERIAL ACCEPTANCE

209-4.1 Acceptance. The Contractor shall provide the quality assurance necessary for the Engineer to determine conformance to the required grading and Atterberg limits of subbase and aggregate base material.

Sampling and testing for determination of grading, moisture, and Atterberg limits shall be performed by the Contractor. The Contractor shall provide such test results within 48 hours of sampling to the Department through “the Producer Lab Analysis and Information Details” (PLAID) website https:// plaid.vdot.virginia.gov. The Contractor shall maintain appropriate current quality control charts. The Department will perform independent monitor tests at a laboratory of its choice. If there is a statistically significant difference between the two sets of results, an investigation will be made to determine the reason for the difference. If it is determined that the material does not conform to the requirements of the Contract, the material will be rejected.

Determination of gradation and Atterberg limits will be based on a mean of the results of tests performed on four samples taken in a stratified random manner from each lot. Lots of 2000 tons or 4000 tons may be used at the discretion of the Engineer when warranted by annual plant shipping quantity and past performance. Samples shall be obtained by methods approved by the Engineer. Any statistically acceptable method of randomization may be used to determine the time and location of the stratified random sample to be taken. The Department shall be advised of the method to be used prior to the beginning of production.

A lot will be considered acceptable for grading if the mean of the test results is within the deviation from the job-mix formula specified in Table 2.

A lot will be considered acceptable for Atterberg limits if the mean of the test results is less than the maximum for the liquid limit and plasticity index specified in Table 3.

If the liquid limit exceeds 30 or the plasticity index exceeds 6 for Type I base material or No. 19 subbase material; or the plasticity index exceeds 9 for Type II base material or subbase materials No. 20, 21, 21A, 21B, or 22 on any individual sample; that portion of the lot from which the sample was taken will be considered a separate part of the lot and the Contractor shall remove that portion from the roadway.

If either the amount of material in the lot is less than 2,000 tons (4,000 tons if applicable), the job-mix formula is modified within a lot, or the Engineer rejects a portion of the lot on the basis of individual test results, the mean test results of the samples taken will be compared to the job-mix formula with the tolerances given in Tables 2 and 3 for the number of tests performed.

If a visual examination by the Engineer reveals that material in any load is obviously contaminated or segregated, the Engineer will reject that load without additional sampling or testing of the lot. If it is necessary to determine grading or Atterberg limits of material in an individual load, one sample (taken from the load) will be tested and the results compared to the job-mix formula with the tolerances given in

Tables 2 and 3 for one test. Results obtained in the testing of a specific individual load will apply only to the load in question.

METHOD OF MEASUREMENT

209-5.1 The quantity of crushed aggregate base course will be determined by measurement of the number of cubic yards of material actually constructed and accepted by the RPR as complying with the plans and specifications. Base materials shall not be included in any other excavation quantities.

BASIS OF PAYMENT

209-6.1 Payment shall be made at the contract unit price per cubic yard for crushed aggregate base course. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-209-5.1	Crushed Aggregate Base Course – VDOT 21A - per cubic yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D3665	Standard Practice for Random Sampling of Construction Materials

ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D4643	Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D7928	Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

American Association of State Highway and Transportation Officials (AASHTO)

M288	Standard Specification for Geosynthetic Specification for Highway Applications
T96	Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
T103	Standard Method of Test for Soundness of Aggregates by Freezing and Thawing
T104	Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

Virginia Test Method (VTM)

VTM-7	Atterberg Limits – (Soils Lab)
VTM-25	Dry Preparation, and Mechanical Analysis of Soils, Select Material, Subbase, and Aggregate Bases- (Soils Lab)

END OF ITEM P-209

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*Item P-403 Asphalt Mix Pavement Intermediate and Surface Course

*This specification has been edited to include VDOT criteria for materials and placement

DESCRIPTION

403-1.1 This item shall consist of pavement courses composed of mineral aggregate and asphalt binder mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS

403-2.1 Aggregate. Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand and mineral filler, as required. The aggregates should have no known history of detrimental pavement staining due to ferrous sulfides, such as pyrite. Coarse aggregate is the material retained on the No. 4 (4.75 mm) sieve. Fine aggregate is the material passing the No. 4 (4.75 mm) sieve.

a. Coarse aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Coarse aggregate material shall meet VDOT Grade A requirements as identified in the table below.

Aggregate Material Requirements

	Coarse Aggregate Properties			**Fine Aggregate Properties**	
	Coarse Aggregate Angularity (CAA)				
Mix Type	1 Fractured Face	2 Fractured Faces	F&E % by Weight	SE	FAA
SM-12.5D	85% Min	80% Min	10% Max[1]	45% Min	45% Min
IM-19.0D	85% Min	80% Min	10% Max[1]	45% Min	45% Min
	Max LA Abrasion Loss				
	Magnesium Sulphate 100 Rev.	Freeze and Thaw, 500 Rev.			
Grade A	9	40			

	Deleterious Material				
	% by Weight	AASHTO Test Method		% by Weight	AASHTO Test Method
Coal and Lignite	0.25	T113		-	-
Clay Lumps	0.25	T112		0.25	T112
Material passing No. 200 sieve by washing	1.00[2]	T11		5.0[3]	T11 and T21
Shale, mica, coated grains, soft or flaky particles	-	-		1.0	T113
Organic Material	-	-		0.0	T21

NOTES

1. Flat and Elongated: 10 Percent measured at 5:1 on maximum to minimum dimension.

2. Coarse Deleterious: When the material passing the No. 200 sieve by washing is dust of fracture, the percentage of deleterious material may be increased to 1.50 percent.

3. Fine Deleterious: In the case of stone sand, if the material passing the No. 200 sieve is dust of fracture, essentially free from clay or shale, the percentages shown for use in concrete subject to abrasion and in other concrete may be increased to 5.0 percent and 7.0 percent, respectively.

b. Fine aggregate. Fine aggregate shall consist of clean, sound, tough, durable, angular shaped particles produced by crushing stone, slag, or gravel and shall be free from coatings of clay, silt, or other objectionable matter. Natural (non-manufactured) sand may be used to obtain the gradation of the aggregate blend or to improve the workability of the mix. Fine aggregate material requirements are listed in the table above Sharp-edged natural sand or sand prepared from stone, gravel, or combination thereof, complying with AASHTO M6. Soundness loss shall be a maximum of 15% per AASHTO T103 or 25% (for surface and intermediate courses). Fine aggregate angularity (FAA) shall be tested in accordance with AASHTO T 304 (Method A) and sand equivalent (SE) in accordance with AASHTO T 176.

c. Sampling. ASTM D75 shall be used in sampling coarse and fine aggregate, and ASTM C183 shall be used in sampling mineral filler.

403-2.2 Mineral filler. Mineral filler (baghouse fines) may be added in addition to material naturally present in the aggregate. Mineral filler shall meet the requirements of ASTM D242.

Mineral filler Requirements

Material Test	Requirement	Standard
Plasticity Index	4 maximum	ASTM D4318

403-2.3 Asphalt binder. Asphalt binder shall conform to ASTM D6373 Performance Grade (PG).

a. Mix SM-12.5D shall use a Performance Graded 64-22 bituminous cement conforming to the requirements of AASHTO Provisional Specification MP-1.

b. Mix IM-19.0D shall be use a Performance Graded 64-22 bituminous cement conforming to the requirements of AASHTO Provisional Specification MP-1.

A certificate of compliance from the manufacturer shall be included with the mix design submittal.

The supplier's certified test report with test data indicating grade certification for the asphalt binder shall be provided to the RPR for each load at the time of delivery to the mix plant. A certified test report with test data indicating grade certification for the asphalt binder shall also be provided to the RPR for any modification of the asphalt binder after delivery to the mix plant and before use in the HMA.

403-2.4 Anti-stripping agent. Any anti-stripping agent or additive (anti-strip) shall be heat stable and shall not change the asphalt binder grade beyond specifications. Anti-strip shall be an approved material of the Virginia Department of Transportation.

COMPOSITION

403-3.1 Composition of mixture. The asphalt plant mix shall be composed of a mixture of well-graded aggregate, filler and anti-strip agent if required, and asphalt binder. The several aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

403-3.2 Job mix formula (JMF) laboratory. The laboratory used to develop the JMF shall possess a current certificate of accreditation, listing D3666 from a national accrediting authority and all test methods required for developing the JMF, and listed on the accrediting authority's website. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the RPR prior to start of construction.

403-3.3 Job mix formula (JMF).

No hot-mixed asphalt (HMA) for payment shall be produced until a JMF has been approved in writing by the RPR.

a. Provide the indicated hot mix bituminous concrete mix indicated on the drawings and in Tables below

1. Aggregate gradation shall be tested in accordance with AASHTO T27.

ASPHALT CONCRETE MIXTURES –
DESIGN RANGE PERCENTAGE
By Weight Passing Square Mesh Sieves

Mix Type	1	3/4	1/2	3/8	No. 4	No. 8	No. 30	No. 200
SM-12.5D Surface Course		100	95-100	90 Max	58-80	34-50	23 Max	2-10
IM-19.0D Intermediate Course	100	90-100	90 Max	-	-	28-49		2-8

MIX DESIGN CRITERIA

	VTM (%)	VFA (%)	VFA (%) Production	Min. VMA	Fines	Number of Gyrations		
Mix Type	(Note 1)	Design	(Note 2)	(%)	(Note 3)	N Design		
SM-12.5D	2.0 – 5.0	73 – 79	68 – 84	15	0.7 – 1.3	50		
IM-19.0D	2.0 – 5.0	69-76	64-81	13	0.6 – 1.2	65		

Note 1: Asphalt content should be selected at the 4.0 percent Air Voids.

Note 2: During production of an approved job mix, the VFA shall be controlled within these limits.

Note 3: Fines-Asphalt Ratio is based on effective asphalt content.

b. The job-mix-formula (JMF) shall be submitted to the RPR for approval prior to construction of the test strip. In support of the JMF, the Contractor shall submit SUPERPAVE design test data for the following minimum list:

1. Aggregate sieve analysis.
2. Percent of aggregate component comprising the aggregate blend.
3. Aggregate gradation after stripping bituminous from the mix for sample preparation.
4. VTM, VMA, VFA, and F/A percentages.
5. Mix specific gravity to 3 decimal places.
6. Mix temperature for testing - 310°F to 320°F; compaction temperature for testing shall be 295°F to 300°F.
7. Field correction factor.
8. SUPERPAVE design data shall be plotted on graphs provided by the software of the test equipment manufacturer illustrating that the JMF requirements have been met.

c. The JMF shall establish a single percentage of aggregate passing each required sieve, a single percentage of asphalt material to be added to the aggregate, a temperature at which the mixture is to be produced, and a temperature at which the mixture is to be compacted for SUPERPAVE testing according to the requirements of AASHTO PP28-99. All formulas shall remain in effect until modified in writing by the RPR.

d. The Contractor shall have a VDOT certified Asphalt Mix Design Technician for designing and adjusting mixes as necessary. The Asphalt Mix Design Technician or Asphalt Plant Level II Technician may perform testing of asphalt mixes. The Asphalt Mix Design Technician shall be responsible for reviewing and approving the results of all testing. The Asphalt Mix Design Technician shall be available and have direct communication with the plant for making necessary adjustments in the asphalt concrete mixes at the mixing plant. The Asphalt Mix Design Technician and Asphalt Plant Level II Technician shall each be capable of conducting any tests necessary to put the plant into operation; however, the Asphalt Mix Design Technician shall be responsible for producing a mixture that complies with the requirements of these Specifications.

The mixture shall be designed and compacted at the N design gyrations specified in Table 3. For surface mixes, permeability test data shall be submitted in accordance with VTM 120 using either single point verification or the regression method for each surface mix having a different gradation. If the average of the permeability results from the single point verification method exceeds 150 x 10-5 cm/sec, or if the regression method predicts a permeability exceeding 150 x 10-5 cm/sec at 7.5% voids, the Contractor shall redesign the mixture to produce a permeability number less than 150 x 10-5 cm/sec.A minimum of one permeability samples will be taken and test run in the first lot, and every other lot thereafter, and results submitted to the RPR.

e. Type SM-12.5A asphalt concrete shall consist of crushed stone, crushed slag, or crushed gravel and fine aggregate, slag or stone screenings or a combination thereof combined with asphalt cement. No more than 5 percent of the aggregate retained on the No. 4 sieve and no more than 20 percent of the total aggregate may be polish susceptible.

f. The mixture shall produce a tensile strength ratio (TSR) value not less than 0.80 for the design and production tests. The TSR value shall be determined in accordance with AASHTO T283, including a freeze-thaw cycle, (4 inch specimens compacted with Marshall hammer or 3.5 x 6 inch specimens when compacted with a gyratory), except that the 16 hour curing time requirement and 72 to 96 hour storage period will be waived. Design tests shall use the same materials that are to be used in the production mix and shall be conducted in a VDOT approved laboratory.

403-3.4 Reclaimed Asphalt Pavement (RAP). Reclaimed asphalt pavement shall consist of reclaimed asphalt pavement (RAP), coarse aggregate, fine aggregate, mineral filler, and asphalt. Recycled asphalt shingles (RAS) shall not be allowed. The RAP shall be of a consistent gradation and asphalt content and properties. When RAP is fed into the plant, the maximum RAP chunk size shall not exceed 1-1/2 inches (38 mm). The reclaimed asphalt mix shall be designed using procedures contained in the Asphalt Institute MS-2 Mix Design Manual, 7th Edition. The percentage of asphalt in the RAP shall be established for the mixture design according to ASTM D2172 using the appropriate dust correction procedure. The JMF shall meet the requirements of paragraph 403-3.3. RAP should only be used for shoulder surface course mixes and for any intermediate courses. The use of RAP containing Coal Tar shall not be allowed. Coal Tar surface treatments must be removed prior to recycling underlying asphalt material. The amount of RAP shall be limited to **30** percent.

In addition to the requirements of paragraph 403-3.3, the JMF shall indicate the percent of reclaimed asphalt pavement and the percent and grade of new asphalt binder.

For the PG graded asphalt binder selected in paragraph 403-2.3, adjust as follows:

- **a.** For 0-20% RAP, there is no change in virgin asphalt binder content.
- **b.** For >20% to 30% RAP, select asphalt binder one grade softer, i.e., PG 64-22 would soften to PG 58-28.

403-3.5 Control strip. A control strip is not required.

CONSTRUCTION METHODS

403-4.1 Weather limitations. The asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the RPR, if requested; however, all other requirements including compaction shall be met.

Table 4. Surface Temperature Limitations of Underlying Course

Mat Thickness	Base Temperature (Minimum)	
	Degrees F	Degrees C
3 inches (7.5 cm) or greater	40	4
Greater than 2 inches (50 mm) but less than 3 inches (7.5 cm)	45	7

403-4.2 Asphalt plant. Plants used for the preparation of asphalt shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 including the following items:

a. Inspection of plant. The RPR, or RPR's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

b. Storage bins and surge bins. The asphalt mixture stored in storage and/or surge bins shall meet the same requirements as asphalt mixture loaded directly into trucks. Asphalt mixture shall not be stored in storage and/or surge bins for a period greater than twelve (12) hours. If the RPR determines there is an excessive heat loss, segregation or oxidation of the asphalt mixture due to temporary storage, temporary storage shall not be allowed.

403-4.3 Aggregate stockpile management. Aggregate stockpiles shall be constructed in such a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the concrete batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used.

A continuous supply of materials shall be provided to the work to ensure continuous placement.

403-4.4 Hauling equipment. Trucks used for hauling asphalt shall have tight, clean, and smooth metal beds. To prevent the asphalt from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the RPR. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

403-4.4.1 Material transfer vehicle (MTV). Material transfer Vehicles shall be required due to the improvement in smoothness and decrease in both physical and thermal segregation. To transfer the material from the hauling equipment to the paver, use a self-propelled, material transfer vehicle with a swing conveyor that can deliver material to the paver without making contact with the paver. The MTV shall be able to move back and forth between the hauling equipment and the paver providing material transfer to the paver, while allowing the paver to operate at a constant speed. The Material Transfer Vehicle will have remixing and storage capability to prevent physical and thermal segregation.

403-4.5 Asphalt pavers. Asphalt pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of asphalt that will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface. The asphalt paver shall be equipped with a control system capable of automatically maintaining the specified screed grade and elevation.

If the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued.

The paver shall be capable of paving to a minimum width specified in paragraph 401-4.11.

403-4.6 Rollers. The number, type, and weight of rollers shall be sufficient to compact the asphalt to the required density while it is still in a workable condition without crushing of the aggregate, depressions or other damage to the pavement surface. Rollers shall be in good condition, capable of operating at slow speeds to avoid displacement of the asphalt. All rollers shall be specifically designed and suitable for compacting asphalt concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used.

403-4.6.1 Density device. The Contractor shall have on site a density gauge during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall also supply a qualified technician during all paving operations to calibrate the density gauge and obtain accurate density readings for all new asphalt. These densities shall be supplied to the RPR upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

403-4.7 Preparation of asphalt binder. The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of the unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F (160°C) when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F (175°C) when added to the aggregate.

403-4.8 Preparation of mineral aggregate. The aggregate for the asphalt shall be heated and dried. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350°F (175°C) when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

403-4.9 Preparation of asphalt mixture. The aggregates and the asphalt binder shall be weighed or metered and introduced into the mixer in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all asphalt upon discharge shall not exceed 0.5%.

403-4.10 Application of Tack Coat. Immediately before placing the asphalt mixture, the underlying course shall be cleaned of all dust and debris.

A tack coat shall be applied in accordance with Item P-603 to all vertical and horizontal asphalt and concrete surfaces prior to placement of the first and each subsequent lift of asphalt mixture.

403-4.11 Laydown plan, transporting, placing, and finishing. Prior to the placement of the asphalt, the Contractor shall prepare a laydown plan with the sequence of paving lanes and width to minimize the number of cold joints; the location of any temporary ramps; laydown temperature; and estimated time of

completion for each portion of the work (milling, paving, rolling, cooling, etc.). The laydown plan and any modifications shall be approved by the RPR.

Deliveries shall be scheduled so that placing and compacting of asphalt is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to approximately ambient temperature. The Contractor, at their expense, shall be responsible for repair of any damage to the pavement caused by hauling operations.

Contractor shall survey each lift of asphalt surface course and certify to RPR that every lot of each lift meets the grade tolerances of paragraph 401-6.2e before the next lift can be placed.

Edges of existing asphalt pavement abutting the new work shall be saw cut and the cut off material and laitance removed. Apply a tack coat in accordance with P-603 before new asphalt material is placed against it.

The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Placement of the asphalt mix shall begin along the centerline of a crowned section or on the high side of areas with a one way slope unless shown otherwise on the laydown plan as accepted by the RPR. The asphalt mix shall be placed in consecutive adjacent lanes having a minimum width of **15** feet except where edge lanes require less width to complete the area. Additional screed sections attached to widen the paver to meet the minimum lane width requirements must include additional auger sections to move the asphalt mixture uniformly along the screed extension.

The surface course paving plan shall identify longitudinal hot joints full width of the defined taxiway in the daily allotted timeframe. The contractor shall set the paving lane widths in a manner to address existing grade breaks. The plan for multiple layers shall identify the lane widths, tonnage amounts per lane, cooling timeframes, and appropriate clean up.

The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot (30 cm); however, the joint in the surface top course shall be at the centerline of crowned pavements. Transverse joints in one course shall be offset by at least 10 feet (3 m) from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet (3 m).On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the asphalt may be spread and luted by hand tools.

The RPR may at any time, reject any batch of asphalt, on the truck or placed in the mat, which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or overheated asphalt mixture. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 401-3.3, Table 2 for the approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet (3 m) long. If an unusual amount of segregated or contaminated material is identified, all production paving shall be stopped until the cause can be identified and corrected. Removal of such areas may include the material produced within the lot.

403-4.12 Compaction of asphalt mixture. After placing, the asphalt mixture shall be thoroughly and uniformly compacted by self-propelled rollers. The surface shall be compacted as soon as possible when the asphalt has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot

mixture and be effective in compaction. Any surface defects and/or displacement occurring as a result of the roller, or from any other cause, shall be corrected at the Contractor's expense.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross-section, and the required field density is obtained. To prevent adhesion of the asphalt to the roller, the wheels shall be equipped with a scraper and kept moistened with water as necessary.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power tampers.

Any asphalt that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed**.**

403-4.13 Joints. The formation of all joints shall be made in such a manner as to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

The roller shall not pass over the unprotected end of the freshly laid asphalt except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be coated with an asphalt tack coat before placing any fresh asphalt against the joint.

Longitudinal joints which are have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F (80°C); or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches (75 mm) to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. An asphalt tack coat or other product approved by the RPR shall be applied to the clean, dry joint prior to placing any additional fresh asphalt against the joint. The cost of this work shall be considered incidental to the cost of the asphalt.

403-4.14 Saw-cut grooving. Saw-cut grooves shall be provided as specified in Item P-621.

403-4.15 Diamond grinding. Diamond grinding shall be completed prior to pavement grooving. Diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive.

Diamond grinding shall be performed with a machine designed specifically for diamond grinding capable of cutting a path at least 3 feet (0.9 m) wide. The saw blades shall be 1/8-inch (3-mm) wide with a minimum of 55 to 60 blades per 12 inches (300 mm) of cutting head width; grooves between 0.090 and 0.130 inches (2 and 3.5 mm) wide; and peaks and ridges approximately 1/32 inch (1 mm) higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that causes ravels, aggregate fractures, spalls or disturbance to the pavement will not be permitted.

Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. The Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

403-4.16 Nighttime Paving Requirements. The Contractor shall provide adequate lighting during any nighttime construction. A lighting plan shall be submitted by the Contractor and approved by the RPR prior to the start of any nighttime work. All work shall be in accordance with the approved CSPP and lighting plan.

CONTRACTOR QUALITY CONTROL (CQC)

403-5.1 General. The Contractor shall develop a CQCP in accordance with Item C-100. No partial payment will be made for materials that are subject to specific QC requirements without an approved CQCP.

403-5.2 Contractor quality control (QC) facilities. The Contractor shall provide or contract for testing facilities in accordance with Item C-100. The RPR shall be permitted unrestricted access to inspect the Contractor's QC facilities and witness QC activities. The RPR will advise the Contractor in writing of any noted deficiencies concerning the QC facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

403-5.3 Quality Control (QC) testing. The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved CQCP. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A QC Testing Plan shall be developed as part of the CQCP**.**

a. Asphalt content. A minimum of two tests shall be performed per day in accordance with ASTM D6307 or ASTM D2172 for determination of asphalt content. When using ASTM D6307, the correction factor shall be determined as part of the first test performed at the beginning of plant production; and as part of every tenth test performed thereafter. The asphalt content for the day will be determined by averaging the test results.

b. Gradation. Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of extracted aggregate in accordance with ASTM D5444 and ASTM C136, and ASTM C117.

c. Moisture content of aggregate. The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C566.

d. Moisture content of asphalt. The moisture content of the asphalt shall be determined once per lot in accordance with AASHTO T329 or ASTM D1461.

e. Temperatures. Temperatures shall be checked, at least four times per lot, at necessary locations to determine the temperatures of the dryer, the asphalt 64-22 in the storage tank, the asphalt at the plant, and the asphalt at the job site.

f. In-place density monitoring. The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D2950.

g. Smoothness for Contractor Quality Control.

The Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than ¼ inch in 12 feet, identifying areas that may pond water which could lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues

The Contractor may use a 12-foot (3.7 m) "straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot (3.7m) straightedge approved by the RPR. Straight-edge testing shall start with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Testing shall be continuous across all joints. The surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement

surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between the two high points. If the rolling inclinometer or external reference device is used, the data may be evaluated using the FAA profile program, ProFAA, using the 12-foot straightedge simulation function.

Smoothness readings shall not be made across grade changes or cross slope transitions. The transition between new and existing pavement shall be evaluated separately for conformance with the plans.

(1) Transverse measurements. Transverse measurements shall be taken for each day's production placed. Transverse measurements will be taken perpendicular to the pavement centerline each 50 feet (15 m) or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

(2) Longitudinal measurements. Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests will be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet (6 m); and at the third points of paving lanes when widths of paving lanes are 20 ft (6 m) or greater.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch (6 mm) shall be corrected with diamond grinding per paragraph 403-4.15 or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 401-6.1d(3) Areas that have been ground shall be sealed with a surface treatment in accordance with Item P-608. To avoid the surface treatment creating any conflict with runway or taxiway markings, it may be necessary to seal a larger area.

Control charts shall be kept to show area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or methods produce significant areas that need corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

h. Grade. Grade shall be evaluated daily to allow adjustments to paving operations when grade measurements do not meet specifications. As a minimum, grade shall be evaluated prior to the placement of the first lift and then prior to and after placement of the surface lift.

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch (12 mm) vertically. The documentation will be provided by the Contractor to the RPR by the end of the following working day.

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch (12 mm) less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 403-4.15.

The Contractor shall repair low areas or areas that cannot be corrected by grinding by removal of deficient areas to the depth of the final course plus ½ inch and replacing with new material. Skin patching is not allowed.

403-5.4 Sampling. When directed by the RPR, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified. Samples shall be cut with a core drilling machine, portable saws shall not be an acceptable method of sampling material.

403-5.5 Control charts. The Contractor shall maintain linear control charts both for individual measurements and range (i.e., difference between highest and lowest measurements) for aggregate gradation, asphalt content, and VMA. The VMA for each day shall be calculated and monitored by the QC laboratory.

Control charts shall be posted in a location satisfactory to the RPR and kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the RPR may suspend production or acceptance of the material.

a. Individual measurements. Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation, asphalt content, and VMA. The control charts shall use the JMF target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

Control Chart Limits for Individual Measurements

Sieve	Action Limit	Suspension Limit
3/4 inch (19.0 mm)	±6%	±9%
1/2 inch (12.5 mm)	±6%	±9%
3/8 inch (9.5 mm)	±6%	±9%
No. 4 (4.75 mm)	±6%	±9%
No. 16 (1.18 mm)	±5%	±7.5%
No. 50 (300 µm)	±3%	±4.5%
No. 200 (75 µm)	±2%	±3%
Asphalt Content	±0.45%	±0.70%
Minimum VMA	-0.5%	-1.0%

b. Range. Control charts for range shall be established to control process variability for the test parameters and Suspension Limits listed below. The range shall be computed for each lot as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of n = 2. Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for n = 3 and by 1.27 for n = 4.

Control Chart Limits Based on Range
(n = 2)

Sieve	Suspension Limit
1/2 inch (12.5 mm)	11%
3/8 inch (9.5 mm)	11%
No. 4 (4.75 mm)	11%
No. 16 (1.18 mm)	9%
No. 50 (300 µm)	6%
No. 200 (75 µm)	3.5%
Asphalt Content	0.8%

c. Corrective action. The CQCP shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain sets of rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

(1) One point falls outside the Suspension Limit line for individual measurements or range; or

(2) Two points in a row fall outside the Action Limit line for individual measurements.

403-5.6 Quality control (QC) reports. The Contractor shall maintain records and shall submit reports of QC activities daily, in accordance with the CQCP described in Item C-100.

MATERIAL ACCEPTANCE

403-6.1. Quality Assurance Acceptance sampling and testing. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the RPR at no cost to the Contractor except that coring as required in this section shall be completed and paid for by the Contractor.

a. Quality Assurance (QA) testing laboratory. The QA testing laboratory performing these acceptance tests will be accredited in accordance with ASTM D3666. The QA laboratory accreditation will be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing will be listed on the lab accreditation.

b. Lot Size. A standard lot will be equal to one day's production divided into approximately equal sublots of between 400 to 600 tons. When only one or two sublots are produced in a day's production, the sublots will be combined with the production lot from the previous or next day.

Where more than one plant is simultaneously producing asphalt for the job, the lot sizes will apply separately for each plant.

c. Asphalt air voids. Plant-produced asphalt will be tested for air voids on a sublot basis.

(1) Sampling. Material from each sublot shall be sampled in accordance with ASTM D3665. Samples shall be taken from material deposited into trucks at the plant or at the job site in accordance with ASTM D979. The sample of asphalt may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to maintain the material at or above the compaction temperature as specified in the JMF.

set of compacted specimens prepared in accordance with ASTM D6925.

d. In-place asphalt mat and joint density. Each sublot will be tested for in-place mat and joint density as a percentage of the theoretical maximum density (TMD).

(1) Sampling. The Contractorwill cut minimum 5 inches (125 mm) diameter samples in accordance with ASTM D5361. The Contractor shall furnish all tools, labor, and materials for cleaning, and filling the cored pavement. Laitance produced by the coring operation shall be removed immediately after coring, and core holes shall be filled within one day after sampling in a manner acceptable to the RPR.

(2) Bond. Each lift of asphalt shall be bonded to the underlying layer. If cores reveal that the surface is not bonded, additional cores shall be taken as directed by the RPR to determine the extent of unbonded areas. Unbonded areas shall be removed by milling and replaced at no additional cost as directed by the RPR.

(3) Thickness. Thickness of each lift of surface course will be evaluated by the RPR for compliance to the requirements shown on the plans after any necessary corrections for grade. Measurements of thickness will be made using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point will not be more than 1/4 inch (6 mm) less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, will not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or sublot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the RPR to circumscribe the deficient area.

(4) Mat density. One core shall be taken from each sublot. Core locations will be determined by the RPR in accordance with ASTM D3665. Cores for mat density shall not be taken closer than one foot (30 cm) from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the TMD for that sublot.

(5) Joint density. One core centered over the longitudinal joint shall be taken for each sublot which contains a longitudinal joint. Core locations will be determined by the RPR in accordance with ASTM D3665. The bulk specific gravity of each core sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each joint density sample by the average TMD for the lot. The TMD used to determine the joint density at joints formed between lots will be the lower of the average TMD values from the adjacent lots.

403-6.2 Acceptance criteria.

a. General. Acceptance will be based on the implementation of the Contractor Quality Control Program (CQCP) and the following characteristics of the asphalt and completed pavements: air voids, mat density, joint density, grade and Profilograph smoothness

b. Air voids. Acceptance of each lot of plant produced material for air voids shall be based on the limits identified in Section 403-3.3 for each sublot of material produced. If any sublot fails to fall within the identified limits, the lot shall be removed and replaced at the Contractor's expense.

c. Mat density. Acceptance of each lot of plant produced material for mat density will be based on the average of all of the densities taken from the sublots. If the average mat density of the lot so established equals or exceeds 94%, the lot will be acceptable. If the average mat density of the lot is below 94%, the lot shall be removed and replaced at the Contractor's expense.

d. Joint density. Acceptance of each lot of plant produced asphalt for joint density will be based on the average of all of the joint densities taken from the sublots. If the average joint density of the lot so established equals or exceeds 92%, the lot will be acceptable. If the average joint density of the lot is less than 92%, the Contractor shall stop production and evaluate the method of compacting joints. Production may resume once the reason for poor compaction has been determined and appropriate measures have been taken to ensure proper compaction.

e. Grade. The final finished surface of the pavement of the completed project shall be surveyed to verify that the grade elevations and cross-sections shown on the plans do not deviate more than 1/2 inch (12 mm) vertically.

Cross-sections of the pavement shall be taken at a minimum 50-foot (15-m)longitudinal spacing and at all longitudinal grade breaks. Minimum cross-section grade points shall include grade at centerline, ± 10 feet of centerline, and edge of runway ortaxiway pavement.

The survey and documentation shall be stamped and signed by a licensed surveyor. Payment for sublots that do not meet grade for over 25% of the sublot shall not be more than 95%.

f. Profilograph roughness for QA Acceptance. The final profilograph of the taxiway shall be the full length of the P-403 portion of the project to facilitate testing of roughness between lots. The Contractor, in the presence of the RPR shall perform a profilograph roughness test on the completed project with a profilograph meeting the requirements of ASTM E1274 or a Class I inertial profiler meeting ASTM E950. Data and results shall be provided within 48 hrs of profilograph roughness tests.

The pavement shall have an average profile index less than 15 inches per mile per 1/10 mile. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate "must grind" bumps and the Profile Index for the pavement using a 0.2-inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an offset of 0.4 inches (10 mm). The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). Profilograph shall be performed one foot right and left of project centerline and 15 feet (4.5 m) right and left of project centerline. Any areas that indicate "must grind" shall be corrected with diamond grinding per paragraph 401-4.15 or by removing and replacing full depth of surface course. as directed by the RPR. Where corrections are necessary, a second profilograph run shall be performed to verify that the corrections produced an average profile index of 15 inches per mile per 1/10 mile or less.

403-6.3 Resampling Pavement for Mat Density.

a. General. Resampling of a lot of pavement will only be allowed for mat density and then, only if the Contractor requests same in writing, within 48 hours after receiving the written test results from the RPR. A retest will consist of all the sampling and testing procedures contained in paragraphs 403-6.1. Only one resampling per lot will be permitted.

(1) A redefined mat density will be calculated for the resampled lot. The number of tests used to calculate the redefined mat density will include the initial tests made for that lot plus the retests.

(2) The cost for resampling and retesting shall be borne by the Contractor.

b. Payment for resampled lots. The redefined mat density for a resampled lot will be used to evaluate the acceptance of that lot in accordance with paragraph 403-6.2.

c. Outliers. Check for outliers in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded and density determined using the remaining test values.

METHOD OF MEASUREMENT

403-7.1 Measurement. Plant mix asphalt mix pavement shall be measured by the number of tons (kg) of asphalt pavement used in the accepted work. Recorded batch weights or truck scale weights will be used to determine the basis for the tonnage.

BASIS OF PAYMENT

403-8.1 Payment. Payment for a lot of asphalt mixture meeting all acceptance criteria as specified in paragraph 403-6.2 shall be made at the contract unit price per ton (kg) for asphalt. The price shall be

compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-403-8.1	SM-12.5D Variable Depth Asphalt Surface Course - per ton
Item P-403-8.2	IM-19.0D Bituminous Intermediate Course – per ton

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C183	Standard Practice for Sampling and the Amount of Testing of Hydraulic Cement
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D242	Standard Specification for Mineral Filler for Bituminous Paving Mixtures
ASTM D946	Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D979	Standard Practice for Sampling Bituminous Paving Mixtures
ASTM D1073	Standard Specification for Fine Aggregate for Bituminous Paving Mixtures
ASTM D1074	Standard Test Method for Compressive Strength of Bituminous Mixtures
ASTM D1461	Standard Test Method for Moisture or Volatile Distillates in Bituminous Paving Mixtures

ASTM D2041	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D2172	Standard Test Method for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2489	Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D2726	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3203	Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D3381	Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4125	Standard Test Methods for Asphalt Content of Bituminous mixtures by the Nuclear Method
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4552	Standard Practice for Classifying Hot-Mix Recycling Agents
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D4867	Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D5444	Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
ASTM D5581	Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (6 inch-Diameter Specimen)
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6307	Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method
ASTM D6373	Standard Specification for Performance Graded Asphalt Binder
ASTM D6752	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method

ASTM D6925	Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor
ASTM D6927	Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures
ASTM D6995	Standard Test Method for Determining Field VMA based on the Maximum Specific Gravity of the Mix (Gmm)
ASTM E11	Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
ASTM E178	Standard Practice for Dealing with Outlying Observations
ASTM E2133	Standard Test Method for Using a Rolling Inclinometer to Measure Longitudinal and Transverse Profiles of a Traveled Surface

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M156	Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
AASHTO T329	Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method
AASHTO T 340	Standard Method of Test for Determining the Rutting Susceptibility of Hot Mix Asphalt (APA) Using the Asphalt Pavement Analyzer (APA)

Asphalt Institute (AI)

MS-2	Mix Design Manual, 7th Edition
MS-26	Asphalt Binder Handbook AI State Binder Specification Database

FAA Orders

5300.1	Modifications to Agency Airport Design, Construction, and Equipment Standards

Federal Highway Administration (FHWA)

Long Term Pavement Performance Binder program

Software

FAARFIELD

END OF ITEM P-403

ITEM P-555
ROANOKE-BLACKSBURG RUNWAY 34 DEPARTURE END EMAS BED INSTALLATION

EMAS BED AND ANCHOR BEAM INSTALLATION DESCRIPTION

555-1.0 This item shall consist of the installation, of an Engineered Material Arresting System (EMAS) at the Departure End of Runway 34 in accordance with these specifications, manufacturer's requirements, and the contract drawings, at the locations and to the form and dimensions shown on the plans. This item shall include all labor, transporting materials from the designated staging area to final placement, and installation of the materials for the EMASMAX bed as well as the necessary tools and fuel to complete the installation and maintain materials at proper conditions on site. This item also consists of the removal and disposal of the existing EMAS system including debris deflector, removal of the existing anchor beam and installation of a new anchor beam.

MATERIALS

555-2.0 SPECIFICATIONS: The EMAS materials shall be manufactured in compliance with FAA Advisory Circular 150/5220-22B.

555-2.1 MATERIAL ACCEPTANCE. The EMASMAX bed shall receive final product release until the following installation tolerances are met:

Dimension	Lower Tolerance	Upper Tolerance
Width of Bed	-0.1 %	+ 0.1 %
Length of Bed	-0.1 %	+ 0.1 %
Height of Bed	-.25 inch	+ 0.75 inch

CONCRETE WORK

555-3.0 INSTALLATION OF CONCRETE ANCHOR BEAM

555.3.1 SUBMITTALS. The CONTRACTOR shall submit the following shop drawings:

- Concrete mix design, curing compound, and reinforcing steel conforming to FAA Specification P-610, Structural Portland Cement Concrete using 4,000 psi concrete mix

555-3.2 Concrete. All concrete for work under this section shall conform to FAA Specification P-610, Structural Portland Cement Concrete, using 3/4-inch maximum size coarse aggregate.

555-3.3 Layout. The CONTRACTOR shall layout the Concrete Anchor Beam in accordance with the Contract Documents showing the location and dimensions required.

555-3.4 Installation. The CONTRACTOR is responsible for the complete installation of the anchor beam in accordance with the Contract Documents.

555-3.5 Quality Control. The CONTRACTOR must place the Concrete Anchor Beam in accordance with the EMASMAX manufacturer's installation specifications, FAA Specification P-610, Structural Portland Cement Concrete, and a Quality Control Plan approved by the Runway Safe. The Concrete Anchor Beam shall be poured monolithically, and the edges shall not have chamfers or radii. Placement tolerances are extremely important in installing the Concrete Anchor Beam to allow for proper EMASMAX arrestor bed installation as shown on the drawings and included in this specification. The back of the Concrete Anchor Beam (side facing the EMASMAX arrestor bed, shall be perpendicular with the runway centerline as measured from centerline to each end within **+/- 1/4".** The length of the anchor beam shall be **178' +3"/-0"**. The top of the Concrete Anchor Beam shall match the elevation of the adjacent pavement. The EMASMAX manufacturer shall inspect the Concrete Anchor Beam to confirm proper placement prior to installation of the EMASMAX blocks. The CONTRACTOR shall inform the EMASMAX manufacturer two weeks in advance of planned Concrete Anchor Beam completion so that the inspection can be scheduled.

CONSTRUCTION METHODS

555-4.0 WEATHER LIMITATIONS. The surface of the asphalt pavement that is to receive the EMASMAX blocks must be dry and above 40 degrees F, and rising, before EMAS block installation may begin.

555-5.0 INSTALLING ENGINEERED MATERIAL ARRESTING SYSTEM (EMAS)

555-5.1 REMOVAL OF EXISTING EMAS. The Contractor shall remove the existing EMAS blocks, debris deflector, concrete anchor beam and installation materials. Removed material shall be disposed of off airport property by the Contractor.

555-5.2 WORK SUMMARY FOR ROA RUNWAY 34 DEPARTURE END

The EMAS bed installation for the Roanoke-Blacksburg Airport Runway 34 Departure End involves the unloading and placing of 4,708 pre-cast cellular concrete blocks into a prepared bed as shown on the plans with dimensions of approximately 178 feet wide by 433 feet long (44 blocks wide x 107 blocks long). The blocks are manufactured by Runway Safe Group. The blocks are nominally 4-ft. wide x 4-ft. long x 6 7/8-inches up to 26 7/8 inches in height. Approximately 1% more blocks than necessary will be available to adjust for blocks damaged during shipping and installation. Pallets, extra material, and extra block shall be repackaged for transport back to Runway Safe Group by the CONTRACTOR. EMAS blocks are shipped to the site stacked on pallets. The largest pallet of stacked blocks is nominally 4-ft. x 4-ft. x 77-in. and weighs approximately 2,000 lbs. The logistics for receiving and staging of the 53’ enclosed trailers containing the pallets of blocks will need to be determined by the CONTRACTOR with concurrence by Runway Safe Group and the Resident Project Representative (RPR). It is desirable to commence installation of the blocks when approximately 30% of the EMAS blocks have been delivered to the staging area. It is estimated that delivery of the blocks and other related installation material requires approximately 75 trailers. One trailer will be refrigerated to maintain the environmental conditions necessary for the joint sealant. This trailer’s refrigeration unit will be fueled by the CONTRACTOR.

Runway Safe Group will have a field representative on-site during the installation of the EMAS system to train the CONTRACTOR’s personnel on the proper handling of the EMAS blocks and

installation technique. In addition, Runway Safe Group field representative will inspect the installation progress and quality of the work throughout the EMASMAX installation. Training by the Runway Safe Group field representative and familiarization with the EMAS product by the CONTRACTOR on the proper handling and installation procedures is very crucial to having a proper quality installation. The training will occur in the initial phases of the EMAS block placement process. It is required that the CONTRACTOR's personnel perform the installation in strict conformance with Runway Safe Group's installation specifications and the project submittals approved by Runway Safe Group. There will be no deviations from these specifications without prior written approval from Runway Safe Group and the RPR. In the event there is a material loss during the installation work due to non-conformance with the handling or installation specifications of the EMAS product, the CONTRACTOR shall remove and replace all material losses at no additional cost to the Airport.

Dates for access to the work site and EMAS block installation are provided in the airport's contract bidding documents. It is expected the CONTRACTOR will make appropriate adjustments to the labor and material requirement to meet the installation schedule. In the following labor breakdown estimate, twenty-five (25), eight-hour day-time shifts are assumed, with some arrangements for an early start for the asphalt cement melting kettle warm-up operation. **This estimate is subject to change based on future work conditions and consideration provided by the Airport and CONTRACTOR.** Utilizing one block installation crew (16 people), normally 300 EMAS blocks can be installed per shift except for a planned first day quota of 42 blocks, second day quota of 120 blocks, and all subsequent days having a daily expected installation of 300 blocks.

Because training and familiarization with the EMAS block placement is crucial to correct installation, CONTRACTOR will be required to revert to 42 blocks per shift quotas without additional compensation after any significant crew changes. Specifically, if a new crew, in whole or in part, is put in place after initial start-up, the Runway Safe Group field representative has the unilateral authority to reduce the daily installation quota to ensure proper training is accomplished. That decision will be based upon the magnitude of the crew change and the contractor's demonstrated performance. Additionally, the Runway Safe Group field representative shall have the authority to identify and retrain any CONTRACTOR representative who is unable to provide and maintain quality workmanship in the assigned tasks.

All EMAS joint sealing must be installed to a high-quality standard. All the top joints of all the blocks will be sealed with backer rod and self-leveling caulk ("In-Gap"). The side and rear (vertical) joints will be sealed with self-adhering tape (side coating). The sealing joint tape must be installed with minimum overlapping of joints. The specialty self-adhesive joint sealing tape is adhered to the adjoining blocks. This seam sealing material cannot be stretched and requires a careful installer. Prior to any blocks being readied for placement, the CONTRACTOR shall be required to demonstrate their ability to apply and finish the backer rod, self–leveling caulk and tape in a manner acceptable to Runway Safe Group field representative. In addition to sealing the joints to prevent moisture intrusion, the finished installed self-leveling caulk ("In-Gap") taped joint must be aesthetically pleasing, i.e., look good. In order to help achieve the desired result, Runway Safe Group will provide two hours of training to the CONTRACTOR in EMAS block joint sealing. This project includes approximately 585 gallons of self-leveling caulk. Full and careful consideration of which Contractor personnel to assign to this sealing work is encouraged, as experience has shown workmen not fully experienced in sealing usually do not meet Runway Safe Group's quality or workmanship standards thus leading to job delays and rework at the CONTRACTOR's expense. Runway Safe Group's experience has shown that this sealing effort will be the task which paces

the job. The entire thrust of these requirements is to attain and maintain a very high level of placement competence and quality of installation.

If night work is required, the CONTRACTOR shall provide adequate portable lighting for use at the work site before dawn and after dusk. For EMAS installation and finishing work, six large self-contained four-bulb light plants, such as the Allmand MLT 3060 or similar, is the minimum. In addition, if night work is required, Runway Safe Group's experience has shown that installation pace will typically slow down, and workmanship is more likely to deteriorate by the CONTRACTOR. Therefore, Runway Safe Group highly encourages day work when possible.

Before any shut-down of contract operations, all equipment and materials used at the work site shall be moved by the CONTRACTOR to the designated airport mobilization site, to ensure safe aircraft operations between the contractor's work shifts.

Initial receiving operations at the staging area can be at any time allowed by the airport until installation commences. Upon commencement of block installation receiving operations would be expanded to include access control, which must be coordinated with the work periods at the work site.

The CONTRACTOR is responsible for setting up the staging area and providing access control, a dumpster, all trash collection and rubbish removal, portable lavatory, and all other requirements for the duration of this project. Control of Foreign Object Damage (FOD) construction materials (block packaging materials, paper wrappers, hand tools, small parts, etc.) that are used during the installation of the EMAS is always of concern to an airport and must be controlled. It will be necessary for the CONTRACTOR to provide covered containers to hold all construction debris and refuse in at the worksite and/or airport property.

The sequence for installation of the EMAS will be as follows:

- Validate perpendicularity of anchor beam
- Validate smoothness of EMAS support pavement
- Installation of jet blast debris deflector Mark-out of installation grid (centerline, sidelines, rear edge line, and every block corner with a grid system of 4.05' x 4.05')
- Installation of the EMAS blocks including
  - Placement of backer rod material into block joints as needed
  - Installation of PVC angle material along perimeter
  - Installation of backer rod and self-leveling caulk into block joints
  - Installation of side coating
  - Installation of high and low perimeter block vents (sides and back of bed)
- Complete any "punch-list" work
- Painting of safety area markings (under a separate specification)
- Site clean-up and demobilization

Specific works are as detailed on the following pages. Note: where this Statement of Work conflicts with the contract drawings, the contract drawings shall govern.

Prior to installation of the EMAS blocks, the Contractor shall receive written acceptance from Runway Safe that the asphalt surface condition (i.e., is smooth) is prepared for EMAS block installation.

555-5.3 RECEIVING AND LAYOUT FOR ROA RUNWAY 34 DEPARTURE END

a. RECEIVING The RPR, at a staging area designated by the Airport, will receive the trailers containing pre-cast EMAS blocks and installation materials. The staging area for this project will be within a half mile radius of the project site. "Receiving duties" are generally limited to acknowledging the trailer delivery by signing the trucker's delivery ticket. To avoid incurring any additional costs to the Airport, it is strongly recommended that any present damage to delivered trailers be specifically noted on the delivery tickets. After receiving the EMAS blocks and installation materials, the CONTRACTOR will assume immediate responsibility and control for the EMAS blocks and installation materials, including the protection of the EMAS materials by securing the staging location during the storage time and prior to installation. Prior to the start of block installation, approximately 30% of the EMAS blocks will arrive at the airport. Once installation is underway, the delivery of blocks will continue until all blocks have been delivered. Runway Safe Group shall determine and control the rate of delivery of truckloads of blocks in accordance with the installation rates outlined in this specification and keep the CONTRACTOR and RPR informed of the delivery schedule. Any requests by the CONTRACTOR to accelerate the truckload delivery schedule shall be submitted in writing to Runway Safe Group a minimum of 72 hours prior to the desired adjustment. Runway Safe Group does not guarantee that requests to accelerate block delivery schedules will be able to be accommodated.

Blocks will be shipped in 53-foot air-ride suspension trailers. Blocks shipped in advance of installation will be stored at the staging area and will be left secured in the trailers. Blocks will continue to be shipped and received at the staging area during the installation program. The EMAS blocks are shipped stretch-wrapped on 4-ft. x 4-ft. pallets.

b. LAYOUT NOTE: The paved surface upon which the EMAS blocks are to be placed must comply to the runway smoothness requirements of the surface paving specification of the EMAS support pavement and to the slope requirements set forth in the project drawings prior to the block grid layout and placement of any EMAS blocks. Runway Safe Group personnel will check the surface using a straightedge as outlined in the surface paving specification of the EMAS support pavement.

Careful layout of extended runway centerline, sides and back edges of the bed rows and steps shall be augmented by field marking the perimeter of each block location for all the blocks. Because the sides of the blocks are not designed to be altered in the field, the field marking for block corners will be crucial for correct block placement, while edge layout lines will provide side and back block placement guidance. A surveyor, licensed in the state in which the EMAS is being installed, shall establish the control points for field layout marking lines. These control points shall establish the extended runway centerline through the EMAS, EMAS bed perimeter, and interim points both perpendicular and parallel to runway centerline within the confines of the EMAS bed on a **20.25 ft. x 20.25 ft.** grid pattern **within a tolerance of +/- 1/8 inch**. PK nails shall be used to mark these points. The entire grid layout must be completely installed and accepted by Runway Safe Group before any blocks are installed.

NOTE: Prior to establishing the points perpendicular to runway centerline, check with Runway Safe Group to ensure the debris deflector has been satisfactorily installed and accepted. The grid points will use the back of the deflector channel as the reference base. For marking the grid lines, the CONTRACTOR should use a durable marking system. Chalk lines and other such marking systems will not remain visible after the large amount of foot and vehicular traffic associated with this installation. Experience has shown that a white, painted 1/8" string line grid on the pavement with block heights painted in each box appears to be the simplest and most effective method. A walk behind spray paint unit is recommended and works best in windy conditions.

SUGGESTED LAYOUT LABOR FOR ROA RUNWAY 34 DEPARTURE END

# Of Personnel	Task	Days	Area
6	Survey & Grid Laying	2-3	EMAS Site

LAYOUT EQUIPMENT FOR ROA RUNWAY 34 DEPARTURE END

- Horizontal Survey Equipment with 1/8-inch (plus or minus) accuracy over the area occupied by the EMAS Bed.

- Surveyor's choice of waterproof and durable grid marking devices (see recommendation above)**, however, all major points (20.25' grid intersections, rear corner, and centerline point) shall be marked with PK nails.**

555-5.4 INSTALLATION PHASE FOR ROA RUNWAY 34 DEPARTURE END The air-ride trailers containing EMAS blocks will be received in the staging area designated by the airport. The CONTRACTOR will be responsible for moving trailers to the EMAS installation site as they are needed. The CONTRACTOR will unload the EMAS blocks and installation materials using a pallet jack and forklift. Great care must be taken when off-loading the EMAS blocks to prevent damage. It is strongly encouraged that the trailers be located on a solid surface to allow for ease of forklift movements. The sides of the EMAS block are particularly vulnerable. Forklift load guards shall be covered with a cushioning material (foam or carpet) to help protect the EMAS blocks. Any foot traffic atop the blocks must be minimized. Anyone walking on the bed must have soft-soled shoes with no sharp heels (Sneakers or flat soled boots preferred). At no time shall any vehicle be allowed to drive on the EMAS.

The jet blast debris deflector channels supplied by Runway Safe Group must be installed before the block layout grid is started and before any blocks are installed. This will provide a starting point for the grid layout. The debris deflector panels will be secured after a select number of blocks have been installed at the discretion of the Runway Safe Group field representative. The primary task involved in the installation of the two-piece Debris Deflector sections will be confirming that the 220 holes, sized 11/16" diameter x 5" deep, in the existing Concrete Anchor Beam and the grouted-in-place threaded anchors in those holes are fully functional. The CONTRACTOR must replace all defective anchors by replacing with Runway Safe Group-provided new anchors. The holes must be clear of dust, debris, and water prior to insertion of replacement anchors. It is highly encouraged to use a pneumatic air compressor with a long nozzle to clean out each hole prior to securing the anchors. After the anchors are prepared, the aluminum Debris Deflector sections are set into

position by hand and secured with 3/8" size hex head bolts threaded into the concrete anchors. Due to its frangible nature, people must avoid stepping on the Debris Deflector. The Debris Deflector comes pre-marked with "NO STEP." Prior to placement of the debris deflector sections, a bead of 100% silicone caulk shall be applied to the surface of the grade beam such that the channel and panel sections of the deflector receive a continuous seal from one edge to the other. Following placement of the debris deflector sections, a bead of 100% silicone caulk shall be applied to the joints between the panel sections.

a. **BLOCK PLACEMENT-** Blocks less than 6 inches in height may be placed into position by hand. These lower height blocks have a maximum weight of 200 pounds but because of their size require four people to lift (one person per block corner). Blocks greater than 6 inches in height will then be placed into position using one of the four (4) CONTRACTOR Supplied forklifts. Each block will be pushed into its final position as marked on the pavement grid either by hand or using a forklift equipped with a means to protect the block from being punctured by the forklift tynes such as a push plate provided by the contractor.

   NOTE: The push plate should rarely be used. The blocks will slide easily into place within the first 20 seconds after coming into contact with hot EMASMAX standard adhesive. Improper usage of the Push Plate may damage otherwise good blocks.

   Prior to the placement of any blocks, the tar kettle should be purged to remove any excess or foreign material. The kettle should then be filled with 100 gallons of EMASMAX standard adhesive material, mixed and purged again.

   Immediately prior to placing blocks, EMASMAX standard adhesive, a hot asphalt cement augmented with a crack sealing additive, shall be applied to cover (minimum 90%) the area where the block will be placed at a rate of approximately 1.25 to 1.50 gallons per block and a temperature ranging from 360^0F to 380^0F. The hot asphalt cement/crack sealer coating is the bond or anchor device between the overrun surface and the EMAS blocks. The asphalt cement, while still hot, acts as a lubricant between the block and the existing pavement so that blocks will slide into their final position when pushed. Runway Safe Group's experience has shown that the total elapsed time from when the hot asphalt cement is placed to when the block must be in its final position is approximately 20 to 25 seconds, depending upon ambient temperatures. After that time, the asphalt cement will have cooled sufficiently to bond the block to the pavement, and it will not slide easily. If this occurs before the block is in the correct position, the block will have to be removed and replaced with a new block.

   NOTE: **An adhered block cannot be removed without being destroyed.**

   NOTE: All blocks have a particular orientation when installed. The backside of the block (the side away from the debris deflector) has the nominal height of the block, in inches, marked on that side. The forklift operator should always be facing the side of the block when picking up the block for placement. The block side with the serial (or batch) number faces the runway. The forklift slot in the tray shall be oriented when the block is placed so that it is perpendicular to the runway centerline.

   Block spacers, loaned by Runway Safe Group, are inserted between the blocks during the block placement process to provide a positive control on the gaps between the blocks while

the hot asphalt cement is cooling and to simplify the process of block alignment. Once the hot asphalt cement is set, individual spacers are removed and reused.

As the first row of blocks next to the anchor beam is completed, the appropriate size backer rod is inserted into the joint between the blocks at a depth of approximately 5/8-inch from the top of the block, and then caulked. It is a requirement that all installed blocks have backer rod installed and be caulked by the end of the work shift unless otherwise stated by the Runway Safe Group field representative.

Next, a specialty coating will be adhered to all vertical sides of the completed bed along with 2 inches of overlap onto adjoining horizontal block surfaces. For every vertical side and back row joint between blocks, high and low vents will be installed in the step riser.

Finally, the appropriate pavement marking paint will be applied. This last painting phase consists of applying marking paint to indicate the EMAS arrestor bed as unusable pavement. The CONTRACTOR will supply the marking paint, any reflectorized beads to be used with it, and all labor under a separate pay item.

Lastly, return of materials. The empty pallets are neatly stacked eleven (11) high, banded and loaded back onto trailers as well as any Runway Safe Group tools and remaining installation materials by the CONTRACTOR for shipment back to the EMAS production facility. The cardboard spacers shipped between the blocks need to be collected, stacked, and banded for return shipment to Runway Safe Group.

NOTE: Some blocks may be damaged during transport, off-loading and installation. The CONTRACTOR must exercise care to minimize these losses for blocks under their care. The CONTRACTOR is responsible for removal of and disposal of any damaged block material. Extra pallets of good blocks left over at completion of installation will be stacked, corner-protected, plastic-wrapped, and re-loaded onto trucks by the CONTRACTOR and transported back to Runway Safe Group.

b. DEBRIS DISPOSAL It is the CONTRACTOR'S responsibility to ensure all stretch wrap, plastic padding, and cardboard corner protectors (packing material) used to protect the blocks during transit, and all other debris generated by this project be collected at the work site, including the staging area, and properly disposed of off-site. All debris transport and disposal shall be in accordance with all applicable federal, state, and local regulations. Recycling of materials, especially cardboard products, is strongly encouraged.

While within the aircraft operations area, care must be taken to ensure that all debris is collected and stored in covered containers to mitigate Foreign Object Damage (FOD) to aircraft.

555-5.5 SUGGESTED CONTRACTOR-PROVIDED INSTALLATION LABOR FOR ROA RUNWAY 34 DEPARTURE END

# Of Personnel	Task	Installation Days	Area	Responsibility
1	Foreman	25	Work Site	Coordination and Supervision
1	Truck Driver	25	Work Site & Staging Area	Transport Blocks and Materials to/from Staging Area and Installation Site
4	Forklift Operators	25	Work Site	Team of two: Unload truck, place pallets, and push blocks; team of two: place blocks
4	Laborers	25	Work Site	Operate pallet jack during truck loading and unloading, remove and dispose of shrink wrap, collect, and dispose of padding between blocks, install debris deflector, apply hot asphalt cement, Install block, vents, plastic edge piece, and cleanup
6	Caulkers/Tapers	25	Work Site	Install back rod, silicone caulk, self-leveling caulk, seam seal, and side coating

555-5.6 CONTRACTOR-PROVIDED INSTALLATION EQUIPMENT FOR ROA RUNWAY 34 DEPARTURE END.

EQUIPMENT & ASSOCIATED ITEMS	QUANTITY Recommended For Installation
Skid Steer; Forklift, 5000 lb. fork tynes convertible	4
Fuel for all forklifts (propane, gas, or diesel as required)	As-required
Carry-on-Trailer for block movement off of trailer	1
Portable Electric Generator, 5000 watts	1
Hot Mix Asphalt Truck/trailer with dispensing wand	1
Fuel for Hot Mix Truck & Refrigerated Materials Trailers	As-required
Dumpster, 40 cubic yard volume	As-required
Portable Air Compressor, 100 psi minimum	1
Air Hose, 50 ft minimum	2
Air Nozzle	1
Pressurized water truck, 500 gallon, 50 psi at 25 gpm	As-required
Transit, Tool Station with Digital Read-out (e.g. Trimble TS305/Nikon 532/ Nikon 322; Tripod; LM80 Layout/Data Collector; Marking chalk/pen)	1
200 foot long steel measuring tape	2
200 foot long string line	4
Aluminum Straight Edge 16 feet	1
Light Plants with fuel (if needed)	6
Tractor for moving 48/53-ft trailers	1

HAND TOOLS	QUANTITY Recommended For Installation
Push plate to attached to forklift	1
40-48" Long Handle, Heavy Duty 7in wide forged blade scraper	2
Safety Hook Knives	4
Wire Saw	2
Torch, Propane (Rosebud style wand)	2
Push Broom, heavy duty 24"	2
Shovel, long handled, square nose	2
Trowel	2
Window Scraper, solid shank, extra heavy duty, 4" blade; spare blades	4
Hammer Drill,1/2" chuck, electric, variable speed, HD	2
Masonry Drill Bit, 3/8" diameter x 8" long	2
Masonry Drill Bit, 11/16" diameter x 12" long minimum	3
Extension Cord, Heavy Duty, 100 feet minimum	3
9/16" size Hex Socket for Impact Gun, 1/2" drive	2
3/8" drive extension, 4" long	2
9/16" size Hex Socket for 3/8" drive	2
3/8" drive ratchet wrench	2
5/32" size hex Allen wrench, 3/8" drive	2
Gas Leaf Blower	2
1/2" drive air or electric powered impact wrench	1
Die Grinder, air powered	1
Bur, 3/8" dia. cylindrical ball nose	1
Cutting Bit, Solid Carbide, 1/4"	1
Hole Saw, Heavy Duty, 6" diameter	1
Hole Saw Arbor, 3/8" hex shank, 1/4" dia. pilot	1
Pilot Drill, 1/8" dia. replacement part	2
Power Bit Nut Driver, 5/16 hex, 1/4" shank	2
Cordless Drill/Driver and batteries	2
Scissors, Pair	2
Putty Knife	4
Reciprocating saw	1
Solid carbide cutting blades	2
Circular Saw & blades for cutting plastic	1
Shop Vacuum	2
Standard Hand Tool set (sockets, utility knives, combination wrenches, open end wrenches, screwdrivers, L-keys, pilers, etc.)	2

CAULKING/SEALING TOOLS	QUANTITY Recommended For Installation
Backer Road Insertion Tool & Wheel (Recommend Albion # 640-4)	5
Foam Sealant, Spray (Can qty.) (Recommended: Great Stuff Spray Insulating Foam)	12
Caulk Gun, Battery Powered,10.3 oz. w/Battery Chargers	3
Bulk-type caulk gun (Albion Part #: DL-59-T27E) & batteries	4
29 oz. Heavy Duty Caulk Gun	2
Follow plate for 5-gallon pail caulk dispensing (Albion 504-G07)	4
Caulk gun nozzles (Albion Part # 235-3: Orange Cone Nozzle)	10
2 In. Round Seam Rollers, broom handle attachable	4
Extra Batteries for Caulk Guns	5

CONSUMABLES	QUANTITY Recommended For Installation
1/2" x 3 ft. x 5ft Durock Cement Board (for cutting into shims)	2
Simple Green Concentrate & Buckets for Dilution	As-required
Rags, solvent, and pails for clean-up of caulk	As-required
Trash Bags, construction grade	200
Sharpie Markers, Black	2
Spray Bottle of water	2

PERSONAL PROTECTION EQUIPMENT	QUANTITY Recommended For Installation
Safety Glasses	As-required
Nitrile Gloves	As-required
Cut-safe gloves	As-required
Knee Pads	As-required
Respirator masks	As-required
Tyvek suits (easier clean up from caulk)	As-required

NOTE:

- All forklifts must have lateral load shift capability.
- One pallet jack supplied by Runway Safe Group. 2nd pallet jack is optional – will expedite handling.
- To the maximum extent practical, all equipment should be on site at the start of the installation phase to ensure that it will be available when needed.
- CONTRACTOR shall provide fuel for refrigeration unit of refrigerated trailer.

555-5.7 RUNWAY SAFE SUPPLIED INSTALLATION MATERIALS TO THE OWNER FOR ROA RUNWAY 34 DEPARTURE END

Material	Quantity
EMASMAX Asphalt Adhesive	7000 gallons (Approx. 1.5 gal/block for minimum 90% coverage of each 16 sq. ft. grid block)
Pallet jack for interior trailer unloading and reloading	One (1)
Side Vents	Approx. 1200
Jet Blast Debris Deflectors; 2 pieces	22 plus 2 end caps and required hardware
Jet Blast Debris Deflector Anchors	Approx. 220 anchors
Self-Leveling Caulk	Approx. 585 gallons
Backer Rod, closed cell	Approx. 39,400 linear ft. (various sizes)
Side Coating	Approx. 4,500 linear ft
Four (4) ft. bottom angle pieces	Approx. 250 pieces
Sealant	Approx. 150 tubes

IMPORTANT NOTE:

This list includes most of the supplies required of the contractor as well as the material and equipment to be provided by Runway Safe Group. If there are any questions regarding this information, please contact Runway Safe Group.

555-5.8 SUGGESTED EMAS BED CONSTRUCTION SCHEDULE FOR ROA RUNWAY 34 DEPARTURE END

DAY	ACTIVITIES
	Existing EMAS removal and surface preparation
1-2	Surveyors check grade beam. Laborers install debris deflector.
2-3	Surveyors establish grid layout points. Laborers start marking grid.
4	Train Tapers & Forklift Operators.
4-25	Install blocks, backer rod, caulk, side seal, and side vents.
25	Inspection/Punch list.

QUALITY CONTROL

555-6.0 QUALITY CONTROL. CONTRACTOR must place and finish the EMAS bed under the guidance of the EMAS manufacturer's technical support, following the EMAS installation specification and Quality Control Plan.

METHOD OF MEASUREMENT

555-7.1 INSTALL EMAS BED. Measurement shall be lump sum for the EMAS bed installation, completed and approved.

555-7.2 REMOVAL OF EXISTING EMAS BED. Measurement shall be lump sum for the EMAS bed removal, completed and approved.

555-7.3 INSTALL ANCHOR BEAM. Measurement shall be lump sum for the anchor beam installation, completed and approved in place.

555-7.4 REMOVAL OF EXISTING ANCHOR BEAM. Measurement shall be lump sum for the existing anchor beam removal, completed and approved.

BASIS OF PAYMENT

555-8.1 INSTALL EMAS BED. Payment shall be made at the contract unit price per lump sum. This price shall be full compensation for installation of the supplied EMAS blocks, concrete anchor beam, and for all labor, equipment, tools, and incidentals necessary to complete the installation of the EMAS blocks. In the event that a portion of the EMAS bed is installed during the processing of a payment application, the Engineer will use percentage of completion to determine partial payment. For intermediate payments, completion shall exclude side coating and chevron painting marking but must include acceptable block placement with vents and caulked joints.

555-8.2 REMOVAL OF EXISTING EMAS BED. Payment shall be made at the contract unit price per lump sum for the removal of the existing EMAS bed. This price shall be full compensation for furnishing all materials and for all preparation, hauling, disposal of existing EMAS blocks, protection of the existing anchor beam and accessories and for all labor, equipment, tools, and incidentals necessary to complete the item.

555-8.3 INSTALL ANCHOR BEAM. Payment shall be made at the contract unit price per lump sum for the installation of the anchor beam. Materials shall be provided by the Owner. This price shall be full compensation for all preparation, protection of existing treaded inserts, drilling, securing, transporting from staging area, and placing of materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

555-8.4 REMOVAL OF EXISTING ANCHOR BEAM. Payment shall be made at the contract unit price per lump sum for the removal of the existing anchor beam. This price shall be full compensation for furnishing all materials and for all preparation, hauling, disposal of existing

anchor beam and accessories and for all labor, equipment, tools, and incidentals necessary to complete the item.

a. Payment. Payment will be made under

Item	Description	Unit
P-555-1	Install EMAS Bed	Lump Sum
P-555-2	Removal of Existing EMAS Bed	Lump Sum
P-555-3	Install Anchor Beam	Lump Sum
P-555-4	Removal of Existing Anchor Beam	Lump Sum

MATERIAL REQUIREMENTS

ASTM D 946 Asphalt Cement for Use in Pavement Construction

END OF ITEM P-555

Item P-602 Emulsified Asphalt Prime Coat

DESCRIPTION

602-1.1 This item shall consist of an application of emulsified asphalt material on the prepared base course in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

MATERIALS

602-2.1 Emulsified Asphalt material. The emulsified asphalt material shall be as specified in ASTM D3628 for use as a prime coat appropriate to local conditions. The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the emulsified asphalt material. The COA shall be provided to and approved by the Resident Project Representative (RPR) before the emulsified asphalt material is applied. The furnishing of the COA for the emulsified asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project.

CONSTRUCTION METHODS

602-3.1 Weather limitations. The emulsified asphalt prime coat shall be applied only when the existing surface is dry; the atmospheric temperature is 50°F (10°C) or above, and the temperature has not been below 35°F (2°C) for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the RPR.

602-3.2 Equipment. The equipment shall include a self-powered pressure asphalt material distributor and equipment for heating asphalt material.

Provide a distributor with pneumatic tires of such size and number that the load produced on the base surface does not exceed 65.0 psi (4.5 kg/sq cm) of tire width to prevent rutting, shoving or otherwise damaging the base, surface or other layers in the pavement structure. Design and equip the distributor to spray the asphalt material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 1.0 gallons per square yard (0.23 to 4.5 L/square meter), with a pressure range of 25 to 75 psi (172.4 to 517.1 kPa) and with an allowable variation from the specified rate of not more than ±5%, and at variable widths. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying asphalt material manually to areas inaccessible to the distributor. Equip the distributor to circulate and agitate the asphalt material during the heating process. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper.

A power broom and power blower suitable for cleaning the surfaces to which the asphalt coat is to be applied shall be provided.

Asphalt distributors must be calibrated annually in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

602-3.3 Application of emulsified asphalt material. Immediately before applying the prime coat, the full width of the surface to be primed shall be swept with a power broom to remove all loose dirt and other objectionable material.

The asphalt emulsion material shall be uniformly applied with an asphalt distributor at the rate of 0.15 to 0.30 gallons per square yard (0.68 to 1.36 liters per square meter) depending on the base course surface texture. The type of asphalt material and application rate shall be approved by the RPR prior to application.

Following application of the emulsified asphalt material and prior to application of the succeeding layer of pavement, allow the asphalt coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread sand to effectively blot up and cure excess asphalt material. The Contractor shall remove blotting sand prior to asphalt concrete lay down operations at no additional expense to the Owner. Keep traffic off surfaces freshly treated with asphalt material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

602-3.4 Trial application rates. The Contractor shall apply a minimum of three lengths of at least 100 feet (30 m) for the full width of the distributor bar to evaluate the amount of emulsified asphalt material that can be satisfactorily applied with the equipment. Apply three different application rates of emulsified asphalt materials within the application range specified in paragraph 602-3.3. Other trial applications can be made using various amounts of material as directed by the RPR. The trial application is to demonstrate the equipment can uniformly apply the emulsified asphalt material within the rates specified and determine the application rate for the project.

602-3.5 Freight and waybills. The Contractor shall submit waybills and delivery tickets during the progress of the work. Before the final estimate is allowed, file with the RPR certified waybills and certified delivery tickets for all emulsified asphalt materials used in the construction of the pavement covered by the contract. Do not remove emulsified asphalt material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

METHOD OF MEASUREMENT

602-4.1 The emulsified asphalt material for prime coat shall be measured by the gallon. Volume shall be corrected to the volume at 60°F (16°C) in accordance with ASTM D4311. The emulsified asphalt material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10% over the specified application rate. Any amount of emulsified asphalt material more than 10% over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the emulsified asphalt material is necessary. Water added to emulsified asphalt will not be measured for payment.

BASIS OF PAYMENT

602-5.1 Payment shall be made at the contract unit price per gallon for emulsified asphalt prime coat. This price shall be full compensation for furnishing all materials and for all preparation, delivering, and applying the materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item P-602-5.1	Emulsified Asphalt Prime Coat - per gallon

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D2995	Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors
ASTM D3628	Standard Practice for Selection and Use of Emulsified Asphalts

END OF ITEM P-602

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Item P-603 Emulsified Asphalt Tack Coat

DESCRIPTION

603-1.1 This item shall consist of preparing and treating an asphalt or concrete surface with asphalt material in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

MATERIALS

603-2.1 Asphalt materials. The asphalt material shall be an emulsified asphalt as specified in ASTM D3628 as an asphalt application for tack coat appropriate to local conditions. The emulsified asphalt shall not be diluted. The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the asphalt material to the Resident Project Representative (RPR) before the asphalt material is applied for review and acceptance. The furnishing of COA for the asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project.

CONSTRUCTION METHODS

603-3.1 Weather limitations. The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is 50°F (10°C) or above; the temperature has not been below 35°F (2°C) for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the RPR.

603-3.2 Equipment. The Contractor shall provide equipment for heating and applying the emulsified asphalt material. 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. Spray 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).

The equipment will be tested under pressure for leaks and to ensure proper set-up before use to verify truck set-up (via a test-shot area), including but not limited to, nozzle tip size appropriate for application, spray-bar height and pressure and pump speed, evidence of triple-overlap spray pattern, lack of leaks, and any other factors relevant to ensure the truck is in good working order before use.

The distributor truck shall be equipped with a minimum 12-foot (3.7-m) spreader spray bar with individual nozzle control with computer-controlled application rates. 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. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper.

The distributor truck shall be equipped to effectively heat and mix the material to the required temperature prior to application as required. Heating and mixing shall be done in accordance with the manufacturer's recommendations. Do not overheat or over mix the material.

The distributor shall be equipped with a hand sprayer.

Asphalt distributors must be calibrated annually in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

A power broom and/or power blower suitable for cleaning the surfaces to which the asphalt tack coat is to be applied shall be provided.

603-3.3 Application of emulsified asphalt material. The emulsified asphalt shall not be diluted. Immediately before applying the emulsified asphalt tack coat, the full width of surface to be treated shall be swept with a power broom and/or power blower to remove all loose dirt and other objectionable material.

The emulsified asphalt material shall be uniformly applied with an asphalt distributor at the rates appropriate for the conditions and surface specified in the table below. The type of asphalt material and application rate shall be approved by the RPR prior to application.

Emulsified Asphalt

Surface Type	Residual Rate, gal/SY (L/square meter)	Emulsion Application Bar Rate, gal/SY (L/square meter)
New asphalt	0.02-0.05 (0.09-0.23)	0.03-0.07 (0.13-0.32)
Existing asphalt	0.04-0.07 (0.18-0.32)	0.06-0.11 (0.27-0.50)
Milled Surface	0.04-0.08 (0.18-0.36)	.0.06-0.12 (0.27-0.54)
Concrete	0.03-0.05 (0.13-0.23)	0.05-0.08 (0.23-0.36)

After application of the tack coat, the surface shall be allowed to cure without being disturbed for the period of time necessary to permit drying and setting of the tack coat. This period shall be determined by the RPR. The Contractor shall protect the tack coat and maintain the surface until the next course has been placed. When the tack coat has been disturbed by the Contractor, tack coat shall be reapplied at the Contractor's expense.

603-3.4 Freight and waybills The Contractor shall submit waybills and delivery tickets, during progress of the work. Before the final statement is allowed, file with the RPR certified waybills and certified delivery tickets for all emulsified asphalt materials used in the construction of the pavement covered by the contract. Do not remove emulsified asphalt material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

METHOD OF MEASUREMENT

603-4.1 The emulsified asphalt material for tack coat shall be measured by the gallon. Volume shall be corrected to the volume at 60°F (16°C) in accordance with ASTM D1250. The emulsified asphalt material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10% over the specified application rate. Any amount of emulsified asphalt material more than 10% over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the emulsified asphalt material is necessary. Water added to emulsified asphalt will not be measured for payment.

BASIS OF PAYMENT

603.5-1 Payment shall be made at the contract unit price per gallon of emulsified asphalt material. This price shall be full compensation for furnishing all materials, for all preparation, delivery, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-603-5.1	Emulsified Asphalt Tack Coat - per gallon

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D1250	Standard Guide for Use of the Petroleum Measurement Tables
ASTM D2995	Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors
ASTM D3628	Standard Practice for Selection and Use of Emulsified Asphalts

END ITEM P-603

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Item P-605 Joint Sealants for Pavements

DESCRIPTION

605-1.1 This item shall consist of providing and installing a resilient and adhesive joint sealing material capable of effectively sealing joints in pavement; joints between different types of pavements; and cracks in existing pavement.

MATERIALS

605-2.1 Joint sealants. Joint sealant materials shall meet the requirements of ASTM D5893.

Each lot or batch of sealant shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, the safe heating temperature, and shall be accompanied by the manufacturer's certification stating that the sealant meets the requirements of this specification.

605-2.2 Backer rod. The material furnished shall be a compressible, non-shrinking, non-staining, non-absorbing material that is non-reactive with the joint sealant in accordance with ASTM D5249. The backer-rod material shall be 25% ± 5 % larger in diameter than the nominal width of the joint.

605-2.3 Bond breaking tapes. Provide a bond breaking tape or separating material that is a flexible, non-shrinkable, non-absorbing, non-staining, and non-reacting adhesive-backed tape. The material shall have a melting point at least 5°F (3°C) greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D789. The bond breaker tape shall be approximately 1/8 inch (3 mm) wider than the nominal width of the joint and shall not bond to the joint sealant.

CONSTRUCTION METHODS

605-3.1 Time of application. Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. The pavement temperature shall be 50°F (10°C) and rising at the time of application of the poured joint sealing material. Do not apply sealant if moisture is observed in the joint.

605-3.2 Equipment. Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and maintained in satisfactory condition at all times. Submit a list of proposed equipment to be used in performance of construction work including descriptive data, 7 days prior to use on the project.

a. Tractor-mounted routing tool. Provide a routing tool, used for removing old sealant from the joints, of such shape and dimensions and so mounted on the tractor that it will not damage the sides of the joints. The tool shall be designed so that it can be adjusted to remove the old material to varying depths as required. The use of V-shaped tools or rotary impact routing devices will not be permitted. Hand-operated spindle routing devices may be used to clean and enlarge random cracks.

b. Concrete saw. Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, for cutting joints to the depths and widths specified.

c. Sandblasting equipment. Sandblasting is not allowed.

d. Waterblasting equipment. The Contractor must demonstrate waterblasting equipment including the pumps, hose, guide and nozzle size, under job conditions, before approval in accordance with

paragraph 605-3.3. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans the joint and does not damage the joint.

e. Hand tools. Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces. Hand tools should be carefully evaluated for potential spalling effects prior to approval for use.

f. Cold-applied, single-component sealing equipment. The equipment for installing ASTM D5893 single component joint sealants shall consist of an extrusion pump, air compressor, following plate, hoses, and nozzle for transferring the sealant from the storage container into the joint opening. The dimension of the nozzle shall be such that the tip of the nozzle will extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval. Small hand-held air-powered equipment (i.e., caulking guns) may be used for small applications.

605-3.3 Preparation of joints. Pavement joints for application of material in this specification must be dry, clean of all scale, dirt, dust, curing compound, and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans the joint and does not damage the joint.

a. Sawing. All joints shall be sawed in accordance with specifications and plan details. Immediately after sawing the joint, the resulting slurry shall be completely removed from joint and adjacent area by flushing with a jet of water, and by use of other tools as necessary.

b. Sealing. Immediately before sealing, the joints shall be thoroughly cleaned of all remaining laitance, curing compound, filler, protrusions of hardened concrete, old sealant and other foreign material from the sides and upper edges of the joint space to be sealed. Cleaning shall be accomplished by waterblaster as specified in paragraph 605-3.2. The newly exposed concrete joint faces and the pavement surface extending a minimum of 1/2 inch (12 mm) from the joint edge shall be sandblasted clean. Sandblasting shall 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 (75 mm) from it. After final cleaning and immediately prior to sealing, blow out the joints with compressed air and leave them completely free of debris and water. The joint faces shall be surface dry when the seal is applied.

c. Backer Rod. When the joint opening is of a greater depth than indicated for the sealant depth, plug or seal off the lower portion of the joint opening using a backer rod in accordance with paragraph 605-2.2 to prevent the entrance of the sealant below the specified depth. Take care to ensure that the backer rod is placed at the specified depth and is not stretched or twisted during installation.

d. Bond-breaking tape. Where inserts or filler materials contain bitumen, or the depth of the joint opening does not allow for the use of a backup material, insert a bond-separating tape breaker in accordance with paragraph 605-2.3 to prevent incompatibility with the filler materials and three-sided adhesion of the sealant. Securely bond the tape to the bottom of the joint opening so it will not float up into the new sealant.

605-3.4 Installation of sealants. Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the RPR before sealing is allowed. Sealants shall be installed in accordance with the following requirements:

Immediately preceding, but not more than 50 feet (15 m) ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to 1/4 inch (6 mm) ±1/16 inch (2 mm) below the top of pavement surface; or bottom of groove for grooved pavement. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the RPR. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

605-3.5 Inspection. The Contractor shall inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid, entrapped air and voids.

Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified at no additional cost to the airport.

605-3.6 Clean-up. Upon completion of the project, remove all unused materials from the site and leave the pavement in a clean condition.

METHOD OF MEASUREMENT

605-4.1 ~~Joint sealing material shall be measured by the **[** gallon (liter) **] [** pound (kg) **] [** linear foot (meter) **]** of sealant in place, completed, and accepted.~~ No measurement will be made for direct payment of sealant, as the cost of furnishing and installing shall be considered as subsidiary obligation in the completion of installation of P-403 material.

BASIS OF PAYMENT

605-5.1 ~~Payment for joint sealing material shall be made at the contract unit price per **[** gallon (liter) **] [** pound (kg) **] [** linear foot (meter) **]**. The price shall 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:~~

~~Item P-605-5.1~~	~~Joint Sealing Filler, **[** per gallon (liter) **] [** per pound (kg) **] [** per linear foot (meter) **]**~~

No payment will be made separately or directly for sealant. The sealant shall be considered necessary and incidental to the work of this Contract.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D789	Standard Test Method for Determination of Relative Viscosity of Polyamide (PA)
ASTM D5249	Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
ASTM D5893	Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt
ASTM D7116	Standard Specification for Joint Sealants, Hot Applied, Jet Fuel Resistant Types for Portland Cement Concrete Pavements

Advisory Circulars (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids

END ITEM P-605

Item P-610 Concrete for Miscellaneous Structures

DESCRIPTION

610-1.1 This item shall consist of concrete and reinforcement, as shown on the plans, prepared and constructed in accordance with these specifications. This specification shall be used for all concrete other than airfield pavement which are cast-in-place.

MATERIALS

610-2.1 General. Only approved materials, conforming to the requirements of these specifications, shall be used in the work. Materials may be subject to inspection and tests at any time during their preparation or use. The source of all materials shall be approved by the Resident Project Representative (RPR) before delivery or use in the work. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to ensure preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed in them.

The use of pit-run aggregates shall not be permitted unless the pit-run aggregate has been screened and washed, and all fine and coarse aggregates stored separately and kept clean. The mixing of different aggregates from different sources in one storage stockpile or alternating batches of different aggregates shall not be permitted.

a. Reactivity. Fine aggregate and coarse aggregates to be used in all concrete shall have been tested separately within six months of the project in accordance with ASTM C1260. Test results shall be submitted to the RPR. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.08% at 14 days (16 days from casting). If the expansion either or both test specimen is greater than 0.08% at 14 days, but less than 0.20%, a minimum of 25% of Type F fly ash, or between 40% and 55% of slag cement shall be used in the concrete mix.

If the expansion is greater than 0.20%, the aggregates shall not be used, and test results for other aggregates must be submitted for evaluation; or aggregates that meet standard P-501 reactivity test requirements may be utilized.

610-2.2 Coarse aggregate. The coarse aggregate for concrete shall meet the requirements of ASTM C33 and the requirements of Table 4, Class Designation 5S; and the grading requirements shown below, as required for the project.

Coarse Aggregate Grading Requirements

Maximum Aggregate Size	ASTM C33, Table 3 Grading Requirements (Size No.)
1 1/2 inch (37.5 mm)	467 or 4 and 67
1 inch (25 mm)	57
¾ inch (19 mm)	67
½ inch (12.5 mm)	7

610-2.2.1 Coarse Aggregate susceptibility to durability (D) cracking.

Coarse aggregate may only be accepted from sources that have a 20-year service history for the same gradation to be supplied with no history of D-Cracking. Aggregates that do not have a 20-year record of service free from major repairs (less than 5% of slabs replaced) in similar conditions without D-cracking shall not be used unless the material currently being produced has a durability factor greater than or equal to 95 per ASTM C666. The Contractor shall submit a current certification and test results to verify the aggregate acceptability. Test results will only be accepted from a State Department of Transportation (DOT) materials laboratory or an accredited laboratory. Certification and test results which are not dated or which are over one (1) year old or which are for different gradations will not be accepted.

Crushed granite, calcite cemented sandstone, quartzite, basalt, diabase, rhyolite or trap rock are considered to meet the D-cracking test requirements but must meet all other quality tests specified in Item P-501.

610-2.3 Fine aggregate. The fine aggregate for concrete shall meet all fine aggregate requirements of ASTM C33.

610-2.4 Cement. Cement shall conform to the requirements of ASTM C150 Type I or II.

610-2.5 Cementitious materials.

a. Fly ash. Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than 15% and a total available alkali content less than 3% per ASTM C311. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the RPR.

b. Slag cement (ground granulated blast furnace (GGBF)). Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

610-2.6 Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

610-2.7 Admixtures. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the RPR may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the RPR from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

a. Air-entraining admixtures. Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

b. Water-reducing admixtures. Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. ASTM C494, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used.

c. Other chemical admixtures. The use of set retarding, and set-accelerating admixtures shall be approved by the RPR. Retarding shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

610-2.8 Premolded joint material. Premolded joint material for expansion joints shall meet the requirements of ASTM D1751 or D1752.

610-2.9 Joint filler. The filler for joints shall meet the requirements of Item P-605, unless otherwise specified.

610-2.10 Steel reinforcement. Reinforcing shall be as detailed on the plans and shall conform to the requirements found in the table below ~~consist of [ ] conforming to the requirements of [ ]~~.

Steel Reinforcement

Reinforcing Steel	ASTM A615, ASTM A706, ASTM A775, ASTM A934
Welded Steel Wire Fabric	ASTM A1064, ASTM A884
Welded Deformed Steel Fabric	ASTM A1064
Bar Mats	ASTM A184 or ASTM A704

610-2.11 Materials for curing concrete. Curing materials shall conform to the following requirements.

Materials for Curing

Waterproof paper	ASTM C171
Clear or white Polyethylene Sheeting	ASTM C171
White-pigmented Liquid Membrane-Forming Compound, Type 2, Class B	ASTM C309

CONSTRUCTION METHODS

610-3.1 General. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified here. All machinery and equipment used by the Contractor on the work, shall be of sufficient size to meet the requirements of the work. All work shall be subject to the inspection and approval of the RPR.

610-3.2 Concrete Mixture. The concrete shall develop a compressive strength of 4000 psi in 28 days as determined by test cylinders made in accordance with ASTM C31 and tested in accordance with ASTM C39. The concrete shall contain not less than 470 pounds of cementitious material per cubic yard (280 kg per cubic meter). The water cementitious ratio shall not exceed 0.45 by weight. The air content of the concrete shall be 5% +/- 1.2% as determined by ASTM C231 and shall have a slump of not more than 4 inches (100 mm) as determined by ASTM C143.

610-3.3 Mixing. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C94 or ASTM C685.

The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F (4°C) without the RPRs approval. If approval is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F (10°C) nor more than 100°F (38°C). The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his expense.

Retempering of concrete by adding water or any other material is not permitted.

The rate of delivery of concrete to the job shall be sufficient to allow uninterrupted placement of the concrete.

610-3.4 Forms. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the RPR. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as shown on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes. The Contractor shall be responsible for their adequacy.

The internal form ties shall be arranged so no metal will show in the concrete surface or discolor the surface when exposed to weathering when the forms are removed. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied immediately before the concrete is placed. Forms shall be constructed so they can be removed without injuring the concrete or concrete surface.

610-3.5 Placing reinforcement. All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concrete placement. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610-3.6 Embedded items. Before placing concrete, all embedded items shall be firmly and securely fastened in place as indicated. All embedded items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The concrete shall be spaded and consolidated around and against embedded items. The embedding of wood shall not be allowed.

610-3.7 Concrete Consistency. The Contractor shall monitor the consistency of the concrete delivered to the project site; collect each batch ticket; check temperature; and perform slump tests on each truck at the project site in accordance with ASTM C143.

610-3.8 Placing concrete. All concrete shall be placed during daylight hours, unless otherwise approved. The concrete shall not be placed until the depth and condition of foundations, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved by the RPR. Concrete shall be placed as soon as practical after mixing, but in no case later than one (1) hour after water has been added to the mix. The method and manner of placing shall avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. The concrete shall not be dropped from a height of more than 5 feet (1.5 m). Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation. Concrete shall be placed on clean, damp surfaces, free from running water, or on a properly consolidated soil foundation.

610-3.9 Vibration. Vibration shall follow the guidelines in American Concrete Institute (ACI) Committee 309R, Guide for Consolidation of Concrete.

610-3.10 Joints. Joints shall be constructed as indicated on the plans.

610-3.11 Finishing. All exposed concrete surfaces shall be true, smooth, and free from open or rough areas, depressions, or projections. All concrete horizontal plane surfaces shall be brought flush to the proper elevation with the finished top surface struck-off with a straightedge and floated.

610-3.12 Curing and protection. All concrete shall be properly cured in accordance with the recommendations in American Concrete Institute (ACI) 308R, Guide to External Curing of Concrete. The concrete shall be protected from damage until project acceptance.

610-3.13 Cold weather placing. When concrete is placed at temperatures below 40°F (4°C), follow the cold weather concreting recommendations found in ACI 306R, Cold Weather Concreting.

610-3.14 Hot weather placing. When concrete is placed in hot weather greater than 85ºF (30 ºC), follow the hot weather concreting recommendations found in ACI 305R, Hot Weather Concreting.

QUALITY ASSURANCE (QA)

610-4.1 Quality Assurance sampling and testing. Concrete for each day's placement will be accepted on the basis of the compressive strength specified in paragraph 610-3.2. The RPR will sample the concrete in accordance with ASTM C172; test the slump in accordance with ASTM C143; test air content in accordance with ASTM C231; make and cure compressive strength specimens in accordance with ASTM C31; and test in accordance with ASTM C39. The QA testing agency will meet the requirements of ASTM C1077.

The Contractor shall provide adequate facilities for the initial curing of cylinders.

610-4.2 Defective work. Any defective work that cannot be satisfactorily repaired as determined by the RPR, shall be removed and replaced at the Contractor's expense. Defective work includes, but is not limited to, uneven dimensions, honeycombing and other voids on the surface or edges of the concrete.

METHOD OF MEASUREMENT

610-5.1 Concrete shall be considered incidental to P-555-3 and no separate measurement shall be made.

BASIS OF PAYMENT

610-6.1 Concrete shall be considered incidental to P-555-3 and no separate payment shall be made.

~~Payment will be made under:~~

~~Item P-610-6.1 Concrete, incidental to other work items~~

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A884	Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement

ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C685	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1157	Standard Performance Specification for Hydraulic Cement
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

ASTM C1365	Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

American Concrete Institute (ACI)

ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 308R	Guide to External Curing of Concrete
ACI 309R	Guide for Consolidation of Concrete

END OF ITEM P-610

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Item P-620 Runway and Taxiway Marking

DESCRIPTION

620-1.1 This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Resident Project Representative (RPR). The terms “paint” and “marking material” as well as “painting” and “application of markings” are interchangeable throughout this specification.

MATERIALS

620-2.1 Materials acceptance. The Contractor shall furnish manufacturer’s certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer’s surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Resident Project Representative (RPR) prior to the initial application of markings. The reports can be used for material acceptance or the RPR may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the RPR upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the RPR.

620-2.2 Marking materials.

Table 1. Marking Materials

Paint[1]				Glass Beads[2]	
Type	**Color**	**Fed Std. 595 Number**	**Application Rate Maximum**	**Type**	**Application Rate Minimum**
Waterborne Type III	Yellow (Initial)	33538 or 33655	180 ft²/gal	--	--
Waterborne Type III	White (Initial)	37925	180 ft²/gal	--	--
Waterborne Type III	Yellow (Final)	33538 or 33655	90 ft²/gal	III	8 lb/gal
Waterborne Type III	White (Final)	37925	90 ft²/gal	III	8 lb/gal
Waterborne Type III	Black (Outline)	37038	90 ft²/gal	--	--

[1] See paragraph 620-2.2a

[2] See paragraph 620-2.2b

a. Paint. Paint shall be waterborne in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595.

Waterborne. Paint shall meet the requirements of Federal Specification TT-P-1952F, Type III. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis. The acrylic resin used for Type III shall be 100% cross linking

acrylic as evidenced by infrared peaks at wavelengths 1568, 1624, and 1672 cm-l with intensities equal to those produced by an acrylic resin known to be 100% cross linking.

b. Reflective media. Glass beads for white and yellow paint shall meet the requirements for Federal Specification TT-B-1325D Type III.

~~Glass beads for red and pink paint shall meet the requirements for **[** Type I, Gradation A **] [** Type IV, Gradation A **]**.~~

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.

Glass beads shall not be used in black ~~and green~~ paint.

~~Type III glass beads shall not be used in red and pink paint.~~

CONSTRUCTION METHODS

620-3.1 Weather limitations. Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer's recommendations in accordance with paragraph 620-2.1. Painting operations shall be discontinued when the ambient or surface temperatures does not meet the manufacturer's recommendations. Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Markings shall not be applied when weather conditions are forecasts to not be within the manufacturers' recommendations for application and dry time.

620-3.2 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 with automatic glass bead dispensers suitable for application of traffic paint and capable of applying markings from 6 to 36 inches in a single pass. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. The marking equipment for both paint and beads shall be calibrated daily.

620-3.3 Preparation of surfaces. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other contaminates that would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by high pressure water blasting not to exceed 10,000 psi 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 RPR. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

a. Preparation of new pavement surfaces. The area to be painted shall be cleaned by broom, blower, water blasting, or by other methods approved by the RPR to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface.

b. Preparation of pavement to remove existing markings. Existing pavement markings shall be removed by rotary grinding, water blasting, or by other methods approved by the RPR minimizing damage to the pavement surface. The removal area may need to be larger than the area of the markings to eliminate ghost markings. After removal of markings on asphalt pavements, apply a fog seal or seal coat to 'block out' the removal area to eliminate 'ghost' markings.

c. Preparation of pavement markings prior to remarking. Prior to remarking existing markings, loose existing markings must be removed such that 75% of the existing markings are removed with low (3,500-10,000 psi) water blasting ~~minimizing damage to the pavement surface, with a method approved by the RPR~~. After removal, the surface shall be cleaned of all residue or debris.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufactures application and surface preparation requirements must be submitted to the RPR prior to the initial application of markings.

620-3.4 Layout of markings. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

620-3.5 Application. A period of 30 days shall elapse between placement of surface course or seal coat and application of the permanent paint markings. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the RPR.

The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50 feet (15 m), and marking dimensions and spacing shall be within the following tolerances:

Marking Dimensions and Spacing Tolerance

Dimension and Spacing	Tolerance
36 inch (910 mm) or less	±1/2 inch (12 mm)
greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)
greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)
greater than 60 feet (18.3 m)	±3 inch (76 mm)

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted.

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 shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment and distribution should be performed.

620-3.6 Application--preformed thermoplastic airport pavement markings. Preformed thermoplastic pavement markings not used.

620-3.7 Control strip. Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the RPR. The Contractor shall demonstrate the surface preparation method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads (per Table 1) that are properly embedded and evenly distributed across the full width of the marking. Prior to acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance.

620-3.8 Retro-reflectance. [Reflectance shall be measured with a portable retro-reflectometer meeting ASTM E1710 (or equivalent). A total of 6 reading shall be taken over a 6 square foot area with 3 readings taken from each direction. The average shall be equal to or above the minimum levels of all readings which are within 30% of each other.

Minimum Retro-Reflectance Values

Material	Retro-reflectance mcd/m²/lux	
	White	Yellow
Initial Type III	600	300

[1] 'Prior to remarking determine if removal of contaminants on markings will restore retro-reflectance

620-3.9 Protection and cleanup. After application of the markings, all markings shall be protected from damage until dry. 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 reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the RPR. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

METHOD OF MEASUREMENT

620-4.1a The quantity of full application, markings (yellow and white), with reflective media shall be measured by the number of square feet of painting.

620-4.1b The quantity of full application, markings (black), without reflective media shall be measured by the number of square feet of painting.

620-4.1c The quantity of half application, markings (yellow and white), shall be measured by the number of square feet of painting.

BASIS OF PAYMENT

620-5.1 This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item complete in place and accepted by the RPR in accordance with these specifications.

620-5.1a Payment for full application, markings (yellow and white), with reflective media shall be made at the contract price by the number of square feet of painting.

620-5.2b Payment for full application, markings (black), without reflective media shall be made at the contract price by the number of square feet of painting.

620-5.3c Payment for half application, markings (yellow and white) shall be made at the contract price by the number of square feet of painting.

Payment will be made under:

Item P-620-5.1	Full Application, Markings (White and Yellow), with Reflective Media – per square foot
Item P-620-5.2	Full Application, Markings (Black), without Reflective Media – per square foot
Item P-620-5.3	Half Application, Markings (White and Yellow) – per square foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E303	Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2302	Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

Code of Federal Regulations (CFR)

40 CFR Part 60, Appendix A-7, Method 24	Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings
29 CFR Part 1910.1200	Hazard Communication

Federal Specifications (FED SPEC)

FED SPEC TT-B-1325D	Beads (Glass Spheres) Retro-Reflective
FED SPEC TT-P-1952F	Paint, Traffic and Airfield Marking, Waterborne
FED STD 595	Colors used in Government Procurement

Commercial Item Description

A-A-2886B	Paint, Traffic, Solvent Based

Advisory Circulars (AC)

AC 150/5340-1	Standards for Airport Markings
AC 150/5320-12	Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces

END OF ITEM P-620

Item P-621 Saw-Cut Grooves

DESCRIPTION

621-1.1 This item consists of constructing saw-cut grooves to minimize hydroplaning during wet weather, providing a skid resistant surface in accordance with these specifications and at the locations shown on the plans, or as directed by the Resident Project Representative (RPR).

CONSTRUCTION METHODS

621-2.1 Procedures. The Contractor shall submit to the RPR the grooving sequence and method of placing guide lines to control grooving operation. Transverse grooves saw-cut in the pavement must form a 1/4 inch (+1/16 inch, -0 inch) wide by 1/4 inch (±1/16 inch) deep by 1-1/2 inch (-1/8 inch, +0 inch) center-to-center configuration. The grooves must be continuous for the entire runway length. They must be saw-cut transversely (perpendicular to centerline) in the runway and high-speed taxiway pavement to not less than 10 feet from the runway pavement edge to allow adequate space for equipment operation.

The saw-cut grooves must meet the following tolerances. The tolerances apply to each day's production and to each piece of grooving equipment used for production. The Contractor is responsible for all controls and process adjustments necessary to meet these tolerances. The Contractor shall routinely spot check for compliance each time the equipment aligns for a grooving pass.

a. Alignment tolerance. The grooves shall not vary more than ±1-1/2 inch (38 mm) in alignment for 75 feet (23 m) along the runway length, allowing for realignment every 500 feet (150 m) along the runway length.

b. Groove tolerance.

(1) Depth. The standard depth is 1/4 inch (6 mm). At least 90% of the grooves must be at least 3/16 inch (5 mm), at least 60% of the grooves must be at least 1/4 inch (6 mm), and not more than 10% of the grooves may exceed 5/16 inch (8 mm).

(2) Width. The standard width is 1/4 inch (6 mm). At least 90% of the grooves must be at least 3/16 inch (5 mm), at least 60% of the grooves must be at least 1/4 inch (6 mm), and not more than 10% of the grooves may exceed 5/16 inch (8 mm).

(3) Center-to-center spacing. The standard spacing is 1-1/2 inch (38 mm). Minimum spacing 1-3/8 inch (34 mm). Maximum spacing 1-1/2 inch (38 mm).

Saw-cut grooves must not be closer than 3 inches (8 cm) or more than 9 inches (23 cm) from transverse joints in concrete pavements. Grooves must not be closer than 6 inches (150 mm) and no more than 18 inches (0.5 m) from in-pavement light fixtures. Grooves may be continued through longitudinal construction joints. Where neoprene compression seals have been installed and the compression seals are recessed sufficiently to prevent damage from the grooving operation, grooves may be continued through the longitudinal joints. Where neoprene compression seals have been installed and the compression seals are not recessed sufficiently to prevent damage from the grooving operation, grooves must not be closer than 3 inches (8 cm) or more than 5 inches (125 mm) from the longitudinal joints. Where lighting cables are installed, grooving through longitudinal or diagonal saw kerfs shall not be allowed.

621-2.2 Environmental requirements. Grooving operations will not be permitted when freezing conditions prevent the immediate removal of debris and/or drainage of water from the grooved area. Discharge and disposal of waste slurry shall be the Contractor's responsibility.

621-2.3 Control strip. Groove a control strip in an area of the pavement outside of the trafficked area, as approved by the RPR. The area shall be 50 feet long by two lanes wide. Demonstrate the setup and alignment process, the grooving operation, and the waste slurry disposal.

621-2.4 Existing pavements. Bumps, depressed areas, bad or faulted joints, and badly cracked and/or spalled areas in the pavement shall not be grooved until such areas are adequately repaired or replaced.

621-2.5 New pavements. New asphalt and Portland cement concrete pavements shall be allowed to cure for a minimum of 30 days before grooving, to allow the material to become stable enough to prevent closing of the grooves under normal use. If it can be demonstrated that grooves are stable, and can be installed with no spalling, tearing or raveling of the groove edge, grooving may occur sooner that 30 days with approval of the RPR. All grade corrections must be completed prior to grooving. Spalling along or tearing or raveling of the groove edges shall not be allowed.

621-2.6 Grooving machine. Provide a grooving machine that is power driven, self-propelled, specifically designed and manufactured for pavement grooving, and has a self-contained and integrated continuous slurry vacuum system as the primary method for removing waste slurry. The grooving machine shall be equipped with diamond-saw cutting blades, and capable of making at least 18 inches (0.5 m) in width of multiple parallel grooves in one pass of the machine. Thickness of the cutting blades shall be capable of making the required width and depth of grooves in one pass of the machine. The cutting head shall not contain a mixture of new and worn blades or blades of unequal wear or diameter. Match the blade type and configuration with the hardness of the existing airfield pavement. The wheels on the grooving machine shall be of a design that will not scar or spall the pavement. Provide the machine with devices to control depth of groove and alignment.

621-2.7 Water supply. Water for the grooving operation shall be provided by the Contractor.

621-2.8 Clean-up. During and after installation of saw-cut grooves, the Contractor must remove from the pavement all debris, waste, and by-products generated by the operations to the satisfaction of the RPR. Cleanup of waste material must be continuous during the grooving operation. Flush debris produced by the machine to the edge of the grooved area or pick it up as it forms. The dust coating remaining shall be picked up or flushed to the edge of the area if the resultant accumulation is not detrimental to the vegetation or storm drainage system. Accomplish all flushing operations in a manner to prevent erosion on the shoulders or damage to vegetation. Waste material must be disposed of in an approved manner. Waste material must not be allowed to enter the airport storm sewer system. The Contractor must dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations

621-2.9 Repair of damaged pavement. Grooving must be stopped and damaged pavement repaired at the Contractor's expense when directed by the RPR.

ACCEPTANCE

621-3.1 Acceptance testing. All acceptance testing necessary to determine conformance with the groove tolerances specified will be performed by the RPR.

Instruments for measuring groove width and depth must have a range of at least 0.5 inch (12 mm) and a resolution of at least 0.005 inch (0.13 mm). Gauge blocks or gauges machined to standard grooves width, depth, and spacing may be used.

Instruments for measuring center-to-center spacing must have a range of at least 3 inches (8 cm) and a resolution of at least 0.02 inch (0.5 mm).

The RPR will measure grooves in five zones across the pavement width. Measurements will be made at least three times during each day's production. Measurements in all zones will be made for each cutting head on each piece of grooving equipment used for each day's production.

The five zones are as follows:

Zone 1	Centerline to 5 feet (1.5 m) left or right of the centerline.
Zone 2	5 feet (1.5 m) to 25 feet (7.5 m) left of the centerline.
Zone 3	5 feet (1.5 m) 25 feet (7.5 m) right of the centerline.
Zone 4	25 feet (7.5 m) to edge of grooving left of the centerline.
Zone 5	25 feet (7.5 m) to edge of grooving right of the centerline.

At a random location within each zone, five consecutive grooves sawed by each cutting head on each piece of grooving equipment will be measured for width, depth, and spacing. The five consecutive measurements must be located about the middle blade of each cutting head ±4 inches (100 mm). Measurements will be made along a line perpendicular to the grooves.

- Width or depth measurements less than 0.170 inch (4 mm) shall be considered less than 3/16 inch (5 mm).
- Width or depth measurements more than 0.330 inch (8 mm) shall be considered more than 5/16 inch (8 mm).
- Width or depth measurements more than 0.235 inch (6 mm) shall be considered more than 1/4 inch (6 mm).

Production must be adjusted when more than one groove on a cutting head fails to meet the standard depth, width, or spacing in more than one zone.

METHOD OF MEASUREMENT

621-4.1 The quantity of grooving to be paid for shall be the number of square yards ~~(square meters)~~ of grooving performed in accordance with the specifications and accepted by the RPR per paragraph 621-3.1.

BASIS OF PAYMENT

621-5.1 Payment for saw-cut grooving. Payment for saw-cut grooving will be made at the contract unit price per square yard ~~(square meter)~~ for saw-cut grooving. This price shall be full compensation for furnishing all materials, and for all preparation, delivering, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-621-5.1	Grooving - per square yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

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

END OF ITEM P-621

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Item T-901 Seeding

DESCRIPTION

901-1.1 This item shall consist of soil preparation, seeding, fertilizing, and/or liming the areas shown on the plans or as directed by the RPR in accordance with these specifications.

MATERIALS

901-2.1 Seed. The species and application rates of grass, legume, and cover-crop seed furnished shall be those stipulated herein. Seed shall conform to the requirements of Federal Specification JJJ-S-181, Federal Specification, Seeds, Agricultural.

Seed shall be furnished separately or in mixtures in standard containers labeled in conformance with the Agricultural Marketing Service (AMS) Seed Act and applicable state seed laws with the seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked for each kind of seed. The Contractor shall furnish the RPR duplicate signed copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within six (6) months of date of delivery. This statement shall include: name and address of laboratory, date of test, lot number for each kind of seed, and the results of tests as to name, percentages of purity and of germination, and percentage of weed content for each kind of seed furnished, and, in case of a mixture, the proportions of each kind of seed. Wet, moldy, or otherwise damaged seed will be rejected.

Seeds shall be applied as follows:

Seed Properties and Rate of Application

Seed	Minimum Seed Purity (Percent)	Minimum Germination (Percent)	Rate of Application lb/acre
Kentucky 31 Tall Fescue	97	85	128
Red Top	94	80	2
Annual Rye	97	90	20

Seeding shall be performed during the period between February 16 and April 31, and August 16 and October 31 inclusive, unless otherwise approved by the RPR.

Millet seeds are prohibited from being applied anywhere on the project. Contractor shall submit certification stating no millet is present in the seed used for this project. All seed types shall be endophyte enhanced to reduce attractiveness to birds and other wildlife.

Seed shall be delivered to the site in separate sacks bearing a green seed label denoting that the seed was inspected and approved by the Virginia Crop Improvement Association. Open bags will not be accepted for use. Seeds shall be mixed under observation of the RPR and shall not be applied until approved by the RPR.

Seed shall not be stored in an enclosure where herbicides, kerosene, or other materials detrimental to seed germination are stored. The number of restricted noxious weed shall be not be more than the number per ounce of per pound specified in the rules and regulations of the Virginia Seed Law.

901-2.2 Lime. Lime shall be ground limestone containing not less than 85% of total carbonates, and shall be ground to such fineness that 90% will pass through a No. 20 (850 µm) mesh sieve and 50% will pass through a No. 100 (150 µm) mesh sieve. Coarser material will be acceptable, providing the rates of application are increased to provide not less than the minimum quantities and depth specified in the special provisions on the basis of the two sieve requirements above. Dolomitic lime or a high magnesium lime shall contain at least 10% of magnesium oxide. Lime shall be applied at the rate of 2 tons (4,000 pounds) per acre (90 pounds per 1,000 square feet). All liming materials shall conform to the requirements of ASTM C602.

901-2.3 Fertilizer. Fertilizer shall be standard commercial fertilizers supplied separately or in mixtures containing the percentages of total nitrogen, available phosphoric acid, and water-soluble potash. They shall be applied at the rate and to the depth specified, and shall meet the requirements of applicable state laws. They shall be furnished in standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon. No cyanamide compounds or hydrated lime shall be permitted in mixed fertilizers.

The fertilizers may be supplied in one of the following forms:

a. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader;

b. A finely-ground fertilizer soluble in water, suitable for application by power sprayers; or

c. A granular or pellet form suitable for application by blower equipment.

Fertilizers shall be 10-10-10 (N-P-K) commercial fertilizer and shall be spread at the rate of 300 pound per acre (6.9 pounds per 1,000 square feet).

901-2.4 Soil for repairs. The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the RPR before being placed.

CONSTRUCTION METHODS

901-3.1 Advance preparation and cleanup. After grading of areas has been completed and before applying fertilizer and ground limestone, areas to be seeded shall be raked or otherwise cleared of stones larger than 2 inches (50 mm) in any diameter, sticks, stumps, and other debris that might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after the completion of grading and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage include filling gullies, smoothing irregularities, and repairing other incidental damage.

An area to be seeded shall be considered a satisfactory seedbed without additional treatment if it has recently been thoroughly loosened and worked to a depth of not less than 5 inches (125 mm) as a result of grading operations and, if immediately prior to seeding, the top 3 inches (75 mm) of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and if shaped to the required grade.

When the area to be seeded is sparsely sodded, weedy, barren and unworked, or packed and hard, any grass and weeds shall first be cut or otherwise satisfactorily disposed of, and the soil then scarified or otherwise loosened to a depth not less than 5 inches (125 mm). Clods shall be broken and the top 3 inches (75 mm) of soil shall be worked into a satisfactory seedbed by discing, or by use of cultipackers, rollers, drags, harrows, or other appropriate means.

901-3.2 Dry application method.

The Contractor shall utilize the dry application method only when expressly authorized by the RPR and only on a limited basis as authorized by the RPR.

a. Liming. Lime shall be applied separately and prior to the application of any fertilizer or seed and only on seedbeds that have previously been prepared as described above. The lime shall then be worked

into the top 3 inches (75 mm) of soil after which the seedbed shall again be properly graded and dressed to a smooth finish.

b. Fertilizing. Following advance preparations and cleanup fertilizer shall be uniformly spread at the rate that will provide not less than the minimum quantity stated in paragraph 901-2.3**.**

c. Seeding. Grass seed shall be sown at the rate specified in paragraph 901-2.1 immediately after fertilizing. The fertilizer and seed shall be raked within the depth range stated in the special provisions. Seeds of legumes, either alone or in mixtures, shall be inoculated before mixing or sowing, in accordance with the instructions of the manufacturer of the inoculant. When seeding is required at other than the seasons shown on the plans or in the special provisions, a cover crop shall be sown by the same methods required for grass and legume seeding.

d. Rolling. After the seed has been properly covered, the seedbed shall be immediately compacted by means of an approved lawn roller, weighing 40 to 65 pounds per foot (60 to 97 kg per meter) of width for clay soil (or any soil having a tendency to pack), and weighing 150 to 200 pounds per foot (223 to 298 kg per meter) of width for sandy or light soils.

901-3.3 Wet application method.

a. General. The Contractor may elect to apply seed and fertilizer (and lime, if required) by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified in the special provisions.

b. Spraying equipment. The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons (190 liters) over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

The unit shall also be equipped with a pressure pump capable of delivering 100 gallons (380 liters) per minute at a pressure of 100 lb / sq inches (690 kPa). The pump shall be mounted in a line that will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipe lines shall be capable of providing clearance for 5/8 inch (16 mm) solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture delivered to the nozzle. At least three different types of nozzles shall be supplied so that mixtures may be properly sprayed over distance varying from 20 to 100 feet (6 to 30 m). One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet nozzle. For case of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings.

In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet (15 m) in length shall be provided to which the nozzles may be connected.

c. Mixtures. Lime, if required, shall be applied separately, in the quantity specified, prior to the fertilizing and seeding operations. Not more than 220 pounds (100 kg) of lime shall be added to and mixed with each 100 gallons (380 liters) of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds (100 kg) of these combined solids shall be added to and mixed with each 100 gallons (380 liters) of 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. The Contractor shall identify to the RPR all sources of water at least two (2) weeks prior to use. The RPR may take samples of the water at the source or from

the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the RPR following such tests.

All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within two (2) hours from the time they were mixed or they shall be wasted and disposed of at approved locations.

d. Spraying. Lime, if required, shall be sprayed only upon previously prepared seedbeds. After the applied lime mixture has dried, the lime shall be worked into the top 3 inches (75 mm), after which the seedbed shall again be properly graded and dressed to a smooth finish.

Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime, if required, shall already have been worked in. The mixtures shall be applied by means of a high-pressure spray that shall always be directed upward into the air so that the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner as might produce erosion or runoff.

Particular care shall be exercised to ensure that the application is made uniformly and at the prescribed rate and to guard against misses and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area.

Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or pans over the area at intervals and observing the quantity of material deposited thereon.

On surfaces that are to be mulched as indicated by the plans or designated by the RPR, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

901-3.4 Maintenance of seeded areas. The Contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the RPR. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

When either the dry or wet application method outlined above is used for work done out of season, it will be required that the Contractor establish a good stand of grass of uniform color and density to the satisfaction of the RPR. A grass stand shall be considered adequate when bare spots are one square foot (0.01 sq m) or less, randomly dispersed, and do not exceed 3% of the area seeded.

METHOD OF MEASUREMENT

901-4.1 The quantity of seeding to be paid for shall be the number of square yards measured on the ground surface, completed and accepted.

BASIS OF PAYMENT

901-5.1 Payment shall be made at the contract unit price per square yard, which price and payment shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

Item T-901-5.1	Seeding - per square yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C602 Standard Specification for Agricultural Liming Materials

Federal Specifications (FED SPEC)

FED SPEC JJJ-S-181, Federal Specification, Seeds, Agricultural

Advisory Circulars (AC)

AC 150/5200-33 Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-901

Item T-905 Topsoil

DESCRIPTION

905-1.1 This item shall consist of preparing the ground surface for topsoil application, removing topsoil from designated stockpiles or areas to be stripped on the site or from approved sources off the site, and placing and spreading the topsoil on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the RPR.

MATERIALS

905-2.1 Topsoil. Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth, and it shall be reasonably free from subsoil and stumps, roots, brush, stones (2 inches (50 mm) or more in diameter), and clay lumps or similar objects. Brush and other vegetation that will not be incorporated with the soil during handling operations shall be cut and removed. Ordinary sod and herbaceous growth such as grass and weeds are not to be removed, but shall be thoroughly broken up and intermixed with the soil during handling operations. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means, shall be removed. The topsoil or soil mixture, unless otherwise specified or approved, shall have a pH range of approximately 5.5 pH to 7.6 pH, when tested in accordance with the methods of testing of the Association of Official Agricultural Chemists in effect on the date of invitation of bids. The organic content shall be not less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction). There shall be not less than 20% nor more than 80% of the material passing the 200 mesh (75 µm) sieve as determined by the wash test in accordance with ASTM C117.

Natural topsoil may be amended by the Contractor with approved materials and methods to meet the above specifications.

905-2.2 Inspection and tests. Within 10 days following acceptance of the bid, the RPR shall be notified of the source of topsoil to be furnished by the Contractor. The topsoil shall be inspected to determine if the selected soil meets the requirements specified and to determine the depth to which stripping will be permitted. At this time, the Contractor may be required to take representative soil samples from several locations within the area under consideration and to the proposed stripping depths, for testing purposes as specified in paragraph 905-2.1.

CONSTRUCTION METHODS

905-3.1 General. Areas to be topsoiled shall be shown on the plans. If topsoil is available on the site, the location of the stockpiles or areas to be stripped of topsoil and the stripping depths shall be shown on the plans.

Suitable equipment necessary for proper preparation and treatment of the ground surface, stripping of topsoil, and for the handling and placing of all required materials shall be on hand, in good condition, and approved by the RPR before the various operations are started.

905-3.2 Preparing the ground surface. Immediately prior to dumping and spreading the topsoil on any area, the surface shall be loosened by discs or spike-tooth harrows, or by other means approved by the RPR, to a minimum depth of 2 inches (50 mm) to facilitate bonding of the topsoil to the covered subgrade soil. The surface of the area to be topsoiled shall be cleared of all stones larger than 2 inches (50 mm) in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting. Limited areas, as shown on the plans, which are too compact to respond to these operations shall receive special scarification.

Grades on the area to be topsoiled, which have been established by others as shown on the plans, shall be maintained in a true and even condition. Where grades have not been established, the areas shall be smooth-graded and the surface left at the prescribed grades in an even and compacted condition to prevent the formation of low places or pockets where water will stand.

905-3.3 Obtaining topsoil. Prior to the stripping of topsoil from designated areas, any vegetation, briars, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, shall be removed using methods approved by the RPR. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means shall be removed.

When suitable topsoil is available on the site, the Contractor shall remove this material from the designated areas and to the depth as directed by the RPR. The topsoil shall be spread on areas already tilled and smooth-graded, or stockpiled in areas approved by the RPR. Any topsoil stockpiled by the Contractor shall be rehandled and placed without additional compensation. Any topsoil that has been stockpiled on the site by others, and is required for topsoil purposes, shall be removed and placed by the Contractor. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded if required and put into a condition acceptable for seeding.

When suitable topsoil is secured off the airport site, the Contractor shall locate and obtain the supply, subject to the approval of the RPR. The Contractor shall notify the RPR sufficiently in advance of operations in order that necessary measurements and tests can be made. The Contractor shall remove the topsoil from approved areas and to the depth as directed. The topsoil shall be hauled to the site of the work and placed for spreading, or spread as required. Any topsoil hauled to the site of the work and stockpiled shall be rehandled and placed without additional compensation.

905-3.4 Placing topsoil. The topsoil shall be evenly spread on the prepared areas to a uniform depth of 2 inches (50 mm) after compaction, unless otherwise shown on the plans or stated in the special provisions. Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Spreading shall be carried on so that turfing operations can proceed with a minimum of soil preparation or tilling.

After spreading, any large, stiff clods and hard lumps shall be broken with a pulverizer or by other effective means, and all stones or rocks (2 inches (50 mm) or more in diameter), roots, litter, or any foreign matter shall be raked up and disposed of by the Contractor. after spreading is completed, the topsoil shall be satisfactorily compacted by rolling with a cultipacker or by other means approved by the RPR. The compacted topsoil surface shall conform to the required lines, grades, and cross-sections. Any topsoil or other dirt falling upon pavements as a result of hauling or handling of topsoil shall be promptly removed.

METHOD OF MEASUREMENT

~~**905-4.1** Topsoil obtained on the site shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoil stockpiled by others and removed for topsoil by the Contractor shall be measured by the number of cubic yards (cubic meters) of topsoil measured in the stockpile. Topsoil shall be measured by volume in cubic yards (cubic meters) computed by the method of end areas.~~

~~**905-4.2** Topsoil obtained off the site shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoil shall be measured by volume in cubic yards (meters) computed by the method of end areas.~~

No measurement will be made for direct payment of topsoil, as the cost of topsoil shall be incidental to P-152 pay items.

BASIS OF PAYMENT

905-5.1 ~~Payment will be made at the contract unit price per cubic yard (cubic meter) for topsoil (obtained on the site). This price shall be full compensation for furnishing all materials and for all preparation,~~

~~placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.~~

~~**905-5.2** Payment will be made at the contract unit price per cubic yard (cubic meter) for topsoil (obtained off the site). This price shall be full compensation for furnishing all materials and for all preparation, placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.~~

~~Payment will be made under:~~

~~Item T-905-5.2 Topsoil (Furnished from Off the Site) - per cubic yard (cubic meter)~~

No payment will be made separately or directly for topsoil. The topsoil shall be considered incidental to P-152 pay items.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C117	Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing

Advisory Circulars (AC)

AC 150/5200-33	Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-905

Item T-908 Mulching

DESCRIPTION

908-1.1 This item shall consist of furnishing, hauling, placing, and securing mulch on surfaces indicated on the plans or designated by the RPR.

MATERIALS

908-2.1 Mulch material. Acceptable mulch shall be the materials listed below or any approved locally available material that is similar to those specified. Mulch shall be free from noxious weeds, mold, and other deleterious materials. Mulch materials, which contain matured seed of species that would volunteer and be detrimental to the proposed overseeding, or to surrounding farm land, will not be acceptable. Straw or other mulch material which is fresh and/or excessively brittle, or which is in such an advanced stage of decomposition as to smother or retard the planted grass, will not be acceptable.

a. Hay. Hay shall be native hay in an air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Hay shall be sterile, containing no fertile seed.

b. Straw. Straw shall be the stalks from threshed plant residue of oats, wheat, barley, rye, or rice from which grain has been removed. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Straw shall contain no fertile seed.

c. Hay mulch containing seed. Hay mulch shall be mature hay containing viable seed of native grasses or other desirable species stated in the special provisions or as approved by the RPR. The hay shall be cut and handled so as to preserve the maximum quantity of viable seed. Hay mulch that cannot be hauled and spread immediately after cutting shall be placed in weather-resistant stacks or baled and stored in a dry location until used.

d. Manufactured mulch. Cellulose-fiber or wood-pulp mulch shall be products commercially available for use in spray applications.

e. Asphalt binder. Asphalt binder material shall conform to the requirements of ASTM D977, Type SS-1 or RS-1.

908-2.2 Inspection. The RPR shall be notified of sources and quantities of mulch materials available and the Contractor shall furnish him with representative samples of the materials to be used 30 days before delivery to the project. These samples may be used as standards with the approval of the RPR and any materials brought on the site that do not meet these standards shall be rejected.

CONSTRUCTION METHODS

908-3.1 Mulching. Before spreading mulch, all large clods, stumps, stones, brush, roots, and other foreign material shall be removed from the area to be mulched. Mulch shall be applied immediately after seeding. The spreading of the mulch may be by hand methods, blower, or other mechanical methods, provided a uniform covering is obtained.

Mulch material shall be furnished, hauled, and evenly applied on the area shown on the plans or designated by the RPR. Straw or hay shall be spread over the surface to a uniform thickness at the rate of 2 to 3 tons per acre (1800 - 2700 kg per acre) to provide a loose depth of not less than 1-1/2 inches (38 cm) nor more than 3 inches (75 mm). Other organic material shall be spread at the rate directed by the RPR. Mulch may be blown on the slopes and the use of cutters in the equipment for this purpose will be permitted to the extent that at least 95% of the mulch in place on the slope shall be 6 inches (150 mm) or

more in length. When mulches applied by the blowing method are cut, the loose depth in place shall be not less than one inch (25 mm) nor more than 2 inches (50 mm).

908-3.2 Securing mulch. The mulch shall be held in place by light discing, a very thin covering of topsoil, pins, stakes, wire mesh, asphalt binder, or other adhesive material approved by the RPR. Where mulches have been secured by either of the asphalt binder methods, it will not be permissible to walk on the slopes after the binder has been applied. When an application of asphalt binder material is used to secure the mulch, the Contractor must take every precaution to guard against damaging or disfiguring structures or property on or adjacent to the areas worked and will be held responsible for any such damage resulting from the operation.

If the “peg and string” method is used, the mulch shall be secured by the use of stakes or wire pins driven into the ground on 5-foot (1.5-m) centers or less. Binder twine shall be strung between adjacent stakes in straight lines and crisscrossed diagonally over the mulch, after which the stakes shall be firmly driven nearly flush to the ground to draw the twine down tight onto the mulch.

908-3.3 Care and repair.

a. The Contractor shall care for the mulched areas until final acceptance of the project. Care shall consist of providing protection against traffic or other use by placing warning signs, as approved by the RPR, and erecting any barricades that may be shown on the plans before or immediately after mulching has been completed on the designated areas.

b. The Contractor shall be required to repair or replace any mulch that is defective or becomes damaged until the project is finally accepted. When, in the judgment of the RPR, such defects or damages are the result of poor workmanship or failure to meet the requirements of the specifications, the cost of the necessary repairs or replacement shall be borne by the Contractor.

c. If the “asphalt spray” method is used, all mulched surfaces shall be sprayed with asphalt binder material so that the surface has a uniform appearance. The binder shall be uniformly applied to the mulch at the rate of approximately 8 gallons (32 liters) per 1,000 square feet (100 sq m), or as directed by the RPR, with a minimum of 6 gallons (24 liters) and a maximum of 10 gallons (40 liters) per 1,000 square feet (100 sq m) depending on the type of mulch and the effectiveness of the binder securing it. Asphalt binder material may be sprayed on the mulched slope areas from either the top or the bottom of the slope. An approved spray nozzle shall be used. The nozzle shall be operated at a distance of not less than 4 feet (1.2 m) from the surface of the mulch and uniform distribution of the asphalt material shall be required. A pump or an air compressor of adequate capacity shall be used to ensure uniform distribution of the asphalt material.

d. If the “asphalt mix” method is used, the mulch shall be applied by blowing, and the asphalt binder material shall be sprayed into the mulch as it leaves the blower. The binder shall be uniformly applied to the mulch at the rate of approximately 8 gallons (32 liters) per 1,000 square feet (100 sq m) or as directed by the RPR, with a minimum of 6 gallons (24 liters) and a maximum of 10 gallons (40 liters) per 1,000 square feet (100 sq m) depending on the type of mulch and the effectiveness of the binder securing it.

METHOD OF MEASUREMENT

908-4.1 Mulching shall be measured in square yards on the basis of the actual surface area acceptably mulched.

BASIS OF PAYMENT

908-5.1 Payment will be made at the contract unit price per square yard for mulching. The price shall be full compensation for furnishing all materials and for placing and anchoring the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item T-908-5.1 Mulching - per square yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D977 Standard Specification for Emulsified Asphalt

Advisory Circulars (AC)

AC 150/5200-33 Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-908

Item L-125 Installation of Airport Lighting Systems

DESCRIPTION

125-1.1 This item shall consist of airport lighting systems furnished and installed in accordance with this specification, the referenced specifications, and the applicable advisory circulars (ACs). The systems shall be installed at the locations and in accordance with the dimensions, design, and details shown in the plans. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

125-2.1 General.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified under the Airport Lighting Equipment Certification Program in accordance with AC 150/5345-53, current version. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not performs as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system for to operate properly.

b. Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials in accordance with these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be clearly made with arrows or circles (highlighting is not acceptable). The Contractor shall be responsible for delays in the project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be submitted in electronic PDF format,tabbed by specification section. The RPR reserves the right to reject any or all equipment, materials or procedures, which, in the RPR’s opinion, does not meet the system design and the standards and codes, specified herein.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve(12)months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

EQUIPMENT AND MATERIALS

125-2.2 Conduit/Duct. Not Required. ~~Conduit shall conform to Specification Item L-110 Airport Underground Electrical Duct Banks and Conduits.~~

125-2.3 Cable and Counterpoise. Not Required. ~~Cable and Counterpoise shall conform to Item L-108 Underground Power Cable for Airports.~~

125-2.4 Tape. Not Required. ~~Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88 respectively, as manufactured by 3M Company or an approved equal.~~

125-2.5 Cable Connections. Not Required. ~~Cable Connections shall conform to Item L-108 Installation of Underground Cable for Airports.~~

125-2.6 Retroreflective Markers. Retroreflective markers shall be type L-853 and shall conform to the requirements of AC 150/5345-39.

125-2.7 Runway and Taxiway Lights. Not Required. ~~Runway and taxiway lights shall conform to the requirements of AC 150/5345-46. Lamps shall be of size and type indicated, or as required by fixture manufacturer for each lighting fixture required under this contract. Filters shall be of colors conforming to the specification for the light concerned or to the standard referenced.~~

125-2.8 Runway and Taxiway Signs. Not Required. ~~Runway and Taxiway Guidance Signs should conform to the requirements of AC 150/5345-44.~~

125-2.9 Runway End Identifier Light (REIL). Not required.

125-2.10 Precision Approach Path Indicator (PAPI). Not required.

125-2.11 Circuit Selector Cabinet. Not Required. ~~The circuit selector cabinet shall meet the requirements of AC 150/5345-5, Type L-847, **[** one **][** two **][** three **][** four **]** circuit control **[** as indicated **]**, Class **[** A, indoor **][** B, outdoor **]**, Rating **[** 1, for 6.6 amperes **][** 2, for 20 amperes **]**.~~

125-2.12 Light Base and Transformer Housings. Not Required. ~~Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases shall be Type **[** L-867 **] [** L-868 **]**, Class **[** 1A **] [** 1B **] [** 2A **] [** 2B **]**, Size **[** A **] [** B **] [** C **]** shall be provided as indicated or as required to accommodate the fixture or device installed thereon. Base plates, cover plates, and adapter plates shall be provided to accommodate various sizes of fixtures.~~

125-2.13 Isolation Transformers. Not Required. ~~Isolation Transformers shall be Type **[** L-830 **] [** L-831 **]**, size as required for each installation. Transformer shall conform to AC 150/5345-47.~~

INSTALLATION

125-3.1 Installation. The Contractor shall furnish, install, connect and test all equipment, accessories, conduit, cables, wires, buses, grounds and support items necessary to ensure a complete and operable airport lighting system as specified here and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and state and local code agencies having jurisdiction.

The Contractor shall install the specified equipment in accordance with the applicable advisory circulars and the details shown on the plans.

125-3.2 Testing. All lights shall be fully tested by continuous operation for not less than 24 hours as a completed system prior to acceptance. The test shall include operating the constant current regulator in each step not less than 10 times at the beginning and end of the 24-hour test. The fixtures shall illuminate properly during each portion of the test.

125-3.3 Shipping and Storage. Equipment shall be shipped in suitable packing material to prevent damage during shipping. Store and maintain equipment and materials in areas protected from weather and physical damage. Any equipment and materials, in the opinion of the RPR, damaged during construction or storage shall be replaced by the Contractor at no additional cost to the owner. Painted or galvanized surfaces that are damaged shall be repaired in accordance with the manufacturer's recommendations.

125-3.4 Elevated and In-pavement Lights. Water, debris, and other foreign substances shall be removed prior to installing fixture base and light.

A jig or holding device shall be used when installing each light fixture to ensure positioning to the proper elevation, alignment, level control, and azimuth control. Light fixtures shall be oriented with the light beams parallel to the runway or taxiway centerline and facing in the required direction. The outermost edge of fixture shall be level with the surrounding pavement. Surplus sealant or flexible embedding material shall be removed. The holding device shall remain in place until sealant has reached its initial set.

METHOD OF MEASUREMENT

125-4.1 Reflective markers will be measured by the number installed as completed units in place, ready for operation, and accepted by the RPR. Runway and taxiway lights will be measured by the number of each type installed as completed units in place, ready for operation, and accepted by the RPR. Guidance signs will be measured by the number of each type and size installed as completed units, in place, ready for operation, and accepted by the RPR. Runway End Identifier Lights shall be measured by each system installed as a completed unit in place, ready for operation, and accepted by the RPR.

~~Precision Approach Path Indicator shall be measured by each system installed as a completed unit, in place, ready for operation, and accepted by the RPR. Abbreviated Precision Approach Path Indicator shall be measured by each system installed as a completed unit, in place, ready for operation, and accepted by the RPR.~~

BASIS OF PAYMENT

125-5.1 Payment will be made at the Contract unit price for each complete runway or taxiway light, guidance sign, reflective marker, runway end identification light, precision approach path indicator, or abbreviated precision approach path indicator installed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

Item L-125-5.1	Furnish and Install Yellow/Red L-853 Retroreflective Markers, Type II, 14-Inch Height – per each

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-18	Standards for Airport Sign Systems
AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems
AC 150/5345-39	Specification for L-853, Runway and Taxiway Retroreflective Markers
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5345-44	Specification for Runway and Taxiway Signs
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
AC 150/5345-51	Specification for Discharge-Type Flashing Light Equipment
AC 150/5345-53	Airport Lighting Equipment Certification Program

Engineering Brief (EB)

EB No. 67	Light Sources Other than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures

END OF ITEM L-125

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