COUNTY OF LOUISA, VIRGINIA

INVITATION FOR BID (IFB)
FOR
AIRFIELD LIGHTING UPGRADES
INSTALL RUNWAY 9 & 27 PAPIs, INSTALL SUPPLEMENTAL WINDCONES & INSTALL ODALS

IFB# LKU-26-08

JUNE 15, 2026

INVITATION FOR BID
(IFB)

Issue Date: June 15, 2026 IFB# LKU-26-08

Title: Airfield Lighting Upgrades – Install RW 9 & 27 PAPIs, Install Windcones & Install ODALs

Issuing Agency:
County of Louisa, Virginia
Attn: Sam Massie
1 Woolfolk Avenue, Suite 304
Louisa, VA 23093

Location Where Work Will Be Performed:
Louisa County Airport
335 Industrial Drive
Louisa, VA 23093-4130

Period of Contract: From TBD Through TBD

Renewable: N/A

Sealed Bids Will Be Received Until: July 14, 2026 @ 3:30 p.m. local prevailing time

Direct All Inquiries for Information To:
Sam Massie, Purchasing Coordinator
1 Woolfolk Avenue
Suite 304
Louisa, VA 23093
(540) 967-3404
smassie@louisacounty.gov

IF BIDS ARE MAILED, SEND DIRECTLY TO ISSUING AGENCY SHOWN ABOVE. IF BIDS ARE HAND DELIVERED, DELIVER TO:

County of Louisa
Louisa County Administration Building
Attn: Sam Massie
Finance Department, 2nd Floor
1 Woolfolk Avenue
Suite 304
Louisa, Virginia 23093
(540) 967-3404

PRE-BID CONFERENCE: A **mandatory pre-bid conference** will be held on **Tuesday, June 23, 2026 at 10:00 am** at the Louisa County Airport located at 335 Industrial Drive, Louisa, Virginia 23093. If special ADA accommodations are needed, please contact Sam Massie at (540) 967-3404 by June 22, 2026.

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.

INVITATION FOR BID TITLE PAGE

INVITATION NUMBER: LKU-26-08 **ISSUE DATE: June 15, 2026**

TITLE: Airfield Lighting Upgrades – Install RW 9 & 27 PAPIs, Install Windcones & Install ODALS

In compliance with this Invitation for Bid and to all the conditions imposed herein, by signing below, Bidder:

(1) Offers and agrees to furnish the goods/services in accordance with the attached signed bid;
(2) Agrees that upon Louisa County's written acceptance of Bidder's response to the Invitation to Bid, a valid and binding contract for services exists between Bidder and Louisa County;
(3) Agrees that the Contract Documents will consist of, and *only* of, the Invitation for Bid, the County of Louisa, Virginia Standard Terms and Conditions and Bidder's response to the Invitation for Bid;
(4) Certifies and warrants that the individual signing on Bidder's behalf is authorized to bind the Bidder in any and all contractual matters relating to this Invitation for Bid;
(5) Certifies and warrants that neither Bidder, nor the individual signing on Bidder's behalf, has any business or personal relationships with any other persons, including Louisa County employees, or companies that are in conflict with the Commonwealth of Virginia's Conflict of Interest Act, or the County of Louisa, Virginia Standard Terms and Conditions; and,
(6) Certifies and warrants that the Bidder is properly licensed for providing the goods/services specified in the Invitation for Bid and has the appropriate License or Certificate and classification(s) required to perform the work included in the scope of the bid documents, prior to submitting the bid, in accordance with Title 54.1, Chapter 11 of the Code of Virginia. If a bidder shall fail to obtain the required license prior to submission of his bid, he shall be deemed to be in violation of § 54.1-1115 of the *Code of Virginia* (1950), as amended, and his bid will not be considered.

Sign in ink and type or print requested information.

Legal Name and Address of Firm:

_____ Date: _____
_____ By: _____
_____ (Signature)
_____ Name: _____
FEI/FIN/SSN: _____ (Please Print)
Fax Number: _____ Title: _____
E-mail Address: _____ Telephone Number: _____

Please provide the following if applicable to this IFB:
Virginia Contractor License # _____ SCC ID # _____

Bidder shall ascertain prior to submitting a response that all Addenda issued have been received and shall **acknowledge receipt and inclusion of all Addenda here**:

Addendum #: _____ Date Issued: _____
Addendum #: _____ Date Issued: _____
Addendum #: _____ Date Issued: _____

Information the Bidder deems Proprietary is included in this response in the separate section of the bid identified immediately below.

_____
_____

This Title Page MUST be Submitted as Part of your Bid

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I. PURPOSE:

Provide construction services for airfield lighting improvements at the Louisa County Airport.

II. STATEMENT OF NEEDS/ SCOPE OF SERVICES:

This project includes the removal of existing 2-box Precision Approach Path Indicators (PAPIs) for Runway 09 & 27 and the installation of new 4-box PAPIs, installation of FAA Specification L-881 Supplemental Wind cones for Runways 09 and 27 as well as installation of a 4 light Omni Directional Approach Light System (ODALs) for the Runway 27 approach at the Louisa County Airport.

Also included is tree clearing, access road construction, the routing of power to the PAPI's and the ODALs from the existing airfield electrical vault, updating the electrical vault and power supply/ regulators as required and connecting two new supplemental wind cones to the existing runway lighting circuit.

III. BIDDER'S INSTRUCTION:

A. BID PREPARATION:

1. A mandatory pre-bid conference will be held on Tuesday, June 23, 2026 at 10:00 a.m. at the Louisa County Airport located at 335 Industrial Drive, Louisa, Virginia 23093. The cut off time for questions will be June 30, 2026 @ 5:00 pm.

2. Bidders may submit any questions or requests for additional information regarding the project in written format by **June 30, 2026 @ 5:00 pm**. All questions shall be directed to Sam Massie at smassie@louisacounty.gov or via fax at (540) 967-3439. A formal clarification will be sent out in writing on **July 7, 2026**, to all known potential bidders.

3. The Bidder must submit a bid, which demonstrates and provides evidence that the Bidder has the capabilities, professional expertise, and experience to provide the necessary services as described in this IFB. The Bidder shall ensure that all information required herein is submitted with the bid. All information provided should be verifiable by documentation requested by the County of Louisa. Failure to provide all information, inaccuracy or misstatement may be sufficient cause for rejection of the bid or rescission of an award.

4. Bids shall be signed by the authorized representative of the Bidder.

5. Bids should be prepared simply and economically, providing a straightforward, concise, detailed description of capabilities to satisfy the requirements of the IFB.

6. All expenses for making Bids to the County shall be incurred by the Bidder.

7. Bidder must be authorized to transact business in Virginia as a domestic or foreign business entity as required by the State Corporation Commission, if such is required by law. Such status shall be maintained during the term of a contract. A contract entered into by a business in violation of the requirements is voidable at the option of the public body.

B. BID SUBMISSION: The following documents must be received in our office via hard copy no later than the closing date and time stated below:

If submitting through eVA, the Virginia e-procurement website, an electronic copy is acceptable.

1. Signed original of the completed Invitation for Bid Title Page

2. Signed Appendix A "County of Louisa, Virginia Standard Terms and Conditions."

3. Completed Appendix B "Bid Price Sheet."

4. BID BOND: Each bid shall be accompanied by a bid bond of five percent (5%) of the amount of the bid, which shall be a certified check, cash escrow or a bid bond payable to the County of Louisa. The sureties of all bonds shall be of such surety company or companies as are approved by the State and are authorized to transact business in the Commonwealth of Virginia. Such bid bond or check shall be submitted with the understanding that it shall guarantee that the bidder will not withdraw such bid during the period of 30 days following the opening of bids; that if such bid is accepted, the bidder will accept and perform under the terms of the Invitation for Bids and purchase order or contract.

5. A list of Bidders proposed staffing to provide services; including primary and back up assignments. Include resumes and credentials for the personnel to be assigned to this service contract. The personnel named in the bid shall remain assigned to the project throughout the period of the service contract. No replacement may be made without submission of a resume and credentials for approval by the County. A background investigation for the replacement will be required.

6. A list of client references of similar service contracts, including at least three (3) customers. These references must include name, address, and telephone number.

7. If substitutions are made to specific component items identified in this IFB, the Bidder shall clearly indicate exception being taken. Exceptions to the bid must be clearly identified, and reasons for the exception clearly stated. Information concerning the items substituted must present clear evidence that the component specified is improper or unnecessary for the intended use, and/or the substituted component is equal or better than that specified by the County.

8. A copy of any applicable Federal, State, or Local license required to legally perform the service, or sell the goods specified in the IFB shall be attached to the bid.

9. A certificate of insurance for all required coverages endorsing the County of Louisa to the insurance policy as an additional insured.

10. Bidders are reminded that changes to the IFB, in the form of addenda, are often issued between the issue date and within 5 days of the due date of the solicitation. All addenda must be acknowledged on the IFB Title Page. Notice of addenda will be posted on eVA and on the County of Louisa procurement page https://www.louisacounty.gov/Bids.aspx. It is the bidder's responsibility to monitor the webpage for the most current addenda.

11. If submitting electronically through eVA, **One (1) electronic document** in WORD format or searchable PDF of the entire bid as one document, INCLUDING ALL ATTACHMENTS must be uploaded through the eVA online submission portal.

12. Should the proposal contain **proprietary information**, provide **one (1) redacted electronic copy** of the bid and attachments **with proprietary portions removed or blacked out**. This redacted copy should follow the same upload procedures as described on item III. B. of this RFP. This redacted copy should be clearly marked *"Redacted Copy"* within the name of the document. The classification of an entire proposal document, line item prices and/or total proposal prices as proprietary or trade secrets is not acceptable. Louisa County shall not be responsible for the Contractor's failure to exclude proprietary information from this redacted copy.

The Bid Form, the bid security, if any, and any other documents required, shall be enclosed in a sealed opaque envelope. Any notation or notations on the exterior of the envelope purporting to alter, amend, modify, or revise the bid contained within the envelope shall be of no effect and shall be disregarded.

The IFB number and closing date must be clearly marked on the outside of the sealed envelope. Each sealed envelope containing a Bid must be plainly marked on the outside as follows:

1. Airfield Lighting Upgrades
2. IFB# LKU-26-08
3. Name of the Bidder
4. Address of the Bidder
5. Due Date and Time: 07/14/26 @ 3:30 p.m.
6. A Statement reading "This container is not to be opened prior to the Bid Opening."

Should any Bid be received which is not so identified, the bidder assumes the risk that the submission will be opened prior to the Bid Opening. Bids so opened shall be disqualified.

This solicitation will close on July 14, 2026 at 3:30 p.m., local time prevailing.

Return the bid to:

Mail to: (US Mail)
County of Louisa
1 Woolfolk Avenue
Suite 304
Louisa, VA 23093
Attn: Sam Massie
(540) 967-3404

or Hand Delivery (FEDEX, UPS, etc.)
County of Louisa
Louisa County Administration Building
Finance Department, 2nd Floor
1 Woolfolk Avenue
Suite 304
Louisa, VA 23093
Attn: Sam Massie
(540) 967-3404

C. <u>SUBMISSION OF PROPRIETARY INFORMATION:</u> All information submitted to the County in response to this solicitation will constitute public information and will be available to the public for inspection upon request pursuant to the Virginia Freedom of Information Act (FOIA).

Pursuant to Virginia Code Section 2.2-4342 and County of Louisa Code Section 60-24, a Bidder/Offeror may request an exception to disclosure for trade secrets or proprietary information as such is defined under Virginia Code Section 59.1-336, part of the Uniform Trade Secrets Act.

In order to claim this exemption, the Bidder/Offeror shall perform ALL of the following: (i) include a written request indicating Bidder/Offeror's desire to invoke the protections of Virginia Code Section 2.2-4342 with submitted proposal materials/data; (ii) specifically identify the data or other materials to be protected by clearly labeling each page containing applicable data as PROPRIETARY; and (iii) to the County's satisfaction, articulate the rationale for why protection for the particular data or materials is necessary. The classification of an entire bid or proposal document, line item prices and/or total bid or proposal prices as proprietary or trade secrets is not acceptable.

Without waiving sovereign immunity or any other available defenses, the County asserts that failure to meet all of these requirements will result in the data or materials being open for inspection in response to a valid inquiry under FOIA and will serve to waive any right of the Bidder/Offeror to assert a claim against the County for disclosure of trade secrets or proprietary information.

Bidder/Offeror shall be responsible for intervening and defending, at its expense, any demands made upon the County by third parties for production of any such items.

D. <u>RECEIPT OF BIDS/LATE BIDS:</u> It is the Bidders responsibility to ensure that his/her bid is received prior to or at the specific time and the place designated in the solicitation. **Bids received after the date and time specified shall not be considered.**

Bids will be opened at the time and place stated in the advertisement, and their contents made public for the information of bidders and others interested who may be present either in person or by representative. The County personnel whose duty it is to open the bids will decide when the specified time has arrived.

Bids shall be addressed as indicated in the Advertisement for Bids and shall be delivered, enclosed in a sealed envelope, marked "Bid" and bearing the title of the work, name of the bidder, and the contractor's license number of the bidder. Bidders shall clearly mark on the outside of the bid envelope which contract(s) they are bidding.

No responsibility will be attached to any County personnel for the premature opening of a bid not properly addressed and identified on the outside of a sealed envelope.

IV. METHOD OF SELECTION:

After the Sealed Bids have been opened, the County shall prepare a list of those contractors who have submitted bids and met the qualifications listed in this offering. Award shall be given based on the lowest responsive and responsible bidder. In case of arithmetic errors, the unit price will govern. The County of Louisa may cancel this IFB in whole or in part or reject any or all bids at any time prior to award. Should the County determine that a bidder is not qualified; the bidder shall be notified in writing of that determination and the reason. The award document will be a contract incorporating by reference all requirements, terms, and conditions of the solicitation of this offer.

The County reserves the right to evaluate any sources of information available.

Description	Unit	Quantity	Price per Unit	Item Total
Mobilization	LS	1	$	$
Temporary Construction Entrance	EA	1	$	$
Installation and Removal of Temporary Silt Fence	LF	1500	$	$
Temporary Culvert Inlet Protection	EA	1	$	$
Closed Runway Markers	EA	2	$	$
Traffic Drums	EA	20	$	$
Low Profile Aviation Barriers	LF	200	$	$
Clearing and Grubbing	AC	1	$	$
Unclassified Excavation	CY	1500	$	$
#8 AWG, 5KV, L-824, Type C Cable Installed in Conduit	LF	5000	$	$
#8 600V, Type C Cable Installed in Conduit	LF	3000	$	$
#6 Bare Copper Counterpoise	LF	2000	$	$
15 Kw L-828 Ferroresonant Constant Current Regulator, 3-Step	EA	1	$	$
2" Schedule 40 PVC Electrical Conduit	LF	1500	$	$
L-881 4 Box Precision Approach Path Indicator System Installation	EA	2	$	$
L-859I, Omni Directional Approach Lighting System	LS	1	$	$
Permanent Seeding	AC	2	$	$
Topsoiling	CY	100	$	$
Permanent Mulching	AC	2	$	$
Jute Mesh	SY	100	$	$
Provide and Install Tower #2 Including Foundation	LS	1	$	$
Provide and Install Tower #3 Including Foundation	LS	1	$	$
Provide and Install Tower #4 Including Foundation	LS	1	$	$
Provide and Install Tower #5 Including Foundation	LS	1	$	$
Staging Area	LS	1	$	$
Airfield Electrical Demolition	LS	1	$	$
Ground Rod Installation	EA	8	$	$
Airfield Lighting Protection	LS	1	$	$
Circuit Verification	LS	1	$	$
Electrical Vault Modifications	LS	1	$	$

V. COUNTY OF LOUISA MASTER CONTRACT GENERAL CONDITIONS AGREEMENT

See Appendix A. Louisa County does not accept changes to the County of Louisa, Virginia Master Contract General Conditions Agreement, and any attempt by the Bidder to make such changes is in itself reason for a bid to be declared as non-responsive to the IFB and rejected by the County.

VI. BID PRICE SHEET

See Appendix A

VII. PLANS

VIII. SPECIFICATIONS

Appendix A

COUNTY OF LOUISA, VIRGINIA

MASTER CONTRACT

GENERAL CONDITIONS AGREEMENT

CONTRACTOR:

DATE:

MASTER CONTRACT GENERAL CONDITIONS AGREEMENT

THIS MASTER CONTRACT GENERAL CONDITIONS AGREEMENT (the "Master Agreement"), made and entered into this ____day of _____, by and between THE COUNTY OF LOUISA, a Local Governmental Agency (of which entities shall hereinafter be referred to as "Owner") and _____, a _____corporation/partnership/ sole proprietorship *[strike through what does not apply]* (hereinafter referred to as "Contractor").

WITNESSETH:

WHEREAS, either entity referred to as Owner may from time to time contract with third parties to perform certain construction work and furnish certain materials (the "Work") on various projects (the "Project(s)"); and

WHEREAS, the applicable Owner may engage Contractor to perform a portion of the Work under such contracts entered into by it; and

WHEREAS, the parties hereto desire to enter into this Master Agreement to set forth the general conditions of contracts between them for Projects in order to expedite the contracting process at the time of future Projects.

NOW THEREFORE, in consideration of the mutual covenants herein and other good and valuable consideration, the receipt and sufficiency of which is hereby confirmed, the parties hereto agree as follows:

GENERAL

1. This Master Agreement shall only be given effect with regard to a particular contract between Contractor and one of the entities referred to as Owner if it is explicitly made a part of the Contract by the terms of the Contractor Agreement, by which the applicable Owner engages Contractor for a particular Project. In order to standardize the incorporation of this Master Agreement into the Contract between the parties, the form "stamp" attached hereto as Exhibit A may be used to incorporate the terms of this Master Agreement into each Contract to which such stamp is affixed. This provision shall not prohibit incorporation of this Master Agreement in the absence of the attached stamp, or through an alternative stamp or language agreed to by the parties.

2. This Master Agreement shall not be deemed or construed to obligate either entity referred to as Owner to engage Contractor nor to obligate Contractor to accept contracting work from either entity referred to as Owner. Additionally, this Master Agreement shall not be deemed or construed to make either entity referred to as Owner liable for the contractual obligations of the other entity referred to as Owner. The liable entity shall be the entity referenced as Owner in the particular Contract.

1. CONFLICTS

1.1 Priorities. In the event of conflicts or discrepancies between the Contract Documents, Invitation for Bid (IFB) or Request for Quotation (RFQ), (as such term is defined in the Contractor Agreement), interpretations will be based on the following priorities: (i) the Contract Agreement, (ii) this Master Agreement, (iii) Addenda, with those of a later date having precedence over those of an earlier date, (iv) the Prime Contract (as such term is defined in the Contractor Agreement), with subsequent addenda, including Modifications and Supplementary Conditions, having precedence over the original documents, and (v) Drawings and/or Specifications. In case of an inconsistency between Drawings and/or Specifications or within other documents not clarified by an Addendum, the more specific provision will take precedence over the less specific, the more stringent will take precedence over the less stringent, the more expensive item will take precedence over the less expensive, and the better quality or greater quantity of work shall be provided. On all Drawings (if applicable), figures shall take precedence over scaled dimensions. Scaled dimensions shall be relied upon by the Contractor at the Contractor's own risk (if applicable). Notwithstanding the foregoing or any other provision of this Master Agreement to the contrary, in no event shall Contractor have greater rights with regard to any item or matter under the Contract than Owner has, and is able to successfully enforce, with regard to the comparable item or matter under the Prime Contract.

1.2 Inconsistencies and Omissions. Should inconsistencies or omissions appear in the Contract Documents, Invitation for Bid (IFB) or Request for Quotation (RFQ), the Contractor shall notify Owner of same in writing within three (3) business days of the Contractor's discovery thereof. Upon receipt of Contractor's notice of such an inconsistency or omission, Owner shall instruct the Contractor as to the measures to be taken, if any, and the Contractor shall comply with Owner's instructions.

2. PERFORMANCE AND PAYMENT BONDS

2.1 Bonds. Owner shall have the right to require the furnishing by Contractor of performance and/or payment bonds, in form and from a surety acceptable to Owner, in the full amount of each Contract, with the expense of such bond(s) being assigned pursuant to the Contract Agreement.

2.2 Additional Security. If Contractor has not been required to furnish bonds, Owner may at any time instruct Contractor in writing to provide performance and/or payment bonds within ten (10) days, in a form and from a surety acceptable to Owner, in an amount up to the then current full value of the Contract. In such event, Owner will reimburse Contractor for the amount of the bond cost. In the event Contractor cannot provide such bonds, Owner may require other security as it deems appropriate, at its sole discretion, or it may terminate the Contract for default, pursuant to Article 13 of this Master Agreement.

3. PAYMENT

3.1 Progress Payments. Progress payments of the Contract Price (as such term is defined in the Contract Agreement) shall be due Contractor, subject to the conditions precedent established by Section 3.3, in the amount of the Contractor's Work (as such term is defined in the Contract Agreement) then completed and approved, less the percentage for retainage (if applicable) provided for in the Contract Agreement, unless a greater rate of retainage (if applicable) is required under the Prime Contract. If a greater rate of retainage (if applicable) is required under the Prime Contract, the parties shall use the greater rate. For the purpose of determining the amount of progress payments, Contractor shall furnish Owner, before its first application for progress payment, a Schedule of Values satisfactory to Owner, at Owner's sole discretion. If Owner disapproves of Contractor's Schedule of Values, Owner shall establish a reasonable breakdown, which shall serve as the basis for progress payments. Acceptance of progress payments under this Section 3.1 by Contractor shall constitute a waiver of any and all claims by the Contractor against the Owner, the Architect, the Engineer the Surety, the premises or any payment bond unless such claims are expressly reserved on the face of the application for payment, a copy of which is attached hereto as Exhibit B. Inclusion of any reservation of claims in a cover letter submitting the

application for payment shall not be sufficient to reserve such claim under this Section 3.1. The application for payment shall also include an affidavit and release/waiver of all claims and liens (if applicable) as described in Section 3.3 and in the form used by the Owner, unless a different form is required by the Owner.

3.2 Stored Materials. Unless otherwise provided in the Prime Contract, progress payments shall include the value of Stored Materials that Owner has approved. "Stored Materials" shall include materials and equipment not yet incorporated into Contractor's Work but delivered to and suitably stored at the site or at some other location agreed upon in writing. Approval of payment for Stored Materials shall be based on submission by Contractor of evidence satisfactory to Owner to protect Owner's interest in such Stored Materials, including transport to the site.

3.3 Conditions Precedent to Payment. It is specifically understood and agreed that Owner shall not process, nor pay, applications for progress payments from Contractor nor pay any other amount to Contractor unless and until each of the following conditions precedent to payment are met: (i) such applications include the Owner Job Number clearly thereon, (ii) Contractor shall provide, in a form satisfactory to Owner, partial lien waivers, release of claims and/or affidavits, as may be required by Owner, from Contractor and its subcontractors and suppliers for all prior payments and the payment then applied for. Owner's payment despite one or more of the foregoing conditions precedent not being satisfied shall not constitute a waiver of Owner's right to insist of any other condition precedent or all conditions precedent at some later time.

3.4 Time of Payment. Contractor shall submit progress payment applications in a form satisfactory to Owner no later than the day of each payment period provided for in the Contract Agreement, indicating work completed and, to the extent allowed under Section 3.2, Stored Materials stored during the preceding payment period. Applications for payment that exceed the percentage of Contractor's Work in place will be placed on hold for thirty (30) days.

3.5 Failure of Contractor to Make Payment. Contractor shall ensure that all its subcontractors, employees, and suppliers are paid all amounts due in connection with the Contract. Owner may withhold any progress payments until Contractor submits evidence satisfactory to Owner that all amounts due in connection with a Contract have been paid. Further, in its sole discretion, Owner may pay any and all persons that have not received payment from Contractor due in connection with a Contract, whether or not a lien has been filed. If Owner is required to pay or indemnify any person hereunder, Contractor shall immediately reimburse Owner for the full amount of such cost. Contractor shall also immediately reimburse Owner for any amounts paid under Owner's payment bond in connection with a Contract or other Owner payments relating to a failure of Contractor to make payment, and indemnify Owner for failure of Contractor to make payment, and indemnify Owner for any other costs associated therewith, including Owner's attorney's fees.

3.6 Payment Not Acceptance. Payment to Contractor is specifically agreed not to constitute or imply acceptance by Owner of any portion of Contractor's work.

3.7 Transfer of Title. All material and work covered by progress payments received by Contractor shall become the property of Owner or, if the Prime Contract so provides, the property of the Owner. This provision does not affect Contractor's sole responsibility and liability for all such materials and work until final acceptance by Owner or the date set forth in the Prime Contract for the transfer of liability for property, whichever is later.

3.8 Right to Withhold Payment. Owner may withhold amounts otherwise due under a Contract or due under any other contractual arrangement between the parties to compensate Owner for costs Owner has incurred or may incur for which Contractor may be responsible hereunder or otherwise. Appropriate adjustments to such withholding shall be made when the exact amounts owed hereunder are determined.

3.9 Final Payment. Final payment shall be made after completion of all work, acceptance by the Owner and compliance with all Contract obligations, all of which shall be conditions precedent to the making of final payment to the Contractor. Owner shall be entitled to proof of the Contractor's payment for labor, material and services used before any payment is due. The Contractor shall submit payroll affidavits if required. Material paid for shall belong to Owner, but shall remain in the care, custody and control of the Contractor and be stored at the Contractor's risk. The Contractor shall be responsible at all times for its labor and/or materials until accepted by the Owner. The Contractor shall furnish a Contractor Reconciliation Form, guarantees, final payment application and all other documents required by the Prime Contract for the Contractor's work, including releases of all claims and liens (if applicable) as a condition precedent to final payment. Any liquidated damages withheld by the Owner shall be asserted against the Contractor for any delay(s) attributable to the Contractor's fault.

Contractor acknowledges the importance of timely payment application to successful Project closeout. In consideration of this requirement, Contractor expressly agrees to submit its Final Payment Application and all required documentation within 30 days of its last work on the Project. Contractor further agrees that failure to submit its Final Payment Application within 90 days of its last work on the Project shall constitute a waiver of further payment.

Acceptance of final payment by Contractor shall constitute a full waiver and release by Contractor of all claims against Owner arising out of or relating to this Agreement.

4.0 SCHEDULE OF WORK

4.1 Schedule. Owner may require a schedule for this Project using CPM schedule techniques, simple bar charts, narrative, and/or other methodologies. The Contractor agrees to promptly provide the Owner a schedule properly depicting activities, including their costs and duration, at no additional cost to Owner. All such data shall be provided within seven (7) days of Owner's notice and request. Owner may at its option withhold making payments to the Contractor until the Contractor has provided said information.

4.2 Time Is Of The Essence. Time is of the essence in the Contractor's proper performance of its obligations under this Contract Agreement. Owner shall have the right to direct the manner in which the Contractor performs its work. The Contractor shall proceed with the performance of the work at such time and in such sequence as Owner may direct and/or as required by the Project Schedule, which may be updated and revised from time to time by Owner as working conditions require, including overtime performance as necessary. If overtime is required solely to accelerate project completion, it shall be authorized in writing and paid for by Owner. Payments due may be withheld to insure timely progress and completion of work. The Contractor shall be liable for all losses and damages incurred by Owner (including consequential damages) due to any inexcusable delay of the Contractor in the performance of the work.

4.3 Extensions of Time. The Contractor shall be entitled to an extension of time for performing and completing the work covered by this Contract upon the same terms and conditions under which and extension of time is allowable under the Prime Contract, but only to the extent that an extension of time is actually granted by the Owner or its representative under the Prime Contract. Notice of the excusable delay shall be given to Owner in writing as soon as possible after the beginning of said delay, but in any case, such notice must be given to Owner in no more than one half (1/2) of the time allowed under the provisions of the Prime Contract. If the Contractor fails to give such notice in a timely manner, then any entitlement to a time extension otherwise due the Contractor shall be deemed to be waived. The Owner's decision with regard to the delay, including any assessment of liquidated damages, shall be binding upon and chargeable to the Contractor, subject only to the disputes procedure provided in the Prime Contract.

4.4 Priority of Work. Contractor will coordinate Contractor's Work with the Work of Owner and other subcontractors to prevent or mitigate delays and interferences in the completion of any part or all of the Work. Owner shall have the right to decide the time, order and priority in which various portions of

the Work shall be performed and all other matters relative to the timely and orderly conduct of Contractor's Work. Owner shall not be responsible for any costs or damages related to the coordination of Contractor's Work with the Work of Owner and other subcontractors.

5. CONTRACTOR LIABLITY

5.1 Scope. Contractor shall be liable to Owner for all costs and other damages Owner incurs as a result of Contractor's failure to perform a Contract in accordance with its terms. Contractor's failure to perform shall include the failure of its suppliers, Materialmen, and/or subcontractors of any tier to perform. Contractor's liability shall include, but not limited to: (i) damages and other delay costs payable by the Owner; (ii) Owner's increased costs, such as extended overhead and increased costs resulting from Contractor-caused delays or improper Contractor's Work; (iii) warranty and rework costs; (iv) liability to third parties; (v) excess costs of re-procurement; and (vi) attorney's fees and related costs of resolving disputes related to Contractor's failure to perform.

5.2 Use of Equipment Owned by Others. If Contractor or any of its agents, employees, suppliers or lower-tier subcontractors use any machinery, equipment, tools, scaffolding, hoists, lifts or similar items belonging to or under control of Owner or other subcontractors or suppliers, Contractor assumes all risks of such use. Contractor shall be liable to and shall indemnify Owner for any loss or damage, including personal injury or death, which may arise from such use, except where such loss or damage shall be due solely to the negligence of Owner, its employees or other contractors.

5.3 Supervision and Work Inspection. The contractor shall have a competent and designated person in charge and outside for each mowing/landscape crew at all times.

5.4 Damages by the Contractor. Any damages to property or grounds as a result of Contractor operations shall be repaired/replaced within two (2) weeks of the date of damage by the Contractor, at no cost to the Owner. All incidents of damage by the Contractor and any discoveries of damage shall be reported to the Owner's contact person. If said damages are not repaired/replaced within (2) weeks of the date of damage, the Owner reserves the right to repair/replace the damages at its expense, and deduct such costs from the payment due the Contractor.

6. CHANGES AND CLAIMS

6.1 Changes. Owner may without notice to any sureties, direct changes in Contractor's Work at any time. Any changes to the Contractor's Work shall be in writing and Contractor shall perform the Contractor's Work, as changed, without delay. Contractor shall submit a price quotation within seven (7) days to Owner for changes requested in its quotation to Owner, which estimate shall be the maximum amount due Contractor for such changes. The costs of such changes shall be the direct cost to Contractor to perform same, plus a percent of such direct cost (the "Profit Percentage") representing overhead and profit. The amount of the Profit Percentage shall be established in the Contract Agreement for each Project.

6.2 Claims. Any claims for adjustment in the Contract Price, time for completion or other Contract provisions, shall be submitted to Owner, in writing, in sufficient time for Owner to review claims in accordance with the Prime Contract, but in no event later than 14 days after such costs are incurred or the cause of such adjustment is known or should be known to Contractor.

6.3 Claims Relating to Owner. As a precondition to any action against Owner, Contractor agrees to exhaust through Owner the remedies available under the Prime Contract, including suit for breach of contract against Owner. If Contractor has a claim or dispute, Contractor may proceed in accordance with the Section of this Master Agreement entitled "CHOICE OF LAW/VENUE". Contractor agrees to furnish all documents, statements, witnesses and other information required by Owner for reconciliation of claim. No dispute shall interfere with the progress of construction and the Contractor shall continue with Contractor's Work as directed.

7. INSPECTION AND ACCEPTANCE

7.1 Inspection of Work. Contractor shall provide appropriate facilities at all reasonable times for inspection by Owner of Contractor's Work and materials provided under a Contract, whether at the Project site or at any place where Contractor's Work or materials may be in preparation, manufacture, storage or installation. The Contractor will establish a firm schedule for recurring ground maintenance actions for each location. This schedule must be provided to Louisa County Department of Facilities Management before payment of the first month's invoice will be made. This schedule will be utilized to conduct random site checks to ensure contractor adherence to these specifications. Contractor must notify the Louisa County Department of Facilities Management in the event that they are not able to adhere to the established schedule during any particular week.

7.2 Correction of Defective Work. Contractor shall promptly replace or correct any work or materials which Owner shall reject as failing to conform to the requirements of a Contract no later than 72 hours from the date of notification by the Owner. If Contractor does not do so within this time frame, Owner shall have the right to replace or correct same and Contractor shall be liable to Owner for the cost thereof. If, in the opinion of Owner, it is not expedient to correct or replace all or any part of rejected work or materials, then Owner, at its option, may deduct from the payment due, or to become due, to Contractor, such amounts as, in Owner's judgment, will represent the higher of: (i) the difference between the fair value of the rejected work and materials and the value thereof, if it complied with the Contract, or (ii) the cost of correction.

7.3 Remedy for Wrongful Rejection. Contractor's remedy for wrongful rejection of work by Owner shall be limited to Owner's remedy for same under the Prime Contract, if any.

7.4 Acceptance. The Contractor's Work shall be accepted according to the terms of the Prime Contract. However, unless otherwise agreed in writing, entrance and use by Owner shall not constitute acceptance of the Contractor's Work.

8. SUBMITTALS

8.1 Timely Submission. Contractor shall timely prepare and submit to Owner all shop drawings, manufacturer's literature, MSDS data, samples and material lists as may be necessary to describe completely the details and construction of Contractor's Work. Such submittals shall be made in sufficient time so as not to delay performance of the Project. Any deviation from the Contract Documents shall be clearly identified in the submittals, and so stated, in writing, in separate correspondence. Approval of such submittals shall not relieve the Contractor of its obligation to perform Contractor's Work in strict accordance with the Contract Documents, nor of its responsibility for the proper matching and fitting of Contractor's Work with contiguous work and the work of other trades.

8.2 Status. If requested by Owner, Contractor shall furnish periodic progress reports on Contractor's Work including information on the status of materials and equipment under a Contract, which may be in the course of preparation or manufacture.

8.3 Liability. Responsibility for submission of appropriate shop drawings, samples, product literature, etc., is that of the Contractor. All submittals must be identified by submittal numbers corresponding to the Contractor's submittal log. In the event that a particular item is not identified on the log, the submittal may be identified without submittal number. Failure to obtain approved submittals may result in the rejection of installed work. The Contractor is liable for all costs associated with correction of their Work as a result of failure to obtain approved submittals prior to execution of Work.

9. CLEANUP

Unless Owner otherwise directs or agrees, Contractor shall, at its own expense, clean and remove from the Project all rubbish and debris resulting from the performance of Contractor's Work and, at the completion of Contractor's Work, in each area of the Project, perform such cleaning as may be required. Such removal shall be done in a manner that will not impede the progress of the Project.

10. LAWS, PERMITS, FEES AND PATENTS

10.1 Compliance. Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the performance of Contractor's Work on the Project. Contractor shall secure and pay for all permits and government fees, licenses, and arrange inspections necessary for the proper execution and completion of Contractor's Work. Contractor shall comply with Federal, State and Local tax laws, Social Security Acts, Unemployment Compensation Acts, Worker's Compensation Acts, equal employment opportunity laws, minority business enterprise laws, women's business enterprise laws, disadvantaged business enterprise laws, and Occupational Safety and health regulations insofar as applicable to the performance of Contractor's Work. Contractor shall be duly licensed to operate under the laws of the applicable jurisdictions.

10.2 Hold Harmless. Contractor agrees to hold Owner harmless against the payment of any and all losses, costs, expenses, contributions, taxes or premiums which may become due or payable under Federal, State or Local laws arising out of Contractor's failure to comply with the laws outlined in Section 10.1 above, including any interest or penalties. Contractor waives any and all claims for additional compensation because of any increase in taxes, contributions or premiums unless Owner agrees to such increases incurred by Contractor.

10.3 Patents and Royalties. Contractor agrees to pay all royalties and license fees owed by reason of performance of Contractor's Work on the Project. Contractor agrees to defend all suits or claims for infringement of any patent rights, due to the inclusion of patented materials in the Contractor's Work, that may be brought against Owner, and agrees to indemnify Owner for all loss, costs and expenses, including attorney's fees, on account thereof.

11. HEALTH AND SAFETY

11.1 Responsibility of Contractor. As relates to the Contractor's work, Contractor is responsible for the safety of the general public and workers engaged on or in the vicinity of the Project. Contractor agrees to comply with all Federal, State, Municipal and Local laws, ordinances, rules, regulations, codes, standards, orders, notices, and requirements concerning safety, as shall be applicable to the Work including among others, the Federal Occupational Safety and Health Act of 1970, as amended, and all standards, rules, regulations and orders which have been or shall be adopted or issued thereunder, and with the safety standards Owner establishes during the progress of the Work.

11.2 Stoppages Ordered by Owner. When so ordered by Owner, Contractor shall stop any part of the Contractor's Work, which Owner deems unsafe until corrective measures, satisfactory to Owner have been taken, and Contractor agrees that it shall not have, nor make any claim for damages growing out of such stoppages. Should Contractor neglect to take such corrective measures, Owner may do so at the cost and expense of Contractor and may deduct the cost thereof from any payment due or to become due to Contractor. Failure on the part of Owner to stop unsafe practices shall not be deemed acceptance or acquiescence by Owner of Contractor's means or methods or construction and shall in no way relieve Contractor of its responsibility therefore.

11.3 Hold Harmless. Contractor agrees to hold Owner harmless for all damages, costs and attorneys' fees arising out of, or relating to, Contractor's violation of any of the foregoing health and safety requirements, or for any accident involving Contractor's Work or work of their subcontractor's.

12. TERMINATION FOR CONVENIENCE

Owner shall have the right to terminate a Contract, without cause, for its convenience, when Owner determines that it is in its own best interests to so terminate the Contract. If a Contractor is terminated for convenience, Contractor shall comply with all of Owner's termination instructions and shall be entitled to receive payment for the portion of Contractor's Work actually completed and accepted, and a reasonable overhead and profit (to in no event exceed the Profit Percentage) in connection with such work, except that if the Prime Contract is also terminated for convenience or otherwise, termination settlement and costs to Contractor shall be as so provided in the Prime Contract, and in the amount actually received by Contractor from Owner for such portion of Contractor's Work. Contractor shall not be entitled to any recovery of profit or unabsorbed overhead in connection with portions of Contractor's Work not actually performed or future work.

13. SUBCONTRACTOR'S FAILURE OR INABILITY TO PERFORM

13.1 Causes for Termination. If, in the opinion of Owner, Contractor shall at any time: (i) refuse or fail to provide sufficient properly skilled workmen or materials of the proper quality; (ii) fail in any respect to prosecute Contractor's Work according to the current schedule; (iii) cause, by any action or omission, the stoppage or delay of or interference with, the Work of Owner or of any other builder or subcontractor; (iv) submit a false or misleading lien or claim waiver; (v) fail to make payments to its subcontractors, employees and suppliers; (vi) file a petition under the Bankruptcy code, make an assignment for the benefit of creditors or become insolvent; or (vii) otherwise fail to comply with all provisions of its Contract Documents then, after providing written notice to Contractor of such failure or default and the passage of twenty-four (24) hours from Contractor's receipt of such notice without such failure or default being fully remedied or cured, Owner, at its option may:

(a) take such steps as are necessary to remedy or cure the failure or default (without voiding or modifying the other provisions of the Contract and without notices to the sureties), in which case the Contractor shall be liable to Owner for all consequent costs, plus interest, and reasonable attorney's fees thereof;

(b) terminate the Contractor for default; or

(c) seek specific performance of Contractor's obligations under the Contract, it being agreed by Contractor that specific performance may be necessary to avoid irreparable harm to Owner.

13.2 Demand for Assurances. In the event Owner becomes concerned about Contractor's ability to continue performance under the Contract, Owner may demand that Contractor provide reasonable assurances of its ability for timely future performance of the Contract. Failure to comply with such a demand within ten (10) days of Contractor's receipt thereof shall entitle Owner to terminate the Contract for default.

13.3 Owner's Rights Upon Termination for Default. In the event of termination for default, Owner may, at its option: (i) enter on the premises and take possession, for the purpose of completing Contractor's Work, of all materials and equipment of Contractor; (ii) require Contractor to assign to Owner any or all of Contractor's subcontracts and purchase order involving the Project; or (iii) either by itself or through others complete Contractor's Work by whatever method Owner may deem expedient. In the event of termination for default, Contractor shall not be entitled to receive any further payment until Contractor's Work shall be fully completed and accepted by the Owner. At such time, if the unpaid balance of the Contract Price to be paid exceeds the expense incurred by Owner to so complete Contractor's Work and all attorneys' fees incurred by Owner as a result of such termination for default, such excess shall be paid by Owner to Subcontractor. However, if the expense incurred by Owner to so

complete Contractor's Work exceeds the unpaid balance of the Contract Price, then Contractor shall pay Owner such excess expense and all attorneys' fees incurred by Owner as a result of such termination for default.

13.4 Recourse Against Owner. If Owner wrongfully terminates Contractor, Owner shall be liable to Contractor for the costs Owner would have paid to Contractor if Owner had terminated Contractor for convenience. Contractor's aforesaid remedy shall be exclusive. Nothing hereunder shall prevent Owner from withholding monies from Contractor under other provisions of the Contract Documents.

13.5 Force Majeure. The performance of the Contract by either party shall be subject to acts of God, war, government regulation, natural disaster, strikes, civil disorder, curtailment of transportation or supply facilities or other emergency beyond the control and not of the making of either party, making it impossible to perform the obligations set forth in the Contract in accordance therewith. In the event such circumstances occur, if performance is totally impossible, either party may terminate the Contract without liability therefore. If partial performance is possible under the Contract, reasonable extensions of time for said performance shall be allowed.

14. WARRANTY

14.1 Scope of Warranty. Contractor warrants to the Owner that all materials and equipment furnished shall be new, unless otherwise specified, and that Contractor's Work shall be of good quality, free from faults and defects and in strict conformance with the Contract Documents. All materials and work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. This warranty shall be in addition to, and not in limitation of, any other warranty or remedy required by law or by the Contract Documents.

14.2 Term. Contractor will warrant the Work to the Owner as stated under the Prime Contract. If the Prime Contract does not state a specific warranty period, the Contractor warrants Contractor's Work for a period of one (1) year from the date of Substantial Completion of the entire Project. In no event shall Contractor's warranty period be less than or terminate earlier than Owner's warranty provision under the Prime Contract.

15. INSURANCE

15.1 Policies. Before commencing Contractor's Work, Contractor shall procure and maintain at its own expense until final acceptance of Contractor's Work by Owner, upon all of its operations and the operation of any of its subcontractors, suppliers or materialism on the Project, the following policies of insurance (and any additional policies or coverages required of the Owner under the Prime Contract) with insurers licensed to do business in the jurisdiction wherein the Project is located and acceptable to Owner and under forms of policies satisfactory to Owner and containing waivers of subrogation in favor of Owner:

(a) Worker's Compensation and Employer's Liability. Contractor shall procure and maintain Worker's Compensation and Employer's Liability Insurance covering all of its employees in conformance with the laws of any state, district or territory of the United States of America in which Contractor's Work is to be performed, except that such insurance shall not have a limit of liability less than the following:

(i) Bodily Injury by accident, $500,000 for each accident;
(ii) Bodily Injury by disease, $500,000 policy limit;
(iii) Bodily Injury by disease, $500,000 for each employee.

(b) Public Liability Insurance. Contractor shall procure and maintain Public Liability Insurance in an amount not less than $1,000,000 for any occurrence involving bodily injury, and not less than $1,000,000 for any occurrence involving property damage. This coverage shall include contractural liability, broad from property damage, independent Contractor and personal injury in support of the section of this Master Agreement entitled "IDEMNIFICATION".

This policy shall be endorsed to include Owner as additional insured's during the term of the Contract and shall state that this insurance is primary insurance as regards any other insurance carried by Owner. Insurance coverage is Primary and Non-Contributory to any other insurance of the above mentioned entities.

(c) Comprehensive Automobile Liability. Contractor shall procure and maintain Comprehensive Automobile Liability Insurance with the following limits:

Combined Single Limit of $1,000,000 per occurrence, including bodily injury and property damage. This policy shall be on a standard form written to cover all owned, hired and non-owned automobiles.

15.2 Notice and Right to Pay Premiums. Contractor shall provide Owner with copies of certificates of insurance coverage for all required coverages and proof of payment of all premiums. Insurance policies shall provide for notification to Owner of non-payment of any premium and shall give Owner the right to make the premium payment thereunder within a reasonable time. Any premium payments made by Owner shall be deducted from amounts due Contractor under the Contract. Insurance policies shall provide for thirty (30) days prior written notice to Owner of cancellation or modification.

16. INDEMNIFICATION

16.1 Contractor's Performance. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner (including its affiliates, parents and subsidiaries), the Owner's architect, engineer, and all other contractors and subcontractors involved in the Project and all of their officers, directors, agents and employees from and against all claims, damages, loss and expenses, including but not limited to attorney's fees, arising out of or resulting from the performance of the Contractor's Work provided that: (i) any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Contractor's Work itself) including the loss of use resulting therefrom, to the extent caused or alleged to be caused in whole or in any part by any negligent act or omission of the Contractor or anyone directly or indirectly employed by the Contractor or anyone for whose acts the Contractor may be liable, regardless of whether it is caused in part by the party indemnified hereunder; and (ii) such obligation shall not be construed to negate, or abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this Section.

16.2 No Limitation Upon Liability. In any/and all claims against the Owner (including its affiliates, parents and subsidiaries) and other contractors or subcontractors involved in a Project, or any of their officers, directors, agents or employees, by any employees of the Contractor, anyone directly or indirectly employed by the Contractor or anyone for whose acts the Contractor may be liable, the indemnification obligation under Section 16.1 shall not be limited in any way by benefits payable by or for the Contractor under Worker's or Workmen's Compensation Acts, disability benefits acts or other employee benefit acts or by the amount of general liability insurance carried or required to be carried hereunder by Contractor.

The indemnity provisions in this Section 16 and the remainder of this Master Agreement are entered into based on the agreement that additional consideration will be given on each Contract for the indemnification provisions contained herein.

16.3 Indemnity Obligations After Project Completion. The indemnity obligations herein shall survive the termination of the Contractor for any reason and shall survive both or either of the Contractor's and Owner's completion of the Work on the Project. In all instances, this indemnity obligation shall survive irrespective of whether the Contractor's insurance coverage, as required by the Master Agreement, has been maintained, changed, cancelled, or otherwise terminated since the termination of the Contract or since the Contractor's and/or Owner's completion of Work under the Project. It is strongly recommended that Contractor maintain its insurance with this requirement in mind.

17. LABOR POLICY

17.1 Project Personnel. Contractor and its subcontractors or suppliers shall not employ anyone engaged in Contractor's work whose employment is objected to by Owner.

17.2 Immigration Reform and Control Act Of 1986. By signing of this Master Contract, Contractor certifies that they do not and will not during the performance of this contract employ illegal alien workers or otherwise violate the provisions of the Federal Immigration Reform and Control Act of 1986, as amended and Section 40.1-11.1, Code of Virginia, which prohibits the employment of illegal aliens and (ii) will follow the provisions of Federal and State employment and wage hour laws.

17.3 Work Stoppage. Should any workers performing Contractor's Work engage in a strike or any other work stoppage or cease to work due to picketing or a labor dispute of any kind, said circumstances shall be deemed failure to perform the Contractor's Work on the part of the Contractor, entitling Owner to terminate the Contract for default.

17.4 Equal Employment Opportunity. Contractor shall not discriminate against any employee or employment applicant because of race, sex, color, religion, national origin, faith based organizational status or any other class or category prohibited by Federal, State or local laws or regulations. Contractor shall allow access to its books, records, and accounts by representatives of Owner for purpose of investigations to ascertain compliance with the foregoing provision. Those requirements shall be in addition to any similar provision of Equal Employment Opportunity in the Prime Contract. If Contractor fails to comply with the foregoing provisions, the Contract may be terminated for default. Notwithstanding the foregoing, the Owner shall not be deemed or construed to be responsible to oversee Contractor's compliance with the foregoing equal employment opportunity requirements, nor shall Owner be deemed or construed to be responsible for Contractor's failure to comply with such requirements.

17.5 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 so that the provisions will be binding upon each subcontractor or vendor.

For the 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, the employees of who 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.

17.6 Anti-Discrimination. All Contractor's must conform to the provisions of the Federal Civil Rights Act of 1964, as amended, as well as the Virginia Fair Employment Act of 1975, as amended, where applicable, the Virginia with Disabilities Act, The Americans with Disabilities Act, and Section 2.2-4359 of the Virginia Public Procurement Act which provides:

In every contract over $10,000 the provision in (a) and (b) below apply:

(a) During the performance of this contract, the Contractor agrees as follows:

(i) **The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, faith based organizational status, 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, notice setting forth the provisions of this non-discrimination clause.

(ii) 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.

(iii) Notices, advertisements and solicitations placed 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 provision of (a) above in every Contractor purchase order over $10,000 so that the provisions will be binding upon each subcontractor and vendor.

18. ASSIGNMENT AND SUBCONTRACTING

18.1 Assignment. Contractor agrees that it will not transfer, assign or delegate the Contract, or any payment due thereunder, without the prior written consent of Owner, which consent shall not be unreasonably withheld.

18.2 Subcontractors. Contractor agrees that all of its subcontractors and lower-tier suppliers will be subject to all terms and conditions of the Contract and the Contract Documents. Owner's consent to any subcontracting by Contractor shall not be deemed to create any contractural relationship between Owner and any subcontractor or supplier to whom Contractor's Work or any portion thereof is subcontracted to.

19. LIENS

At no time shall the Contractor permit any mechanics or similar lien to attach to Louisa County premises on account of labor, material or other claims furnished to the Contractor in connection with Work performed for the County of Louisa. If at any time, there shall be evidence of any lien or claim which if established Owner might become liable for, or which should in any event be charged to Contractor, Owner shall have the right: (i) to require Contractor to have same discharged, by posting a bond with the appropriate authorities, or otherwise, within five (5) days of notice; (ii) to retain, out of any payment due or thereafter to become due, an amount sufficient to indemnify the Owner against said lien or claim, including bond premiums and attorneys' fees, and to apply the same in such manner as Owner deems necessary to secure protection and/or satisfy such claims and liens. Should there be an insufficient unpaid balance to cover the costs incurred in discharging such a lien or claim, Contractor shall reimburse Owner the differences between the payments due Contractor and the costs incurred prior to final payment. Contractor shall provide Owner a release of liens and claims, in a form satisfactory to Owner, for all work performed under the Contract, as well as any other evidence Owner may require to demonstrate that there are not other liens or claims whatsoever outstanding against the Project.

20. CHOICE OF LAW/VENUE

20.1 Choice of Law. This Master Agreement and any Contracts entered into pursuant to this Master Agreement shall be construed and enforced in accordance with the laws of the Commonwealth of Virginia.

20.2 Consent to Jurisdiction. The Contractor expressly consents to the exclusive jurisdiction of the Courts of the Commonwealth of Virginia. The Contractor shall comply with applicable federal, state and local laws and regulations. The Contractor shall not raise and hereby expressly waives any jurisdictional defense related to any action brought in the Courts of the Commonwealth of Virginia relating to any matters arising out of and/or related to this Agreement. Additionally, subject to Section 21.3, Contractor shall not initiate any action other than in the State Courts of the Commonwealth of Virginia, specifically excluding the Federal Courts. Pursuant to this Section 21.2, Contractor also waives any right it may have to remove an action related to this Master Agreement of Federal Court.

20.3 Venue/Forum Selection. Exclusive venue for all actions arising out of or related to this Master Agreement shall be in Louisa County, Virginia. Pursuant to this clause, the Contractor and Owner expressly agree that Louisa County, Virginia, shall be the exclusive forum for the initiation and initial resolution of all actions arising out of or related to this Master Agreement or any Contract between the parties. The parties' choice of the above referenced forum shall prohibit the initiation and/or removal of any action in or to a Federal Court.

20.4 Waiver of Jury Trial. The parties expressly waive all rights to a trial by jury in any action arising out of or related to this Master Agreement.

20.5 Work Continuation and Payment. Unless the parties mutually agree otherwise, Contractor shall carry on Contractor's Work pending any action arising out of or related to this Master Agreement or any Contract between the parties. If Contractor carries on Contractor's Work and otherwise complies with the Contract, Owner shall continue to make progress payments in accordance with the Contract. This provision in no way limits Owner's right to terminate a Contract pursuant to the terms of this Master Agreement.

21. NOTICES

All notices hereunder required to be in writing shall be deemed duly given if delivered in person, by certified mail, return receipt requested, by registered mail, postage prepaid, by facsimile or by e-mail (electronic mail): if to Owner at 105 Woolfolk Avenue, PO Box 1980, Louisa, VA 23093, Attn: Mr. Jeff Ferrel, fax number: (540) 967-5818, and if to Contractor, at

_____

Attn:_____. The party to receive notices and that places notices are to be sent for either Owner or Contractor may be changed by notice given pursuant to the provisions of this Section. Notices given by facsimile or e-mail shall be deemed given as of the time and date shown to have been transmitted by the applicable facsimile transmission report or the e-mail header, provided however, that such facsimiles and/or e-mails delivered after 5:00 p.m. on a Friday shall be deemed delivered at 8:00 a.m. the following Monday morning.

22. ADVERTISING

Contractor shall not place any signs, billboards or posters on any portion of the site, building property or fences (temporary or permanent) surrounding the same, except upon prior written permission received from Owner, and then only of a size, material, color and type and at a location approved by Owner.

23. AUTHORIZED REPRESENTATIVE

The Owner and Contractor shall each designate in the Contract Agreement a person who shall be their authorized representative on-site and off-site with regard to the Project. Such authorized representatives shall be the only persons to issue and receive instruction, orders or directions, except in an emergency.

24. SEVERABILITY AND WAIVER

The partial or complete invalidity of any one or more provisions of Contract shall not affect the validity or continuing force and effect of any other provision. The failure of Owner to insist, in any one or more instances, upon the performance of any of the terms, covenants or conditions of a Contract, or to exercise any right thereunder, shall not be construed as a waiver or relinquishment of such term, covenant, condition or rights as respects further performance of the Contractor.

25. TITLES

The titles given to the Sections of this Master Agreement are for ease of reference only and shall not be relied upon or cited for any other purpose.

26. COUNTY ATTORNEY APPROVAL

This Master Agreement, in its standard form, has been reviewed and approved as to form by the Louisa County Attorney. Any alterations to this Master Agreement by the Architect or Engineer are invalid without subsequent review and approval as to form by the Louisa County Attorney.

IN WITNESS WHEREOF, the parties by their duly authorized representative, have hereunto executed this Master Agreement, on the day and year above written.

OWNER:

County Of Louisa
PO Box 160
Louisa, Virginia 23093

Attest/Witness:

_____

By:_____
Name: Christian Goodwin
Title: County Administrator

CONTRACTOR:

_____

Attest/Witness:

_____

By:_____
Name:
Title:

EXHIBIT A

MASTER CONTRACTOR AGREEMENT INCOPORATION STAMP

The Master Contractor General Conditions Agreement in force between the parties at the time of this Contract, including all amendments thereto, is incorporated herein by reference as if fully set forth herein.

_____
Owner

Company: County of Louisa
Authorized Signer: Christian Goodwin
Address 1: PO Box 160
Address: Louisa, Virginia 23093
Phone: 540-967-0401

_____
Contractor

Company: _____
Authorized Signer: _____
Address 1: _____
Address 2: _____
Phone: _____

APPENDIX A
BID PRICE SHEET

Airfield Lighting Upgrades
IFB # LKU-26-08

Spec No.	Description	Unit	Quantity	Price per Unit	Item Total
C-105	Mobilization	LS	1	$	$
C-102	Temporary Construction Entrance	EA	1	$	
C-102	Installation and Removal of Temporary Silt Fence	LF	1500	$	$
C-102	Temporary Culvert Inlet Protection	EA	1	$	$
M-103	Closed Runway Markers	EA	2	$	$
M-104	Traffic Drums	EA	20	$	$
M-107	Low Profile Aviation Barriers	LF	200	$	$
P-151	Clearing and Grubbing	AC	1	$	$
P-152	Unclassified Excavation	CY	1500	$	$
L-108	#8 AWG, 5KV, L-824, Type C Cable Installed in Conduit	LF	5000	$	$
L-108	#8 600V, Type C Cable Installed in Conduit	LF	3000	$	$
L-108	#6 Bare Copper Counterpoise	LF	2000	$	$
L-109	15 Kw L-828 Ferroresonant Constant Current Regulator, 3-Step	EA	1	$	$
L-110	2" Schedule 40 PVC Electrical Conduit	LF	1500	$	$
L-125	L-881 4 Box Precision Approach Path Indicator System Installation	EA	2	$	$
L-125	L-859I, Omni Directional Approach Lighting System	LS	1	$	$
T-901	Permanent Seeding	AC	2	$	$
T-905	Topsoiling	CY	100	$	$
T-908	Permanent Mulching	AC	2	$	$
VA-302	18” RCP Class III Pipe	LF	22	$	$
VA-606	Jute Mesh	SY	100	$	$
PSP-30	Provide and Install Tower #2 Including Foundation	LS	1	$	$
PSP-30	Provide and Install Tower #3 Including Foundation	LS	1	$	$
PSP-30	Provide and Install Tower #4 Including Foundation	LS	1	$	$
PSP-30	Provide and Install Tower #5 Including Foundation	LS	1	$	$
PSP-21	Staging Area	LS	1	$	$
PSP-26	Airfield Electrical Demolition	LS	1	$	$
PSP-23	Ground Rod Installation	EA	8	$	$
PSP-28	Airfield Lighting Protection	LS	1	$	$
PSP-29	Circuit Verification	LS	1	$	$
PSP-31	Electrical Vault Modifications	LS	1	$	$

Total: $_____

INSTALL PRECISION APPROACH PATH INDICATOR (RWY 9 & 27)
INSTALL SUPPLEMENTAL WINDCONE (RWY 9 & 27) & INSTALL OMNI-DIRECTIONAL APPROACH LIGHTING SYSTEM ODALS (RWY 27)

LOUISA COUNTY AIRPORT / FREEMAN FIELD
LOUISA COUNTY, VIRGINIA

PREPARED FOR

INDUSTRIAL DEVELOPMENT AUTHORITY OF LOUISA COUNTY

DOAV PROJECT NO. CS0078-25
TBI PROJECT NO. 3101-2402

MAY 2026

RESPONSIBLE LAND DISTURBER DESIGNATION

THE CONTRACTOR SHALL SUBMIT THE REQUIRED RLD INFORMATION WHEN APPLYING FOR THE LAND DISTURBANCE PERMIT.
CONTACT THE LOUISA COUNTY DEPARTMENT AT (540) 967-0401 FOR RLD FORMS.

THE CONTRACTOR SHALL BE THE OPERATOR OF THE PROJECT SITE FOR THE DURATION OF CONSTRUCTION IN ACCORDANCE WITH THE VSMP GENERAL PERMIT FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES. THE CONTRACTOR SHALL FILE THE REQUIRED REGISTRATION STATEMENT AND NOTICE OF TERMINATION, PAY ALL ASSOCIATED FEES, PREPARE, IMPLEMENT AND UPDATE (AS NEEDED) THE STORM WATER POLLUTION PREVENTION PLAN, AND CONDUCT AND DOCUMENT REGULAR SITE INSPECTION AS REQUIRED.

ENVIRONMENTAL NOTE:

A CATEGORICAL EXCLUSION WAS PREPARED AND APPROVED BY THE FEDERAL AVIATION ADMINISTRATION ON JULY 11, 2024. BASED ON THIS APPROVAL, NO FURTHER NEPA ACTION IS REQUIRED FOR THIS DEVELOPMENT.

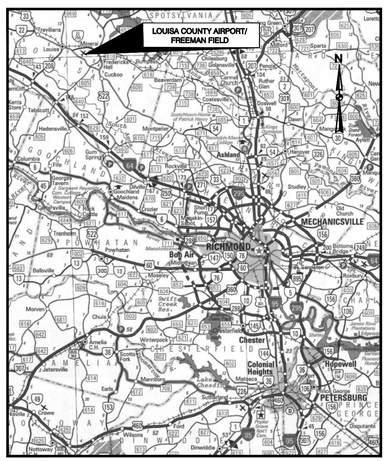
PROJECT SOIL TYPES

NoB2 - NASON SILT LOAM, 2 TO 7 PERCENT SLOPES, ERODED.
ERODIBILITY - K = 0.43
PERMEABILITY - 0.57 TO 1.98 IN/HR
DEPTH - 48" TO 60"
TEXTURE - SILT LOAM
HSG - B

PROJECT INFORMATION

OWNER:	LOUISA COUNTY AIRPORT INDUSTRIAL DEVELOPMENT AUTHORITY OF LOUISA COUNTY BRITTANY SHUPE, AIRPORT MANAGER
ADDRESS:	335 INDUSTRIAL DRIVE, LOUISA VIRGINIA 23093
PHONE NO:	(540) 967-0050
TAX PARCEL NO:	41 205, 41 190, 41 204, 41 191
ZONING:	I 2 (INDUSTRIAL)
MAGISTERIAL DISTRICT:	LOUISA
VOTING DISTRICT:	401 MINERAL
TOTAL AIRPORT AREA:	259.452 AC

	EXISTING	PROPOSED	TOTAL
EXISTING AIRPORT BUILDING AREA:	2.31 AC 0.8903%	0.0 AC 0.0%	2.31 AC 0.8903%
PERCENT AIRPORT IMPERVIOUS: (BLDG & PAVEMENT)	24.15 AC 9.31%	0.36 AC 0.14%	24.51 AC 9.45%



VICINITY MAP
SCALE: 1"=13 MILES (APPROXIMATELY)

PLAN APPROVAL SIGNATURE BLOCK

SIGNATURE: DATE:

LOUISA COUNTY COMMUNITY DEVELOPMENT DEPARTMENT

LOUISA COUNTY WATER AUTHORITY

LOUISA COUNTY BUILDING OFFICIAL

LOUISA COUNTY DEPARTMENT OF EMERGENCY SERVICES

VIRGINIA DEPARTMENT OF HEALTH

VIRGINIA DEPARTMENT OF TRANSPORTATION

SHEET INDEX

NO.	TITLE
1	COVER SHEET
2	DEQ PLAN SUBMISSION CHECKLIST
3	GENERAL LAYOUT
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8	ELECTRICAL VAULT DETAILS
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12	EROSION & SEDIMENT CONTROL NOTES
13	EROSION & SEDIMENT CONTROL DETAILS
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15	ELECTRICAL DETAILS
16	MISCELLANEOUS DETAILS
17	PRE-DEVELOPED DRAINAGE AREA MAP
18	POST-DEVELOPED DRAINAGE AREA MAP

APPROVED
Stormwater Management Plan
Commonwealth of Virginia
DEQ Water Division
Plan Reviewer:
Date: May 7, 2026
DEQ Plan # 2025-0440
☐ Standard Approval
☐ Streamlined Approval
☐ Administrative Approval
☒ De Minimis Approval

TALBERT&BRIGHT
ENGINEERING & PLANNING CONSULTANTS
10105 KRAUSE ROAD, SUITE 100
CHESTERFIELD, VIRGINIA 23832
PHONE: 804/768-6878 FAX: 804/768-6871

REV.	DESCRIPTION	DATE
V	DEQ/COUNTY COMMENTS	4-2-26

COVER SHEET
Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25
Louisa County Airport/Freeman Field - Louisa, Virginia

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COMMONWEALTH OF VIRGINIA
STEVEN T. PETERSON
Lic. No. 038457
5-1-26
PROFESSIONAL ENGINEER

Date	MAY 2026
Scale	NONE
Drawn	REK
Checked	STP
Project No.	3101–2402
Sheet No.	1
Of	18

S:\Projects\Louisa County (LKU)\3101-2402 Lighting Upgrades (Design)\CAD\Drawings\3101-2402 CS.dwg

PLAN SUBMISSION CHECKLIST

[SEE DEQ GUIDANCE MEMO NO. 22-2012 FOR ADDITIONAL INSTRUCTIONS]

A. APPLICATION TYPE

_X_ INITIAL SUBMISSION
___ RESUBMISSION — DEQ PLAN # : __ TBD __
___ MODIFICATION with ACREAGE INCREASE — DEQ PLAN # : _____
___ MODIFICATION without ACREAGE INCREASE — DEQ PLAN # : _____

B. DESIGN PROFESSIONAL

CONTACT NAME: STEVEN T. PETERSON, P.E.
MAILING ADDRESS: 10105 KRAUSE RD, SUITE 100, CHESTERFIELD, VA 23832
TELEPHONE NO: 804-768-6878
EMAIL ADDRESS: SPETERSON@TBIRIC.COM

C. PROJECT DEVELOPER

PROJECT DEVELOPER: LOUISA COUNTY AIRPORT
CONTACT NAME: BRITTANY SHUPE - AIRPORT MANAGER
MAILING ADDRESS: 335 INDUSTRIAL DRIVE, LOUISA, VA. 23093
TELEPHONE NO: (540) 967-0050
EMAIL ADDRESS: bshupe@louisacounty.gov

D. PROPERTY OWNER

PROPERTY OWNER: LOUISA COUNTY AIRPORT - LOUISA COUNTY, VA
CONTACT NAME: BRITTANY SHUPE, AIRPORT MANAGER
MAILING ADDRESS: 335 INDUSTRIAL DR LOUISA VA 23093
TELEPHONE NO: (540) 967-0050
EMAIL ADDRESS: bshupe@louisacounty.gov

E. PROJECT INFORMATION

PROJECT NAME: INSTALL PRECISION APPROACH PATH INDICATOR (RWY 9 & 27), INSTALL SUPPLEMENTAL WINDCONE (RWY 9 & 27) & INSTALL OMNI-DIRECTIONAL APPROACH LIGHTING SYSTEM ODALS (RWY27)
ADDRESS (911 ADDRESS IF AVAILABLE): LOUISA COUNTY AIRPORT 335 INDUSTRIAL DRIVE
COUNTY (IF NOT LOCATED WITHIN A CITY): LOUISA
TAX MAP NO. (OR GPIN): 41 5 1
LATITUDE (6 DIGITS, DECIMAL DEGREES): 38.0102
LONGITUDE (6 DIGITS, DECIMAL DEGREES): -77.9633
TOTAL LAND AREA OF DEVELOPMENT (1/100th ACRE): 175.50
ESTIMATED AREA TO BE DISTURBED (1/100th ACRE): 1.33
PROJECT STATUS: ___ FEDERAL ___ STATE _X_ PUBLIC ___ PRIVATE
PART OF A LARGER COMMON PLAN OF DEVELOPMENT? _X_ YES ___ NO
OFFSITE IMPROVEMENTS PROPOSED? ___ YES _X_ NO

F. OFFSITE SUPPORT ACTIVITY INFORMATION

OFFSITE SUPPORT ACTIVITY NAME: NO OFFSITE SUPPORT ACTIVITIES IDENTIFIED
ADDRESS (911 ADDRESS IF AVAILABLE):
COUNTY (IF NOT LOCATED WITHIN A CITY):
TAX MAP NO. (OR GPIN):
LATITUDE (6 DIGITS, DECIMAL DEGREES):
LONGITUDE (6 DIGITS, DECIMAL DEGREES):
ESTIMATED AREA TO BE DISTURBED (1/100th ACRE):

G. PLAN INFORMATION

GENERAL PLAN INFORMATION	SHEET NO.
1. VICINITY MAP	1
2. NORTH SCALE	1, 3-6, 10, 11, 17,18
3. PLAN LEGEND	3-6, 10, 11, 17,18
4. PLAN SCALE	1-18
5. SHEET INDEX	1-2

PRE-DEVELOPMENT SITE INFORMATION	SHEET NO.
6. NARRATIVE OF PRE-DEVELOPMENT SITE CONDITIONS	CALC. BOOK
7. EXISTING PROPERTY BOUNDARIES (INC. LEASE BOUNDARIES)	3-6, 10, 11, 17,18
8. EXISTING TOPOGRAPHY (EXISTING CONTOURS)	10, 11, 17, 18
9. EXISTING STREAMS, PONDS, DITCHES, WETLANDS & OTHER WATERS	11, 17, 18
10. EXISTING KARST FEATURES	N/A
11. EXISTING 100-YEAR FEMA FLOODPLAIN	N/A
12. RESOURCE PROTECTION AREAS	N/A
13. EXISTING IMPROVEMENTS (BUILDINGS, ROADS, PARKING & UTILITIES)	3-6, 10, 11, 17,18
14. EXISTING VEGETATIVE AREAS (FOREST, OPEN SPACE & TURF)	3-6, 10, 11, 17,18
15. EXISTING LAND COVER / USE TABULATION	17, CALC. BOOK
16. EXISTING EASEMENTS (DEED BOOK/PAGE REF. OR INSTRUMENT #)	N/A
17. PRE-DEV. DRAINAGE AREAS (ACREAGE, DIVIDES & FLOW PATHS)	17

POST-DEVELOPMENT SITE INFORMATION	SHEET NO.
18. NARRATIVE OF POST-DEVELOPMENT SITE CONDITIONS	CALC. BOOK
19. PROPOSED PROPERTY BOUNDARIES (INC. LEASE BOUNDARIES)	N/A
20. PROPOSED LIMITS OF LAND DISTURBANCE (CLEARING & GRADING)	11,18
21. PROPOSED GRADING (PROPOSED CONTOURS INC. SWM PRACTICES)	11,18
22. PROPOSED 100-YEAR FLOODPLAIN	N/A
23. PROPOSED IMPROVEMENTS (BLDGS, ROADS, PARKING & UTILITIES)	11, 18
24. PROPOSED VEGETATIVE AREAS (FOREST, OPEN SPACE & TURF)	11, 18
25. PROPOSED LAND COVER / USE TABULATION	18, CALC. BOOK
26. PROPOSED EASEMENTS	N/A
27. POST-DEV. DRAINAGE AREAS (ACREAGE, DIVIDES & FLOW PATHS)	18

EROSION & SEDIMENT CONTROL INFORMATION	SHEET NO.
28. NARRATIVE OF PROP. EROSION & SEDIMENT CONTROLS	12
29. MINIMUM STANDARDS (9VAC25-840-40)	12
30. CRITICAL EROSION AREAS (VESCH, CHAPTER 6)	12
31. PROP. EROSION & SEDIMENT CONTROLS (VESCH, CHAPTER 3)	11-12
32. EROSION & SEDIMENT CONTROL DETAIL DRAWINGS	13
33. HYDROLOGIC & HYDRAULIC COMPUTATIONS	CALC. BOOK
34. INSPECTION, OPERATION & MAINTENANCE REQUIREMENTS	12

G. PLAN INFORMATION (CONT.)

POST-DEVELOPMENT WATER QUANTITY & WATER QUALITY INFO.	SHEET NO.
35. NARRATIVE OF PROP. SWM FACILITIES / PRACTICES	N/A
36. PROP. SWM FACILITIES / PRACTICES	N/A
37. HYDROLOGIC & HYDRAULIC COMPUTATIONS *	CALC. BOOK
38. LONG-TERM INSP., OPERATION & MAINTENANCE REQUIREMENTS	N/A
39. OUTFALL SUMMARY TABLE WITH PRE, POST, AND ALLOWABLE DISCHARGE RATES USED FOR QUANTITY ASSESSMENT; IDENTIFY THE TYPE OF CONVEYANCE SYSTEM AT EACH POINT OF DISCHARGE	CALC. BOOK

* STORM DRAIN DESIGN COMPUTATIONS AND HYDRAULIC GRADE LINE COMPUTATIONS SHOULD BE PROVIDED AND SHOULD INCLUDE EACH PIPE SEGMENT. IN ADDITION, STORM SEWER LONGITUDINAL PROFILES WITH HYDRAULIC GRADE LINE ELEVATIONS SHOULD BE INCLUDED FOR VISUAL REPRESENTATION. DESIGN CALCULATIONS AND CROSS-SECTIONS SHOULD BE PROVIDED FOR ALL OPEN MANMADE CHANNELS. CROSS-SECTIONS SHOULD SHOW AND LABEL THE 1-YEAR, 2-YEAR, AND 10-YEAR WATER SURFACE ELEVATIONS.

SOILS & GEOTECHNICAL INFORMATION	SHEET NO.
40. SOILS MAP (INC. NRCS SOIL TYPES)	CALC. BOOK, 11
41. SOILS TABULATION	2, CALC. BOOK
42. GEOTECHNICAL INVESTIGATION / REPORT	CALC. BOOK

OTHER SUPPORTING INFORMATION	SHEET NO.
43. BOUNDARY SURVEY (18VAC10-20-370)	N/A
44. PHYSICAL IMPROVEMENT SURVEY (18VAC10-20-380)	N/A
45. TOPOGRAPHIC SURVEY (18VAC10-20-382)	11, 17, 18

H. LAND COVER TABULATION

EXISTING LAND COVER / USE	ACRES
1. IMPERVIOUS COVER	0.03
IMPERVIOUS COVER (% OF TOTAL LAND AREA OF DEVELOPMENT)	2.25%
2. MANAGED TURF	0.81
3. OPEN SPACE	0.00
4. FOREST COVER	0.49
5. PRIME FARMLAND (NRCS FARMLAND CLASSIFICATION)	0.00

PROPOSED LAND COVER / USE ("SITE" TAB OF VRRM SPREADSHEET)	ACRES
1. IMPERVIOUS COVER	0.39
IMPERVIOUS COVER (% OF TOTAL LAND AREA OF DEVELOPMENT)	29.3%
2. MANAGED TURF	0.94
3. OPEN SPACE	0.00
4. FOREST COVER	0.00

I. SOILS TABULATION

MAP UNIT SYMBOL	MAP UNIT NAME	HSG	K FACTOR	ERODIBILITY	ACRES IN LOD	% OF LOD
NoB2	NASON SILT LOAM	B	0.24	MODERATE	1.33	100

J. EROSION & SEDIMENT CONTROL

ESC PLAN VARIANCE REQUEST: ___ YES _X_ NO

IF "YES", PLEASE PROVIDE JUSTIFICATION FOR THE VARIANCE REQUEST:

K. STORMWATER MANAGEMENT

APPLICABLE DESIGN CRITERIA:
_X_ PART II B
___ PART II C (GRANDFATHERING)
___ PART II C (TIME LIMITS ON APPLICABILITY)
___ "SAFE HARBOR"

OFFSITE COMPLIANCE OPTION(S)? _X_ YES ___ NO

IF "YES", PLEASE DESCRIBE THE OFFSITE COMPLIANCE OPTION(S):
PURCHASE OF PHOSPHORUS NUTRIENT CREDITS IN THE AMOUNT OF 0.40 LBS; COORDINATION OF PURCHASE THROUGH ECO-CAP; CREDIT AVAILABILITY LETTER INCLUDED IN CALCULATIONS BOOK.

DISCHARGE TO A KARST FEATURE(S)? ___ YES _X_ NO

IF "YES", PLEASE DESCRIBE THE KARST FEATURE(S):

IF "YES", PLEASE DESCRIBE ANY KNOWN NATURAL HERITAGE RESOURCES IN THE KARST FEATURE(S):

SWM PLAN EXCEPTION REQUEST? ___ YES _X_ NO

IF "YES", PLEASE PROVIDE THE JUSTIFICATION FOR THE EXCEPTION REQUEST:

L. STORMWATER MANAGEMENT FACILITIES / PRACTICES

FACILITY NO.	FACILITY TYPE	LAT.	LONG.	REC. WATER	TOT. ACRES TREATED	IMP. ACRES TREATED	PLAN SHEET NO.
N/A	.	-	-	.	-	-	-
-	.	-	-	.	-	-	-

*A.

M. OWNER / DEVELOPER CERTIFICATION

I hereby certify that coverage under the General VPDES Permit for Discharges of Stormwater from Construction Activities will be obtained, if required, prior to commencing land-disturbing activities.

I hereby certify that all wetlands permits required by law will be obtained, if required, prior to commencing land disturbing activities.

I hereby certify that permission to construct any offsite improvements, if proposed, will be obtained prior to commencing land disturbing activities.

I hereby certify that all offsite nonpoint source nutrient credits will be obtained, if proposed, prior to commencing land disturbing activities.

I hereby certify that construction record drawings (as-built drawings) for all permanent stormwater management facilities/practices will be prepared and submitted to DEQ prior to project closeout. The construction record drawings will be appropriately sealed and by a professional registered in the Commonwealth of Virginia, certifying that the stormwater management facilities/practices have been constructed in accordance with the approved plan(s).

I hereby certify that a long-term maintenance agreement(s) for all permanent stormwater management facilities/practices and other techniques specified to manage the quality and quantity of runoff will be submitted to DEQ, if required, prior to project closeout. The long-term maintenance agreement(s) will be recorded in the local land records prior to termination of coverage under the General VPDES Permit for Discharges of Stormwater from Construction Activities.

OWNER / DEVELOPER NAME: MS. BRITTANY SHUPE
OWNER / DEVELOPER TITLE: AIRPORT MANAGER
SIGNATURE: Brittany Shupe
DATE: NOVEMBER 13, 2025

N. DESIGN PROFESSIONAL CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I hereby certify that the plans and hydrologic & hydraulic computations herein are in compliance with the Stormwater Management Act and attendant regulations, the Erosion and Sediment Control Law and attendant regulations, and applicable DEQ guidance.

DESIGN PROFESSIONAL NAME: STEVEN T. PETERSON, P.E.
LICENSE NO.: 038457
SIGNATURE: ~~~~~~~~~~~~~~~~
DATE: NOVEMBER 13, 2025

SOLAR SPECIFIC REQUIREMENTS

[SEE DEQ GUIDANCE MEMO NO. 22-2012, SECTION 5.500. CROSS "X" OUT IF NOT APPLICABLE]

I. INTERCONNECTION APPROVAL FOR SOLAR PROJECTS N/A

N/A PANELS ARE CONSIDERED "UNCONNECTED IMPERVIOUS"

N/A PANELS QUALIFY AS "PERVIOUS" WITH INTERCONNECTION DOCUMENTATION AND EXPLANATION PROVIDED BELOW:

II. SOLAR PANEL ARRAY HORIZONTAL PROJECTED AREA N/A

THE FOLLOWING EQUATION SHOULD BE USED TO DETERMINE A SOLAR PANEL'S HORIZONTAL PROJECTED AREA (HPA) WHEN PERFORMING EROSION AND SEDIMENT CONTROL, WATER QUANTITY, AND WATER QUALITY DESIGN COMPUTATIONS:

WHERE:

HPA = HORIZONTAL PROJECTED AREA (SQUARE-FEET)

L = SOLAR PANEL LENGTH (FEET)

W = SOLAR PANEL WIDTH (FEET)

θ = SOLAR PANEL MINIMUM OPERATING ANGLE FROM HORIZONTAL (DEGREES) FOR NORMAL OPERATIONS WITHOUT A RAIN SENSOR, OR THE MAXIMUM ANGLE FROM HORIZONTAL (DEGREES) WHEN A RAIN SENSOR IS DEPLOYED IN ACCORDANCE WITH DEQ GUIDANCE MEMO NO. GM 22-2012, SECTION 5.500 D

N/A NO RAIN SENSOR θ = N/A

N/A RAIN SENSOR SYSTEM PROVIDED θ = N/A

DOCUMENTATION OF DESIGN θ PROVIDED BELOW:

APPROVED
Stormwater Management Plan
Commonwealth of Virginia
DEQ Water Division
Plan Reviewer:
Date: May 7, 2026
DEQ Plan # 2025-0440
☐ Standard Approval
☐ Streamlined Approval
☐ Administrative Approval
☒ De Minimis Approval

DATE	REVISIONS	INITIAL

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TALBERT&BRIGHT
ENGINEERING & PLANNING CONSULTANTS
10105 KRAUSE ROAD, SUITE 100
CHESTERFIELD, VIRGINIA 23832
PHONE: 804-768-6878 FAX: 804-768-6871

REV.	DESCRIPTION REVISIONS	DATE

DEQ PLAN SUBMISSION CHECKLIST
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COMMONWEALTH OF VIRGINIA
STEVEN T. PETERSON
Lic. No. 038457
5-1-26
PROFESSIONAL ENGINEER

Date	MAY 2026
Scale	1" = 40'
Drawn	REK
Checked	STP
Project No.	3101-2402
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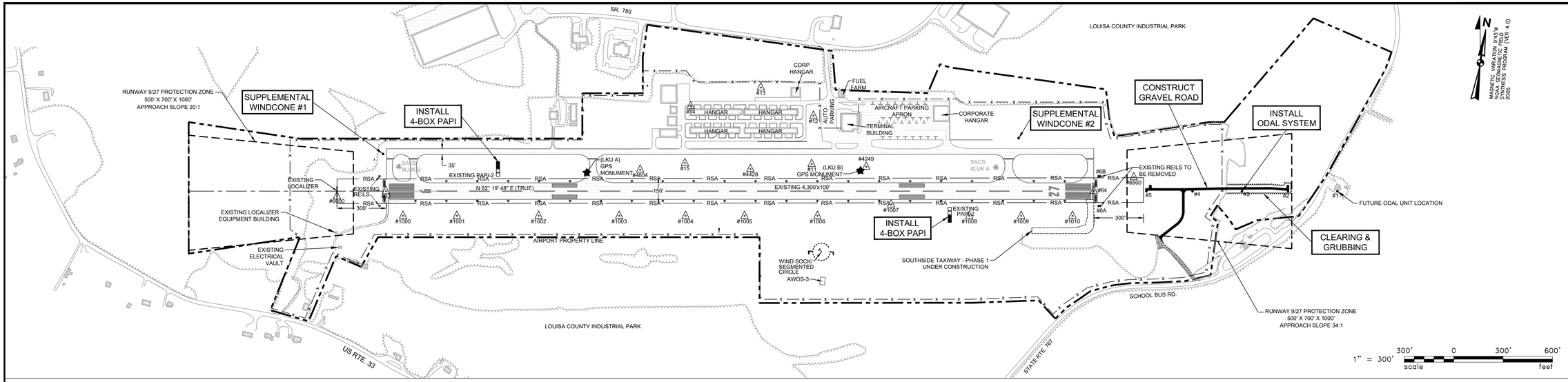

GENERAL NOTES

1. THESE NOTES COVER THE GENERAL REQUIREMENTS FOR CONSTRUCTION SERVICES NECESSARY TO PERFORM THE PROPOSED CONSTRUCTION. THE CONTRACTOR SHALL FURNISH ALL PLANT, LABOR, MATERIAL, EQUIPMENT AND TRANSPORTATION NECESSARY TO CONSTRUCT ALL ELEMENTS OF THIS PROJECT INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   - EROSION AND SEDIMENT CONTROL INSTALLATION
   - CLEARING AND GRUBBING
   - DEMOLITION
   - PAPI INSTALLATION
   - LOCATING, BOTH HORIZONTALLY AND VERTICALLY, ALL EXISTING UNDERGROUND UTILITIES
   - ACCESS ROAD CONSTRUCTION
   - ELECTRICAL VAULT IMPROVEMENTS
   - ALL OTHER MISCELLANEOUS ITEMS, INCLUDING SITE WORK SHOWN ON THE PLANS OR SPECIFIED IN THE PROJECT SPECIFICATIONS
2. THE CONTRACTOR SHALL MARK AND LIGHT AREAS UNDER CONSTRUCTION IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS. AIRCRAFT AND PUBLIC SAFETY SHALL NOT BE COMPROMISED AND PROPER SEPARATION SHALL BE MAINTAINED AT ALL TIMES. EQUIPMENT AND VEHICLES SHALL BE MARKED WITH 3' X 3' ORANGE AND WHITE CHECKERED FLAGS (DAY ONLY) OR YELLOW FLASHING DOME TYPE LIGHT (DAY OR NIGHT).
3. THE CONTRACTOR SHALL LOCATE AND PROTECT EXISTING UTILITIES AND FACILITIES FROM DAMAGE BY EQUIPMENT AND PERSONNEL. THE CONTRACTOR SHALL CONTACT ALL UTILITY AND FACILITY AGENCIES FOR FIELD MARKING BEFORE BEGINNING CONSTRUCTION. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES SHOWN (AND VERIFIED BY SURFACE OBSERVATION) ARE APPROXIMATE. THE CONTRACTOR SHALL PROVIDE A PRIVATE LOCATING COMPANY FOR AIRPORT OWNED UTILITIES.
4. THE CONTRACTOR SHALL ADVISE THE ENGINEER IN WRITING OF ANY EXISTING UTILITIES THAT ARE DAMAGED BEFORE BEGINNING CONSTRUCTION.
5. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN EXCAVATING IN AREAS OF EXISTING ELECTRICAL CABLES AND/OR UTILITIES. ANY KNOWN UTILITIES OR FACILITIES DAMAGED DURING CONSTRUCTION BY THE CONTRACTOR, THE CONTRACTOR'S MEN OR EQUIPMENT SHALL BE PROMPTLY REPAIRED AT THE CONTRACTOR'S EXPENSE. THE LOCATION OF ANY CABLES AND UTILITIES SHOWN IS APPROXIMATE ONLY. DEPTHS ARE NOT KNOWN. THE CONTRACTOR SHOULD ANTICIPATE HAND DIGGING AROUND EXISTING CABLES AS NECESSARY.
6. THE CONTRACTOR SHALL SEED AND MULCH ALL DISTURBED AREAS. THERE WILL BE NO MEASUREMENT FOR PAYMENT OF SEEDING AND MULCHING BEYOND THE CONSTRUCTION LIMITS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESEARCHING AND OBTAINING ALL PERMITS, LICENSES, FEES, ETC. REQUIRED BY LOCAL, STATE AND FEDERAL AGENCIES REGARDLESS OF TYPE.
8. NO EQUIPMENT OR PERSONNEL SHALL ENTER AIRCRAFT OPERATION AREA (RUNWAY, TAXIWAY, OR APRON) UNLESS PROPERLY COORDINATED WITH THE AIRPORT MANAGEMENT.
9. UPON NOTIFICATION FROM THE AIRPORT MANAGEMENT OR IN THE EVENT OF A DECLARED AIRCRAFT EMERGENCY, THE CONTRACTOR SHALL IMMEDIATELY CLEAR AN AIRPORT OPERATION AREA OF EQUIPMENT AND PERSONNEL.
10. THE CONTRACTOR SHALL BE REQUIRED TO RELOCATE THE AVIATION BARRICADES DURING THE PROJECT. MULTIPLE RELOCATIONS OF THE AVIATION BARRICADES SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT. THE LOCATION OF THE AVIATION BARRICADES, AS SHOWN ON THE PLANS, REPRESENTS THE MOST TYPICAL LOCATION.
11. ALL WASTE MATERIAL (TOPSOIL, BROKEN CONCRETE, ASPHALT, CRATING/PACKING MATERIALS, ETC.) SHALL BE DISPOSED OF OFFSITE BY THE CONTRACTOR.
12. THE OWNER RESERVES THE RIGHT TO CONTRACT AND PERFORM OTHER OR ADDITIONAL WORK ADJACENT TO AND WITHIN THE WORK AREA COVERED BY THIS CONTRACT. IT IS ANTICIPATED THAT OTHER WORK MAY BE COMPLETED BY AN INDEPENDENT CONTRACTOR(S) DURING THIS PROJECT. WHEN SEPARATE CONTRACTS ARE LET WITHIN THE LIMITS OF ANY ONE PROJECT, EACH CONTRACTOR SHALL CONDUCT HIS WORK SO AS NOT TO INTERFERE WITH OR HINDER THE PROGRESS OF THE WORK BEING COMPLETED BY OTHER CONTRACTORS. ANY ADDITIONAL EFFORT OR WORK REQUIRED FOR SUCH COORDINATION WITH OTHER CONTRACTORS SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT AND NO SEPARATE MEASUREMENT OR PAYMENT WILL BE MADE.
13. THE CONTRACTOR IS ADVISED THAT AIRCRAFT MAINTENANCE OPERATIONS ARE CONDUCTED ADJACENT TO THE PROJECT. SPECIAL ATTENTION TO DUST CONTROL WILL BE REQUIRED DURING THE PROJECT. THE ENGINEER RESERVES THE RIGHT TO HALT WORK OR HAULING IN NONCONFORMING AREAS IF CORRECTIVE ACTIONS ARE NOT PROMPTLY TAKEN BY THE CONTRACTOR TO CONTROL DUST. THIS WILL NOT CONSTITUTE A DELAY IN THE PROJECT.
14. NO DEBRIS OF ANY NATURE SHALL BE ALLOWED IN ACTIVE AIRCRAFT OPERATIONS AREAS. ALL LOOSE MATERIALS (DIRT, STONE, PAVEMENT, FORMING, ETC.) MUST BE KEPT WITHIN THE LIMITS OF THE CONSTRUCTION. WHEN THE CONSTRUCTION BARRIERS ARE RELOCATED, CLEANUP OF AREAS OUTSIDE THE BARRIERS SHALL OCCUR IMMEDIATELY. IN ADDITION, NO LOOSE MATERIALS THAT COULD BLOW INTO AIRCRAFT OPERATIONS AREAS SHALL BE ALLOWED IN THE CONSTRUCTION AREA.
15. THE CONTRACTOR'S EMPLOYEES SHALL PARK ONLY IN THE STAGING AREA. ONLY AUTHORIZED VEHICLES WILL BE ALLOWED INSIDE THE AIRCRAFT OPERATIONS AREA. AT THE END OF EACH WORK DAY, THE CONTRACTOR SHALL POSITION ALL EQUIPMENT, TOOLS, MATERIAL, ETC. IN THE APPROVED CONTRACTOR'S STAGING AREA UNLESS OTHERWISE REQUESTED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.
16. OPEN TRENCHES, EXCAVATIONS AND STOCKPILED MATERIAL AT THE CONSTRUCTION SITE(S) SHOULD BE PROMINENTLY MARKED WITH ORANGE FLAGS AND LIGHTED WITH FLASHING YELLOW LIGHTS DURING HOURS OF RESTRICTED VISIBILITY AND/OR DARKNESS.
17. VERTICAL CONTROL IS BASED ON SURVEY BY THE LOUISA COUNTY AIRPORT CONTROL NETWORK, HORIZONTAL DATUM: VIRGINIA COORDINATE SYSTEM SOUTH ZONE, NAD 83 (1993) VIRGINIA HARN. THE SURVEY WAS PERFORMED BY:

    H&B SURVEYING AND MAPPING LLC.
    614 MOOREFIELD PARK DRIVE
    RICHMOND, VA 23236
    804-330-3781
18. ALL MATERIALS AND CONSTRUCTION TO BE IN ACCORDANCE WITH THE FEDERAL AVIATION ADMINISTRATION SPECIFICATIONS, VDOT ROAD AND BRIDGE SPECIFICATIONS (CURRENT EDITION) AND STANDARDS AND SUBJECT TO ITS INSPECTION AND CONTROL.
19. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE ON THE ENTIRE PROJECT SITE FOR THE COMPLETE DURATION OF THE PROJECT. THIS SHALL INCLUDE PROVIDING PUMPS, CUTTING DITCHES, ETC. AS NECESSARY.
20. SEVENTY TWO (72) HOURS NOTICE MUST BE GIVEN TO LOUISA COUNTY BEFORE BEGINNING CONSTRUCTION.
21. EXISTING AIRPORT PAVEMENT HAS BEEN DESIGNED AND CONSTRUCTED FOR AIRCRAFT TRAFFIC. THE PAVEMENTS WERE NOT DESIGNED FOR HEAVY TRUCK LOADING. THE CONTRACTOR IS RESPONSIBLE TO PROTECT ALL EXISTING PAVEMENT. DAMAGE DONE TO EXISTING PAVEMENT (I.E. RUTTING, SHOVING, CRACKING...) SHALL BE REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE. PRIOR TO THE START OF CONSTRUCTION, THE AIRPORT MANAGER AND ENGINEER SHALL BE NOTIFIED, IN WRITING, OF ANY EXISTING DAMAGE TO THE APPROVED HAUL ROUTE.
22. ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THE PLANS ARE TO BE CONSTRUCTED, MAINTAINED AND REMOVED IN ACCORDANCE WITH THE CURRENT EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND VIRGINIA REGULATION.
23. THE CONTRACTOR SHALL MAINTAIN A SECURE SITE THROUGHOUT THE COMPLETION OF THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL ACCESS GATES AT THE END OF EACH DAYS WORK.
24. THE CONTRACTOR SHALL BID THIS PROJECT IN IT'S ENTIRETY. THE COST FOR ALL ELEMENTS DESCRIBED WITHIN THESE PLANS AND SPECIFICATIONS SHALL BE INCLUDED IN THE CONTRACTOR BID PROPOSAL AT THE TIME OF BID OPENING. THE INTENT OF THE CONTRACT IS TO PROVIDE FOR CONSTRUCTION AND COMPLETION, IN EVERY DETAIL, OF THE WORK DESCRIBED WITHIN THESE PLANS AND SPECIFICATIONS. THE LIST OF QUANTITIES DOES NOT LIST INCIDENTAL ITEMS OF WORK. THE CONTRACTOR SHALL DETERMINE WHAT LINE ITEMS THAT INCIDENTALS ARE BID. QUESTIONS REGARDING INCIDENTALS OR ITEMS NOT SPECIFICALLY CALLED OUT IN THE LIST OF QUANTITIES SHOULD BE ADDRESSED TO THE ENGINEER PRIOR TO SUBMISSION OF BID.
25. THE RULES, REGULATIONS AND REFERENCE SPECIFICATIONS NOTED IN THESE DOCUMENTS SHALL BE CONSIDERED AS MINIMUM REQUIREMENTS. THEY SHALL NOT RELIEVE THE CONTRACTOR FROM FURNISHING AND INSTALLING HIGHER GRADES OF MATERIAL OR WORKMANSHIP THAN ARE SPECIFIED.
26. ALL RUBBISH AND DEBRIS GENERATED BY THE CONSTRUCTION OPERATIONS SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR ON A CONTINUOUS BASIS TO AN AUTHORIZED LANDFILL OR DUMP. THE CONTRACTOR SHALL PROVIDE, IN WRITING, THE DISPOSAL SITE FOR ALL MATERIAL LEAVING THE AIRPORT. STOCKPILING OF DEBRIS WILL NOT BE ALLOWED.
27. AFTER COMPLETION OF THE WORK, THE CONTRACTOR SHALL REMOVE ALL SURPLUS MATERIAL AND EQUIPMENT FROM THE SITE.
28. THE CONTRACTOR SHALL ATTEND A PRECONSTRUCTION MEETING PRIOR TO BEGINNING WORK. THIS MEETING WILL BE USED TO COVER WORK PROCEDURES WITH ALL PARTIES. THE CONTRACTOR SHALL ALSO ATTEND ANY PRODUCTION MEETINGS CALLED BY THE OWNER'S REPRESENTATIVE.
29. PRIOR TO CONSTRUCTION, THE CONTRACTOR MUST CONTACT MISS UTILITY AT 1-800-557-7001 A MINIMUM OF 48 HOURS PRIOR TO EXCAVATION.
30. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SURVEY LAYOUT NECESSARY TO COMPLETE CONSTRUCTION.
31. ANY LISTING MANUFACTURER'S EQUIPMENT OR MATERIAL SHALL MEAN THAT LISTED ITEM OR AN APPROVED EQUIVALENT UNLESS OTHERWISE NOTED.
32. THE CONTRACTOR MUST VERIFY THE AVAILABILITY OF TEMPORARY POWER SOURCES FOR USE DURING CONSTRUCTION. A COMMERCIAL SOURCE MAY NOT BE AVAILABLE.
33. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE AIRPORT FOR REQUIRED STAGING AND STORAGE AREAS.
34. UNLESS OTHERWISE SPECIFIED, ALL TESTS REQUIRED BY SPECIFICATIONS FOR QUALITY CONTROL OF WORKMANSHIP AND/OR MATERIALS SHALL BE COORDINATED AND PAID FOR BY THE CONTRACTOR IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS. SUBMISSION OF A PROPOSAL SHALL BE EVIDENCE THAT THE CONTRACTOR HAS RESEARCHED ALL TESTING REQUIREMENTS FOR ALL MATERIALS BEING INSTALLED OR CONSTRUCTED. QUALITY ACCEPTANCE TESTING TO BE PAID BY THE OWNER.
35. THE CONTRACTOR SHALL PROVIDE PORTABLE RADIOS CAPABLE OF MONITORING THE AIRPORT UNICOM SYSTEM AT 122.975 MHz.
36. THE DEVELOPER SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL EQUIPMENT, MATERIAL AND GENERAL CONSTRUCTION DEBRIS FROM THE SITE AND FROM ANY LOT, STREET, PUBLIC WAY OR PROPERTY THEREIN OR ADJACENT THERETO. DUMPING OF SUCH DEBRIS INTO SEWERS, ONTO ADJACENT PROPERTY OR ONTO OTHER LAND IN THE COUNTY IS PROHIBITED.

DEPARTMENT OF ENVIRONMENTAL QUALITY NOTES

1. THE DEQ INSPECTOR SHOULD BE INVITED TO THE PRE-CONSTRUCTION MEETING AND NOTIFIED ONE WEEK PRIOR TO THE START OF LAND DISTURBANCE. PLEASE CONTACT MARK REMSBERG AS HE WILL BE COORDINATING THE INSPECTIONS FOR THIS PROJECT. HE CAN BE REACHED AT (703) 583-3874 OR MARK.REMSBERG@DEQ.VIRGINIA.GOV .
2. DEQ CONSTRUCTION GENERAL PERMIT SELF-SITE INSPECTIONS SHALL BE PERFORMED ONCE EVERY 5-BUSINESS DAYS AND WITHIN 24 HOURS AFTER A MEASURABLE STORM EVENT OR ONCE EVERY 4-BUSINESS DAYS. A MEASURABLE STORM EVENT IS DEFINED AS "A RAINFALL EVENT PRODUCING 0.25 INCHES OF RAIN OR GREATER OVER 24 HOURS OR SNOW MELT FROM A SNOW EVENT PRODUCING 3.25 INCHES OR MORE OF SNOW WITHIN A 24-HOUR PERIOD" IN ACCORDANCE WITH 9VAC25-880.1.
3. IF AN OFFSITE DISPOSAL AREA IS IDENTIFIED DURING CONSTRUCTION, THE CONSTRUCTION ACTIVITY OPERATOR SHALL PROVIDE DETAILED INFORMATION TO DEQ, THROUGH THE UPDATING OF ITS REGISTRATION STATEMENT, REGARDING THE LOCATION OF THE DISPOSAL SITE AND MATERIAL TO BE DISPOSED OF AT THAT SITE. THIS NOTIFICATION TO DEQ NEEDS TO OCCUR PRIOR TO TRANSPORTING ANY MATERIAL OFF-SITE.
4. A NOTICE OF TERMINATION (NOT) PACKAGE MUST BE SUBMITTED, AND ACCEPTED BY DEQ AS COMPLETE, PRIOR TO SCHEDULING A FINAL DEQ SITE INSPECTION. THE NOT PACKAGE SHOULD BE SUBMITTED TO DEQ'S CENTRAL OFFICE WITH A COPY TO THE DEQ REGIONAL OFFICE WHERE THE PROJECT IS LOCATED. THE NOTICE OF TERMINATION REQUIRES AS-BUILT CONSTRUCTION RECORD DRAWINGS FOR ALL PERMANENT STORMWATER INFRASTRUCTURE. THESE DRAWINGS SHOULD REPRESENT THE STORMWATER MANAGEMENT FACILITIES AS THEY WERE CONSTRUCTED. THE INFORMATION SHOULD BE DETAILED ENOUGH THAT THE FACILITY COULD BE RECONSTRUCTED TO THE ORIGINAL CONSTRUCTED SPECIFICATIONS. PLEASE REFER TO SECTION 4.4.3.1. OF DEQ'S UPDATED STORMWATER MANAGEMENT HANDBOOK ENTITLED "BMP RECORD DOCUMENTS AND CERTIFICATIONS" FOR MORE INFORMATION. SOME INFORMATION MAY NEED TO BE COLLECTED WHILE THE FACILITY IS BEING CONSTRUCTED SINCE SOME VITAL COMPONENTS WILL NOT BE VISIBLE OR ACCESSIBLE ONCE IT IS COMPLETED. A LICENSED PROFESSIONAL OF RECORD MUST CERTIFY THAT THE FACILITY HAS BEEN CONSTRUCTED IN ACCORDANCE WITH APPROVED PLANS AND SPECIFICATIONS, AND IN ORDER TO CERTIFY THIS, CONSTRUCTION OF CERTAIN COMPONENTS MUST BE OBSERVED.
5. THE EXISTING GRAVEL ACCESS ROAD AND CONTRACTOR'S STAGING AREA TO BE REMOVED AND RETURNED TO MANAGED TURF IN GOOD CONDITION PRIOR TO PROJECT CLOSEOUT.

LEGEND

- AIRPORT PROPERTY LINE
- RSA — RUNWAY SAFETY AREA
- TREELINE
- RUNWAY LIGHTS
- SITE ACCESS
- BENCHMARK
- EXISTING BUILDINGS
- EXISTING BITUMINOUS ASPHALT PAVEMENT
- EXISTING GRAVEL
- PROPOSED GRAVEL

RUNWAY END IDENTIFICATION

RUNWAY	ELEV	LATITUDE	LONGITUDE
EXISTING 9	469.43	N 38° 00' 32.53"	W 77° 58' 39.08"
EXISTING 27	493.46	N 38° 00' 38.21"	W 77° 57' 45.83"

BENCHMARK DATA

CP	ELEV	NORTHING	EASTING	NOTES
LUK "A"	488.05			MONUMENT
LUK "B"	467.23			MONUMENT
62	469.43	3891381.74	11633457.89	PK NAIL
64	493.46	3891979.58	11637716.09	PK NAIL
11	482.83	3891904.77	11635996.27	ROD & CAP
12	475.08	3892197.23	11635965.88	ROD & CAP
13	472.07	3892322.97	11635626.00	ROD & CAP
14	475.21	3892150.76	11635219.46	ROD & CAP
15	478.05	3891803.61	11635232.93	ROD & CAP
1000	469.08	3891247.78	11633581.82	ROD
1001	469.25	3891293.17	11633905.74	ROD
1002	472.46	3891362.23	11634397.06	ROD
1003	478.59	3891430.40	11634882.45	ROD
1004	481.80	3891486.50	11635281.47	ROD
1005	483.90	3891536.19	11635636.03	ROD
1006	482.85	3891597.78	11636074.79	ROD
1007	485.61	3891727.80	11636508.12	ROD
1008	487.55	3891726.00	11636988.33	ROD
1009	488.65	3891769.73	11637300.22	ROD
1010	491.74	3891813.09	11637609.15	ROD
4249	481.43	3891934.42	11636326.15	NAIL
4428	481.41	3891823.41	11635631.50	NAIL
4604	477.62	3891726.08	11634969.25	NAIL
6000	462.85	3891309.67	11633168.12	
6500	484.30	3892097.84	11637945.29	

TALBERT&BRIGHT
ENGINEERING & PLANNING CONSULTANTS
10105 KRAUSE ROAD, SUITE 100
CHESTERFIELD, VIRGINIA 23832
PHONE: 804-768-6878 FAX: 804-768-6871

REV.	DESCRIPTION	DATE
	REVISIONS	

GENERAL LAYOUT

Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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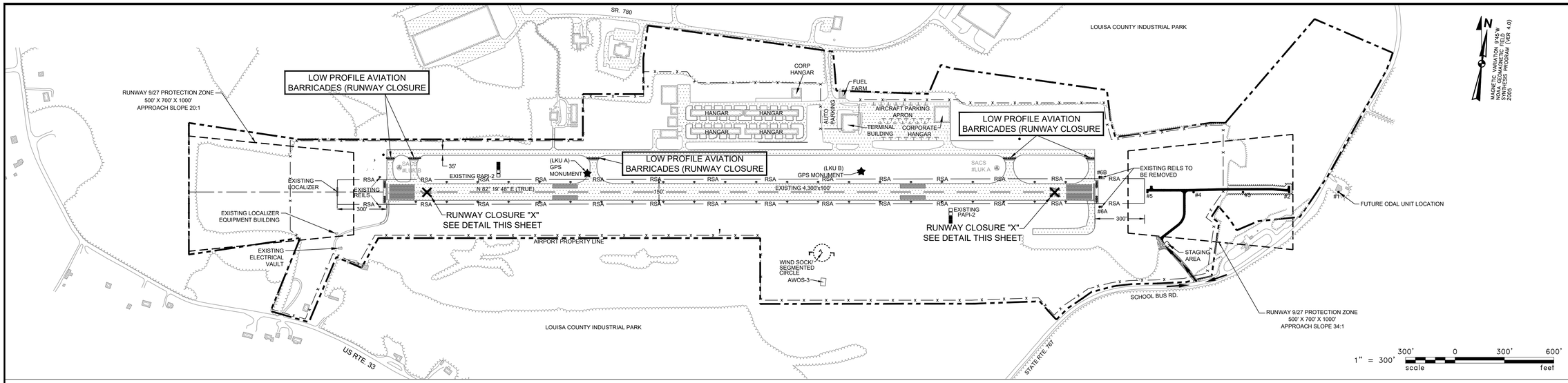
COMMONWEALTH OF VIRGINIA
STEVEN T. PETERSON
Lic. No. 038457
5/26
PROFESSIONAL ENGINEER

Date: MAY 2026
Scale: 1" = 300'
Drawn: REK
Checked: STP
Project No.: 3101-2402
Sheet No.: 3
Of 18

S:\Projects\Louisa County (LKU)\3101-2402 Lighting Upgrades (Des)\CAD\Drawings\3101-2402 GEN.dwg



SAFETY PLAN NOTES:

THE INTENT OF THIS PLAN IS TO ESTABLISH CERTAIN SAFETY REQUIREMENTS THAT MUST BE ADHERED TO BY THE CONTRACTOR DURING CONSTRUCTION OF THIS PROJECT.

1. THE PROJECT AREA IS LOCATED WITHIN THE AIRCRAFT OPERATIONS AREA (AOA). THIS IS A CLOSELY MAINTAINED SECURITY AREA WITH RESTRICTED ACCESS. THE CONTRACTOR WILL BE REQUIRED TO MEET ALL REQUIREMENTS FOR ENTERING AND OPERATING IN THE AOA AT ALL TIMES. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE HIMSELF WITH ALL REQUIREMENTS FOR ENTERING AND OPERATING IN THE AOA. FURTHER, IT WILL REMAIN THE CONTRACTOR'S RESPONSIBILITY TO KEEP HIMSELF ADVISED OF ANY CHANGES IN REQUIREMENTS AND TO ADHERE TO CURRENT REGULATIONS. THE CONTRACTOR SHALL ALSO HAVE PERSONNEL TRAINED TO OPERATE AND MONITOR AIRPORT SECURITY GATES USED DURING THE PROJECT (SEE GENERAL NOTE 3).
2. THE CONTRACTOR SHALL NOT BEGIN WORK UNLESS AND UNTIL 72 HOURS PRIOR NOTICE HAS BEEN GIVEN TO AIRPORT MANAGEMENT. CROSSING OF RUNWAYS OR TAXIWAYS IS ALLOWED ONLY IF THE RUNWAY OR TAXIWAY IS CLOSED. CONTRACTOR IS PROHIBITED FROM ENTERING THE RUNWAY SAFETY AREAS AND NAVAID CRITICAL AREAS AT ANY TIME UNLESS THE RUNWAY IS CLOSED OR CONTRACTOR IS UNDER RADIO CONTROL BY THE ATCT, SEE NOTE 3.
3. IN AN EMERGENCY SITUATION THE CONTRACTOR IS TO NOTIFY AIRPORT MANAGEMENT IMMEDIATELY. AIRPORT MANAGEMENT CAN BE REACHED BY PHONE AT 540-967-0050.
4. SEE GENERAL NOTE 3 FOR AIRPORT ENTRY AND DEPARTURE PROCEDURES AND FOR VEHICLE MARKING REQUIREMENTS.
5. SEE GENERAL NOTE 3 FOR AIRPORT ENTRY AND DEPARTURE PROCEDURES AND FOR VEHICLE MARKING REQUIREMENTS.
6. THE CONTRACTOR SHALL PROVIDE A POINT OF CONTACT (24 HR/DAY, 7 DAYS A WEEK) WHO WILL COORDINATE AN IMMEDIATE RESPONSE TO CORRECT ANY CONSTRUCTION RELATED ACTIVITY THAT ADVERSELY AFFECTS THE OPERATIONAL SAFETY OF THE AIRPORT. THE CONTRACTOR SHALL ALSO PROVIDE A LISTING OF ALL SUB-CONTRACTORS INCLUDING SUPERVISORY PERSONNEL OF EACH TRADE AND CONTACT NUMBERS.
7. A DAILY START-UP AND SHUT-DOWN CHECKLIST WILL BE JOINTLY PREPARED BY THE CONTRACTOR, RESIDENT PROJECT REPRESENTATIVE AND AIRPORT MANAGEMENT. THE CHECKLIST WILL BE FOLLOWED THROUGHOUT THE PROJECT. THIS CHECKLIST SHALL INCLUDE, BUT NOT BE LIMITED TO, BARRICADES, FLAGS, HAUL ROUTES, SECURING OF ACCESS GATES, CLEAN UP, ETC. THE CONTRACTOR'S SITE SUPERVISOR AND LABOR CREW SHALL NOT LEAVE THE WORK SITE UNTIL SUCH TIME AS THE RESIDENT PROJECT REPRESENTATIVE HAS INSPECTED THE AREA AND SIGNED OFF ON THE DAILY CHECKLIST.
8. THE LOCATION OF UNDERGROUND UTILITIES AS INDICATED ON THE PLANS HAS BEEN OBTAINED FROM AS-BUILT DRAWINGS AND VISUAL FIELD LOCATION METHODS. NEITHER AIRPORT MANAGEMENT OR THE OWNER'S PROJECT MANAGER ASSUMES ANY RESPONSIBILITY WHATSOEVER IN RESPECT TO THE ACCURACY, COMPLETENESS OR SUFFICIENCY OF THE INFORMATION SHOWN. THERE IS NO GUARANTEE, EITHER EXPRESSED OR IMPLIED, THAT THE LOCATIONS, SIZES AND TYPES OF MATERIALS OF EXISTING UNDERGROUND UTILITIES INDICATED ARE REPRESENTATIVE OF THOSE TO BE ENCOUNTERED IN THE CONSTRUCTION. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE ACTUAL LOCATION OF ALL SUCH FACILITIES INCLUDING HOMERUN CABLES AND SERVICE CONNECTIONS TO UNDERGROUND UTILITIES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE OWNER'S PROJECT MANAGER OF HIS OPERATIONAL PLANS. IN THE EVENT AN UNEXPECTED UTILITY INTERFERENCE IS ENCOUNTERED DURING CONSTRUCTION, THE BORING POINT CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER'S PROJECT MANAGER. ANY SUCH SERVICES DISTURBED BY THE CONTRACTOR'S OPERATION SHALL BE RESTORED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.
9. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS IN REGARD TO CONSTRUCTION NOISE AND EROSION CONTROL DURING CONSTRUCTION.
10. THE CONTRACTOR SHALL CLEAN ALL CONSTRUCTION AREAS OF LITTER, LOOSE PAPERS, DEBRIS, ETC. ON A DAILY BASIS, OR AS DIRECTED BY OWNER'S PROJECT MANAGER. PRIOR TO THE CLOSE OF DAILY OPERATIONS, CONTRACTOR SHALL INSPECT ALL ACTIVE AIR OPERATIONS AREAS AND CONSTRUCTION AREA FOR FOD AND LITTER. ALL DEBRIS SHALL BE CLEANED UP AND PROPERLY DISPOSED OF PRIOR TO RELEASE OF CREWS FROM EACH SHIFT.
11. MEN, EQUIPMENT OR OTHER CONSTRUCTION-RELATED MATERIAL ARE NOT ALLOWED WITHIN THE RSA OF AN OPEN RUNWAY AT ANY TIME UNLESS THE RUNWAY IS CLOSED (SEE GENERAL NOTE 1). MEN, EQUIPMENT OR OTHER CONSTRUCTION-RELATED MATERIAL WILL NOT BE PERMITTED CLOSER THAN 300 FEET FROM THE EDGE OF ANY RUNWAY OR 100 FEET FROM THE EDGE OF ANY TAXIWAY WITHOUT PRIOR PERMISSION FROM THE AIRPORT MANAGEMENT.
12. FREQUENT INSPECTIONS WILL BE MADE BY AIRPORT MANAGEMENT DURING CRITICAL PHASES OF THE WORK TO ENSURE THAT THE CONTRACTOR IS FOLLOWING THE RECOMMENDED AIRFIELD SAFETY PROCEDURES.
13. CONTRACTOR MUST PROMINENTLY MARK OPEN TRENCHES AND EXCAVATIONS AT THE CONSTRUCTION SITE WITH RED OR ORANGE FLAGS, AS APPROVED BY AIRPORT MANAGEMENT, AND BACKFILL OR LIGHT THEM WITH RED LIGHTS DURING HOURS OF RESTRICTED VISIBILITY OR DARKNESS. OPEN TRENCHES OR EXCAVATIONS ARE NOT PERMITTED WITHIN 200 FEET OF THE RUNWAY CENTERLINE AND AT LEAST THE EXISTING RSA DISTANCE FROM THE RUNWAY THRESHOLD WHILE THE RUNWAY IS OPEN. IF THE RUNWAY MUST BE OPENED BEFORE EXCAVATIONS ARE BACKFILLED, COVER OR BACKFILL THE EXCAVATIONS APPROPRIATELY. COVERINGS FOR OPEN TRENCHES OR EXCAVATIONS MUST BE OF SUFFICIENT STRENGTH TO SUPPORT THE WEIGHT OF THE HEAVIEST AIRCRAFT OPERATING ON THE RUNWAY.

GENERAL NOTES:

1. IT IS THE INTENT OF THE OWNER THAT RUNWAY 9-27 WILL BE CLOSED TO AIR TRAFFIC DURING WORK. THERE MAY BE MORE THAN ONE CONTRACTOR WORKING ON THE AIRPORT SIMULTANEOUSLY. THE CONTRACTOR WILL BE REQUIRED TO COORDINATE ALL WORK WITH THE OWNER'S PROJECT MANAGER TO MINIMIZE CONFLICTS WITH OTHER CONTRACTORS.
2. THE CONTRACTOR'S EMPLOYEES SHALL PARK ONLY IN THE AREA NOTED. ONLY AUTHORIZED VEHICLES WILL BE ALLOWED INSIDE THE AIRCRAFT OPERATIONS AREA. AT THE END OF EACH WORK DAY, THE CONTRACTOR SHALL POSITION ALL EQUIPMENT, TOOLS, MATERIAL, ETC. IN THE APPROVED CONTRACTOR'S STAGING AREA UNLESS OTHERWISE REQUESTED BY THE CONTRACTOR AND APPROVED BY THE OWNER.
3. THE CONTRACTOR SHALL COORDINATE INGRESS-EGRESS REQUIREMENTS WITH THE AIRPORT MANAGEMENT AND OWNER. ALL OPEN GATES TO SECURED AIRPORT AREAS SHALL BE MONITORED CONTINUOUSLY BY CONTRACTOR'S PERSONNEL TO CONTROL ACCESS TO SECURED AREA OR SHALL BE CLOSED AND LOCKED. CONTRACTOR PERSONNEL SHALL NOT ALLOW ANY UNAUTHORIZED PERSONNEL TO ENTER THROUGH THE CONSTRUCTION GATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING AND LOCKING ALL GATES WHEN NOT IN USE AND AT THE END OF EACH DAY'S OPERATIONS.

   ALL CONSTRUCTION VEHICLES MUST BE CLEARED FOR ACCESS BY THE AIRPORT MANAGEMENT. PERSONAL CARS SHALL BE PARKED OUTSIDE OF SECURED AIRFIELD AREAS. ALL VEHICLES OPERATING IN THE AOA SHALL BE LIGHTED OR FLAGGED IN ACCORDANCE WITH FAA ADVISORY CIRCULAR 150/5370-2G. COPIES OF THE ADVISORY CIRCULAR WILL BE MADE AVAILABLE UPON
4. ACCESS ROADS TO BE USED UNDER THIS CONTRACT SHALL BE THOSE DESIGNATED AND APPROVED BY THE OWNER. IN GENERAL, THE CONTRACTOR SHALL CONFINE HIS EQUIPMENT AND HAULING WHERE PRACTICAL TO EXISTING ROADS ON THE AIRPORT. IF EXISTING PAVEMENT OR ROAD SURFACE IS DAMAGED BY THE CONTRACTOR'S OPERATIONS, IT SHALL BE REPAIRED TO ITS ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE. HAUL ROADS ACROSS TURFED AREAS SHALL BE REPAIRED, SCARIFIED, SEEDED, MULCHED, AND FERTILIZED AT THE CONTRACTOR'S EXPENSE. METAL TRACK VEHICLES WILL NOT BE PERMITTED TO OPERATE ON OR ACROSS EXISTING PAVEMENT WITHOUT PROTECTIVE MATTING TO PREVENT MARRING OF THE PAVEMENT SURFACE. ALL COSTS ASSOCIATED WITH SUPPLYING, CONSTRUCTING, MAINTAINING AND RESTORING TEMPORARY ACCESS ROADS SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR "MOBILIZATION".
5. ALL EXISTING FACILITIES SHALL BE CAREFULLY PROTECTED BY THE CONTRACTOR. ANY FACILITIES DAMAGED BY THE CONTRACTOR WILL BE REPAIRED IMMEDIATELY AND RESTORED TO ORIGINAL CONDITION AT CONTRACTOR'S COST.
6. THE CONTRACTOR IS ADVISED THAT AIRCRAFT OPERATIONS ARE CONDUCTED ADJACENT TO THE PROJECT. SPECIAL ATTENTION TO DUST CONTROL WILL BE REQUIRED DURING THE PROJECT. CONTRACTOR SHALL, BY WATERING, CHEMICALS, VEGETATION, OR OTHER MEANS, PREVENT THE OCCURRENCE OF DUST WHICH WILL BE OBJECTIONABLE TO THE RESIDENTS OF THE AREA OR VIOLATE EXISTING LAWS OR REGULATION OR CAUSE HAZARDS TO AIR TRAFFIC.THE OWNER'S PROJECT MANAGER RESERVES THE RIGHT TO HALT WORK IN NONCONFORMING AREAS IF CORRECTIVE ACTIONS ARE NOT PROMPTLY TAKEN BY THE CONTRACTOR TO CONTROL DUST. THIS WILL NOT CONSTITUTE A DELAY IN THE PROJECT.
7. CONTRACTOR MAY ENCOUNTER WET CONDITIONS DURING CONSTRUCTION. ALL COST FOR DEWATERING IS CONSIDERED INCIDENTAL TO COST OF ITEMS OF WORK BID UPON.
8. CONTRACTOR SHALL DISPOSE OF ALL CONSTRUCTION DEBRIS AND WASTE MATERIAL OFF AIRPORT PROPERTY IN A PROPERLY PERMITTED LOCATION. ALL COSTS FOR OFFSITE DISPOSAL SHALL BE INCLUDED IN THE RELATED ITEMS BID UPON.

NOTAMS:

AIRPORT MANAGEMENT WILL ISSUE THE NECESSARY NOTAMS TO REFLECT HAZARDOUS CONDITIONS. IT IS IMPORTANT THAT NOTAMS BE KEPT CURRENT AND REFLECT THE ACTUAL CONDITIONS WITH RESPECT TO CONSTRUCTION SITUATIONS. ACTIVE NOTAMS SHALL BE REVIEWED PERIODICALLY AND REVISED TO REFLECT THE CURRENT CONDITIONS.

SEQUENCE OF WORK

THE FOLLOWING SEQUENCE OF CONSTRUCTION HAS BEEN DEVELOPED TO OUTLINE THE SCHEDULING REQUIREMENTS FOR RUNWAY CLOSURES. IN ACCORDANCE WITH THE SPECIFICATIONS, THE CONTRACTOR SHALL PROVIDE A DETAILED SCHEDULE OF CONSTRUCTION TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO COMMENCING CONSTRUCTION.

THE CONTRACTOR WILL BE THE DESIGNATED OPERATOR OF THE SITE THROUGHOUT THE CONSTRUCTION PERIOD AND SHALL COMPLY WITH ALL REQUIREMENTS OF GENERAL PERMIT VAR10 FOR DISCHARGES OF STORM WATER FROM CONSTRUCTION ACTIVITIES AND THE ASSOCIATED REGULATIONS. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL FILE THE VSMP CONSTRUCTION REGISTRATION STATEMENT AND PROVIDE COPIES OF THE CONSTRUCTION REGISTRATION STATEMENT FOR THE THREE COPIES OF THIS PLAN.

ODAL SEQUENCE OF WORK:

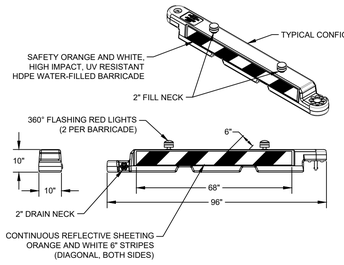
1. ESTABLISH CONSTRUCTION STAGING AREA.
2. COMPLETE NECESSARY SURVEYS REQUIRED TO ESTABLISH BASELINE, LAYOUT AND GRADES.
3. CONSTRUCT TEMPORARY CONSTRUCTION ENTRANCE AND ACCESS ROADS AS PER PLAN. INSTALL ACCESS GATE AS PER PLAN.
4. BEGIN CLEARING AND GRUBBING.
5. BEGIN INSTALLATION OF ODAL LIGHTS #2, #3 AND #4.
6. PRIOR TO THE CONSTRUCTION OF ODAL LIGHT #5 AND #6, THE OWNER SHALL ISSUE A NOTAM FOR THE INTERMITTENT CLOSING OF RUNWAY 9-27. THE CONTRACTOR SHALL COORDINATE SHUT DOWN OF THE RUNWAY LOCALIZER WITH THE OWNER (AS REQUIRED). INSTALL RUNWAY CLOSURE "X" ON BOTH THE RW 9 AND RW 27 ENDS AS PER PLANS IMMEDIATELY FOLLOWING NOTAM ISSUANCE.
7. THE CONTRACTOR SHALL MONITOR AIRCRAFT TRAFFIC WITH AN AVIATION BAND RADIO ON FREQUENCY 122.975.
8. INSTALL LOW PROFILE AVIATION BARRICADES AS PER PLAN.
9. BEGIN INSTALLATION OF ODAL LIGHTS #5, #6A AND #6B. THE CONTRACTOR WILL HAVE 14-DAYS FOR INSTALLATION. THE RUNWAY SHALL BE RE-OPENED EACH EVENING. DEMOLISH AND REMOVE EXISTING REILS. PRIOR TO OPENING THE RUNWAY, THE CONTRACTOR SHALL ENSURE THAT ALL LIGHTING CIRCUITS ARE OPERATIONAL.
10. COORDINATE, WITH THE OWNER, THE CANCELLATION OF ALL NOTAMS AND RE-OPEN RUNWAY 9-27.
11. RESTORE ALL STAGING AREAS AND ANY TEMPORARY ACCESS ROADS/ROUTES.
12. FILE THE VSMP CONSTRUCTION NOTICE OF TERMINATION; PROVIDE A COPY OF THE CONSTRUCTION NOTICE OF TERMINATION AND APPROVAL TO THE ENGINEER.

PAPI AND SUPPLEMENTAL WINDCONE SEQUENCE OF WORK (RW 9 & RW 27):

1. COMPLETE NECESSARY SURVEY REQUIRED TO ESTABLISH LOCATION OF PAPI UNITS.
2. THE OWNER SHALL ISSUE A NOTAM FOR MEN AND EQUIPMENT WORKING IN THE RUNWAY OBJECT FREE AREA.
3. MEN, EQUIPMENT OR OTHER CONSTRUCTION RELATED MATERIALS ARE NOT ALLOWED IN THE RSA OF AN ACTIVE RUNWAY AT ANY TIME UNLESS APPROVED BY THE AIRPORT OR WHEN THE RUNWAY IS CLOSED. ALL EQUIPMENT SHALL BE STORED AT THE STAGING AREA AT THE END OF EACH DAYS WORK.
4. DEMOLISH AND REMOVE EXISTING 2-BOX PAPI'S FOR RW 9 AND RW 27.
5. INSTALL 4-BOX PAPI'S FOR RW 9 AND RW 27
6. INSTALL SUPPLEMENTAL WIND CONES FOR RW 9 AND RW 27.
7. NO EQUIPMENT OR STOCKPILES SHALL BE LOCATED WITHIN THE RUNWAY OJECT FREE AREA.

LEGEND

- AIRPORT PROPERTY LINE
- RSA — RUNWAY SAFETY AREA
- TREELINE
- RUNWAY LIGHTS
- SITE ACCESS
- BENCHMARK
- LOW PROFILE AVIATION BARRICADES
- EXISTING BUILDINGS
- EXISTING BITUMINOUS ASPHALT PAVEMENT
- EXISTING GRAVEL
- PROPOSED GRAVEL

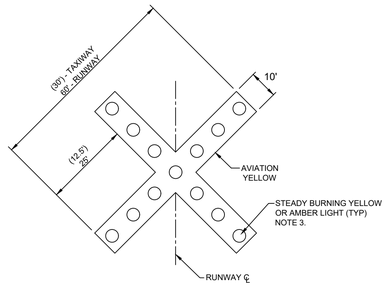


LOW PROFILE AVIATION BARRICADE

NOT TO SCALE

AVIATION BARRICADE NOTES:

1. THE AIRPORT WILL NOT PROVIDE AVIATION TYPE BARRICADES. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING AVIATION BARRICADES IN SUFFICIENT QUANTITIES TO COMPLETE THE WORK FOR THIS CONTRACT
2. LOW PROFILE AVIATION BARRICADES SHALL BE PRE-MADE COMMERCIALLY AVAILABLE UNITS, OR ASSEMBLED BY THE CONTRACTOR. SHOP DRAWINGS ARE REQUIRED. COLOR TO BE AVIATION ORANGE AND WHITE, LIGHTS SHALL BE RED.
3. EXTENDED BARRICADES ACROSS THE FULL WIDTH OF THE PAVEMENT. PROVIDE HOLD DOWN AND LATERAL SUPPORT TO PREVENT OVERTURNING FROM PROP WASH AND JET BLAST, WIND VORTEX, OR OTHER SURFACE WIND CURRENTS. BARRICADES TO BE PLACED FULL WIDTH ACROSS CLOSED SECTIONS.
4. CONTRACTOR SHALL MONITOR LIGHTED BARRICADES ON A REGULAR BASIS TO MAKE SURE LIGHTS ARE OPERATIONAL. THE CONTRACTOR SHALL MAINTAIN A SUPPLY OF BATTERIES AND LIGHTS TO REPLACE AS REQUIRED TO MAINTAIN LIGHTS IN OPERATION AT ALL TIMES.
5. CONTRACTOR SHALL PROVIDE A PERSON ON CALL 24 HOURS A DAY FOR EMERGENCY MAINTENANCE OF AIRPORT HAZARD LIGHTING AND BARRICADES. THE CONTRACTOR MUST FILE THE CONTACT PERSONS INFORMATION WITH THE AIRPORT. LIGHTING SHOULD BE CHECKED FOR PROPER OPERATION AT LEAST ONCE PER DAY, PREFERABLY AT DUSK.
6. BARRICADES SHALL BE POSITIONED AS SHOWN IN THE PLANS. BARRICADES ARE SPACED AT 6' MAX. (TYP).



TEMPORARY CLOSED RUNWAY MARKER

NOT TO SCALE

NOTES:

1. CLOSED RUNWAY MARKERS SHALL BE INSTALLED BEFORE THE CONTRACTOR BEGINS WORK IN THE AFFECTED AIRCRAFT OPERATIONAL AREA. LOCATE MARKERS OVER RUNWAY NUMERALS. NO PAY ITEM FOR MAINTENANCE WORK OR RELOCATION OF MARKERS.
2. THE CLOSED RUNWAY MARKER MAY BE CONSTRUCTED OF PLASTIC FENCE, 40 POUND ROOFING PAPER, SNOW FENCE, OR ANY OTHER MATERIAL APPROVED BY THE ENGINEER. THE MARKERS SHALL BE SECURELY FASTENED. THE CONTRACTOR SHALL MAKE FREQUENT INSPECTION OF THE MARKING AND MAKE PROMPT REPAIRS AS NECESSARY.
3. LIGHT SHALL BE PLACED ON THE CLOSED RUNWAY MARKER DURING NIGHTTIME CLOSURES. LIGHTS SHALL BE INCIDENTAL TO THE CLOSED RUNWAY MARKER PAY ITEM.

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CHESTERFIELD, VIRGINIA 23832
PHONE: 804-768-6878 FAX: 804-768-6871

REV.	DESCRIPTION	DATE
	REVISIONS	

SAFETY & PHASING PLAN

Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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COMMONWEALTH OF VIRGINIA
STEVEN T. PETERSON
Lic. No. 038457
5/1/26
PROFESSIONAL ENGINEER

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LEGEND		
	EXISTING	PROPOSED
AIRPORT PROPERTY LINE		
BENCHMARK		
RUNWAY LIGHT		
TAXIWAY LIGHT		
L-859F ODAL		
GUIDANCE SIGN		
ELECTRICAL BOX		
ELECTRICAL HAND HOLE	EHH	
LIGHT BASE (TOP)		
POWER POLE		
TREE LINE		
UNDERGROUND GAS LINE	GAS	
FENCE	X	
INDEX CONTOUR	465	
INTERMEDIATE CONTOUR	464	
BITUMINOUS PAVEMENT		
CONCRETE		
GRAVEL		
RUNWAY SAFETY AREA	RSA	
TAXIWAY SAFETY AREA	TSA	
TAXIWAY OBJECT FREE AREA	TOFA	
OVERHEAD ELECTRIC	OHE	
UNDERGROUND ELECTRICAL CIRCUIT	E	UGE
RUNWAY LIGHING CIRCUIT	RW	
BARE COPPER COUNTERPOISE	BCC	
MINI POWER ZONE CIRCUIT	MPZ	
PAPI	PAPI	
PAPI/MINI POWER ZONE CIRCUIT		PAPI/MPZ
RUNWAY END IDENTIFIER LIGHT CIRCUIT	REIL	
PAPI/RUNWAY END IDENTIFIER LIGHT CIRCUIT		PAPI/REIL
AUTOMATED WEATHER OBSERVATION SYSTEM CIRCUIT	AWOS	

COUNTY OF LOUISA

41-188
RGE, LLC

NAD 83, VA. SOUTH

AIRPORT PROPERTY LINE

L-806 SUPPLEMENTAL WINDCONE #1. SEE SHEET 9.

SIGN. AIRPORT CHECK LIST

MONUMENT FD. LKU "B"

H&B CTRL #62
N=3891381.74
E=1163457.89
ELEV=469.43
CTRL PT: PKNAIL

H&B CTRL #6000
N=3891309.67
E=1163168.12
ELEV=462.85
CTRL PT:

H&B CTRL #1000
N=3891247.78
E=1163581.82
ELEV=469.08
CTRL PT: ROD

H&B CTRL #1001
N=3891293.17
E=1163905.74
ELEV=469.25
CTRL PT: ROD

NOTE:
THE CONTRACTOR SHALL INSTALL THE PAPI-4 SYSTEM AS PER THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL LABOR AND MATERIALS INCLUDING BUT NOT LIMITED TO WIRING AND CONDUITS TO ENSURE THE SYSTEM IS FULLY OPERATIONAL AND WILL PASS FAA FLIGHT CHECK.

6" VDOT #57 STONE MAINTENANCE AREA

LHA #4

LHA #3

LHA #2

LHA #1

INSTALL OWNER SUPPLIED L-880(L) PAPI (4-BOX). SEE DETAILS SHEET 7

2 - #8 600V, TYPE C
1 - 2" PVC
1 - #6 BCC

PAPI= 476.33'
CONC= 473.25'

PAPI= 476.35'
CONC= 473.70'

EXISTING PAPI UNITS AND FOUNDATIONS TO BE DEMOLISHED AND REMOVED

FIELD LOCATE EXISTING HANDHOLE AND PAPI CIRCUIT

EXISTING CABLES AND CONDUIT TO BE REMOVED

682.87'

50.00

75.00

150.00

100.00

2 - #8 600V, TYPE C
1 - EXISTING 2" PVC

EXISTING 2" PVC CONDUIT

℄ ELEV = ±475.9
SEE PAPI CROSS SECTION DETAIL SHEET 7

RUNWAY 9-27

TW01 (BLUE)
TOL= 471.56'
BASE= 470.41'

TW02 (BLUE)
TOL= 471.82'
BASE= 470.34'

TW03 (BLUE)
TOL= 473.12'
BASE= 471.99'

TW04 (BLUE)
TOL= 473.16'
BASE= 472.00'

RW01 (WHITE/ORANGE)
TOL= 471.60'
BASE= 470.41'

RW02 (WHITE/ORANGE)
TOL= 474.00'
BASE= 473.30'

RW03 (WHITE/ORANGE)
TOL= 473.79'
BASE= 472.60'

RW04 (WHITE/ORANGE)
TOL= 475.79'
BASE= 474.57'

RW05 (WHITE/ORANGE)
TOL= 475.17'
BASE= 473.98'

RW06 (WHITE/ORANGE)
TOL= 476.26'
BASE= 475.07'

RW07 (WHITE/ORANGE)
TOL= 478.87'
BASE= 474.68'

RW56 (RED)
TOL= 469.45'
BASE= 468.37'

RW57 (RED)
TOL= 469.37'
BASE= 468.28'

LIGHT BASE TOP=468.37

LIGHT BASE TOP=468.28

LIGHT BASE TOP=464.78 (BLUE) TOL= 465.92' BASE= 464.78'

LIGHT BASE TOP=468.02 (BLUE) TOL= 468.02' BASE= 465.07'

LIGHT BASE TOP=468.07

REMOVE EXISTING POWER CABLE (PAPI 9 CIRCUIT) TO VAULT. VERIFY MPZ CIRCUIT LOCATION AND PROTECT.

2 - #8 600V, TYPE C
1 - EXISTING 2" PVC
1 - EXISTING MPZ CIRCUIT

PAPI 9 CIRCUIT INSTALL NEW
2 - #8 600V, TYPE C CABLE TO EXISTING ELECTRICAL VAULT

2 - #8 600V, TYPE C
1 - EXISTING 2" PVC
1 - EXISTING MPZ CIRCUIT

FIELD LOCATE EXISTING PAPI-9 CIRCUIT, DISCONNECT IN PANEL AND DISPOSE CABLE OFFSITE. SEE SHEET 8.

EXISTING ELECTRICAL VAULT. SEE DETAILS SHEET 8.

AIRPORT PROPERTY LINE

COUNTY OF LOUISA

COUNTY OF LOUISA

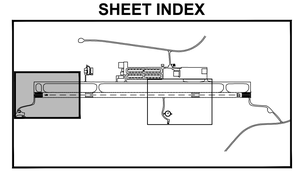
GENERAL ELECTRICAL NOTES

1. THE LOCATION OF UNDERGROUND UTILITIES AS INDICATED ON THE PLANS HAS BEEN OBTAINED FROM AS-BUILT DRAWINGS AND VISUAL FIELD LOCATION METHODS. NEITHER THE AIRPORT MANAGEMENT/OWNER OR THE ENGINEER ASSUMES ANY RESPONSIBILITY WHAT SO EVER IN RESPECT TO THE ACCURACY, COMPLETENESS OR SUFFICIENCY OF THE INFORMATION SHOWN. THERE IS NO GUARANTEE, EITHER EXPRESSED OR IMPLIED THAT THE LOCATIONS, SIZES AND TYPES OF MATERIALS OF EXISTING UNDERGROUND UTILITIES INDICATED ARE REPRESENTATIVE OF THOSE TO BE ENCOUNTERED IN THE CONSTRUCTION. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE ACTUAL LOCATION OF ALL SUCH FACILITIES INCLUDING HOMERUN CABLES AND SERVICE CONNECTIONS TO UNDERGROUND UTILITIES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF HIS OPERATIONAL PLANS. IN THE EVENT AN UNEXPECTED UTILITY INTERFERENCE IS ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER. ANY SUCH SERVICES DISTURBED BY THE CONTRACTOR'S OPERATION SHALL BE RESTORED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.
2. ALL PROPOSED UNDERGROUND CONDUIT TO BE SCHEDULE 40 PVC, UNLESS OTHERWISE INDICATED.
3. ALL WIRING TO BE COPPER. NO ALUMINUM WIRING WILL BE ACCEPTED.
4. THE CONTRACTOR SHALL COORDINATE WITH THE AIRPORT MANAGER CONCERNING OPERATION AND SHUTDOWN OF ANY FACILITIES DURING PROJECT CONSTRUCTION.
5. THE LOCATION OF THE EXISTING CABLE/DUCT IS APPROXIMATE. THE CONTRACTOR IS TO EXERCISE CAUTION AND USE HAND EXCAVATION TOOLS FOR ANY EXCAVATION IN THE VICINITY OF ANY EXISTING INSTALLATIONS. ANY DAMAGE TO EXISTING CIRCUITS SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE. ALL DISTURBED AREAS OUTSIDE OF THE EDGES OF PAVEMENT ARE TO BE RESTORED TO THE ORIGINAL SURFACE ELEVATION, RAKED SMOOTH AND SEEDED AS PER T-901.
6. NO TRENCHES ARE TO BE LEFT OPEN WHEN THE AIRFIELD LIGHTING CIRCUIT IS OPERATIONAL. CONDUCTOR ENDS SHALL NOT BE LEFT EXPOSED TO THE WEATHER.
7. THE CONTRACTOR SHALL VERIFY THE ROUTE OF THE PROPOSED ELECTRICAL CIRCUIT AND DUCT BANKS PRIOR TO THE START OF TRENCHING OR INSTALLATION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES AND FACILITIES (I.E. AIRPORT LIGHTING, NAVAIDS, ETC.) FROM DAMAGE BY EQUIPMENT AND/OR PERSONNEL. THE CONTRACTOR SHALL CONTACT ALL UTILITY AND FACILITY AGENCIES FOR FIELD MARKING BEFORE BEGINNING CONSTRUCTION. THE LOCATIONS OF THE EXISTING UNDERGROUND UTILITIES SHOWN (AND VERIFIED BY SURFACE OBSERVATION) ARE APPROXIMATE.
9. CONTRACTOR SHALL CONSTANTLY MONITOR THE AIRPORT UNICOM WHILE WORKING ON THE RUNWAY AND TAXIWAY LIGHTING SYSTEM. MEN AND EQUIPMENT ARE NOT TO BE STAGED IN THIS AREA AND SHALL NOT REMAIN ON THE RUNWAY AFTER WORKING HOURS.
10. ALL ELECTRICAL WORK SHALL BE COMPLETED IN ACCORDANCE WITH LOCAL ELECTRICAL CODE AND THE LATEST EDITION OF THE NATIONAL ELECTRIC CODE.
11. THE CONTRACTOR SHALL TEST THE CIRCUITS IN ACCORDANCE WITH SECTION 108-2.11 OF THE SPECIFICATIONS BEFORE BEGINNING WORK. RESULTS WILL BE WITNESSED AND LOGGED BY THE OWNERS' REPRESENTATIVE.
12. ALL GROUNDING CONNECTIONS SHALL BE CADWELDED OF APPROVED EQUIVALENT. CADWELD CONNECTIONS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES.

    ALL CONDUIT SHALL BE UL APPROVED.

    ALL EXISTING EQUIPMENT REMOVED SHALL REMAIN THE PROPERTY OF THE OWNER AND SHALL BE STORED AT A LOCATION INDICATED BY THE OWNER OR DISCARDED OFFSITE AS DIRECTED.

SHEET INDEX



1" = 40'
40 0 40 80
scale feet

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REV.	DESCRIPTION	DATE
	REVISIONS	

PAPI - RUNWAY 9 POWER LAYOUT

Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Wind Cone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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STEVEN T. PETERSON
Lic. No. 038457
5-1-26
PROFESSIONAL ENGINEER

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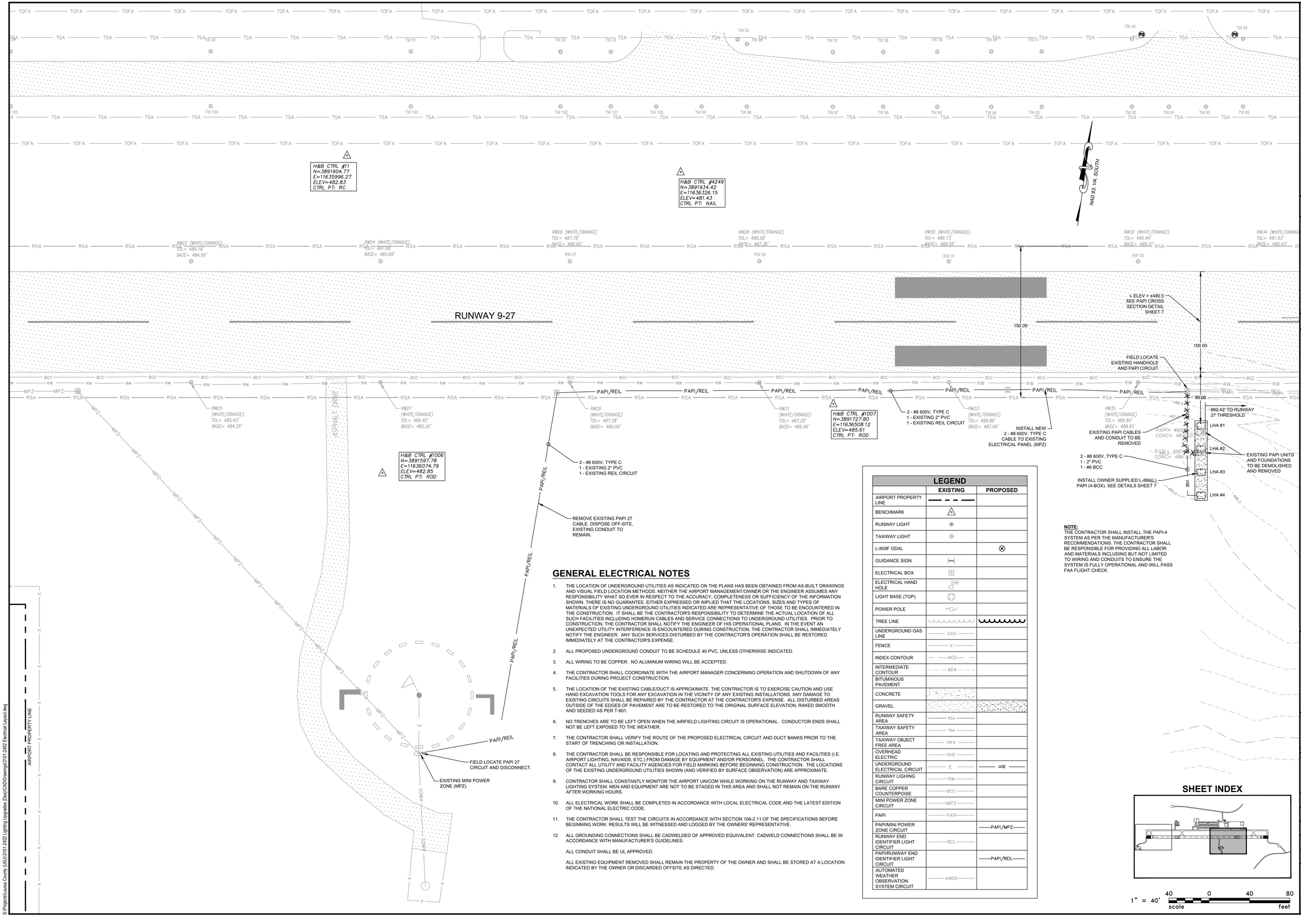

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LEGEND

	EXISTING	PROPOSED
AIRPORT PROPERTY LINE		
BENCHMARK		
RUNWAY LIGHT		
TAXIWAY LIGHT		
L-859F ODAL		
GUIDANCE SIGN		
ELECTRICAL BOX		
ELECTRICAL HAND HOLE	EHH	
LIGHT BASE (TOP)		
POWER POLE		
TREE LINE		
UNDERGROUND GAS LINE	GAS	
FENCE	X	
INDEX CONTOUR	465	
INTERMEDIATE CONTOUR	464	
BITUMINOUS PAVEMENT		
CONCRETE		
GRAVEL		
RUNWAY SAFETY AREA	RSA	
TAXIWAY SAFETY AREA	TSA	
TAXIWAY OBJECT FREE AREA	TOFA	
OVERHEAD ELECTRIC	OHE	
UNDERGROUND ELECTRICAL CIRCUIT	E	UGE
RUNWAY LIGHING CIRCUIT	RW	
BARE COPPER COUNTERPOISE	BCC	
MINI POWER ZONE CIRCUIT	MPZ	
PAPI	PAPI	
PAPI/MINI POWER ZONE CIRCUIT		PAPI/MPZ
RUNWAY END IDENTIFIER LIGHT CIRCUIT	REIL	
PAPI/RUNWAY END IDENTIFIER LIGHT CIRCUIT		PAPI/REIL
AUTOMATED WEATHER OBSERVATION SYSTEM CIRCUIT	AWOS	

NOTE:
THE CONTRACTOR SHALL INSTALL THE PAPI-4 SYSTEM AS PER THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL LABOR AND MATERIALS INCLUDING BUT NOT LIMITED TO WIRING AND CONDUITS TO ENSURE THE SYSTEM IS FULLY OPERATIONAL AND WILL PASS FAA FLIGHT CHECK.

SHEET INDEX

1" = 40' scale: 40 0 40 80 feet

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PAPI - RUNWAY 27 POWER LAYOUT

Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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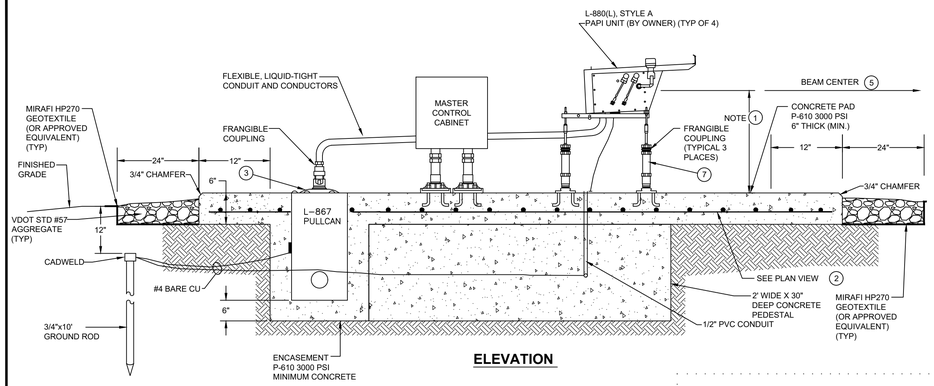
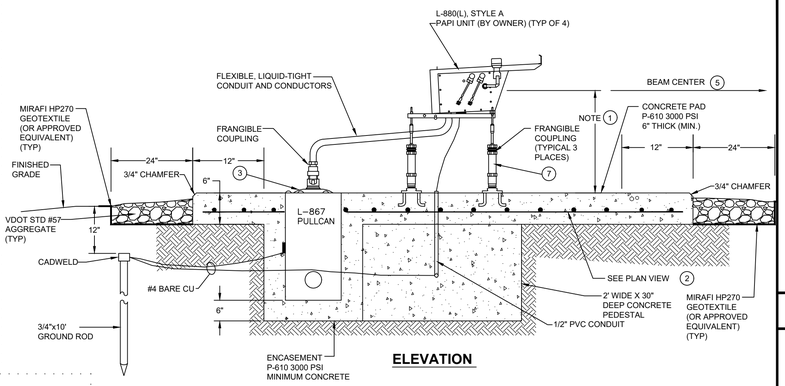


ELEVATION

LHA #4 PAPI DETAIL

NOT TO SCALE



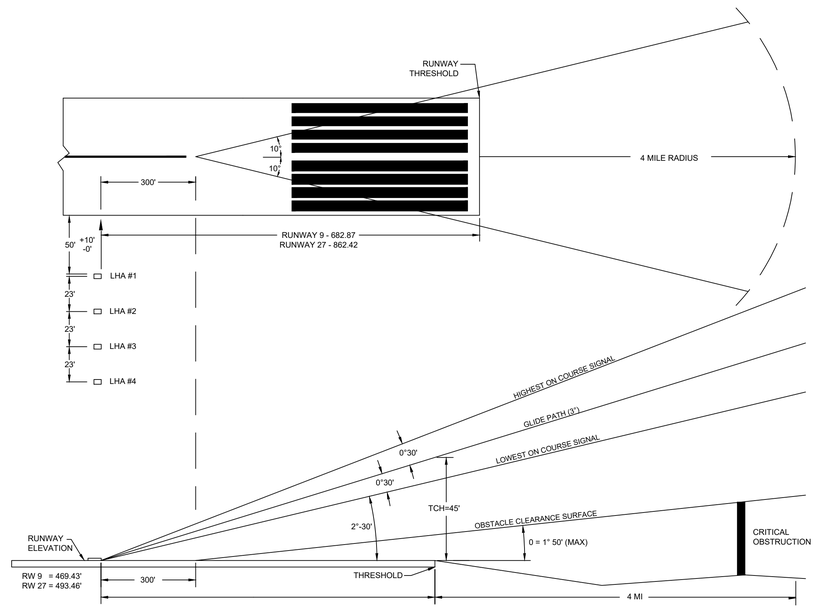
ELEVATION

LHA #1, LHA #2, & LHA #3 PAPI DETAIL

NOT TO SCALE

PAPI DETAIL NOTES:

1. HEIGHT OF PAPI BEAM CENTER TO ±1" AT CROWN OF RUNWAY CENTERLINE.
2. REINFORCING BARS SPACING: 4 VERTICAL SPACES ON 9" CENTERS (TYPICAL FOR ALL PEDESTALS)
3. SPACING FOR SUPPORT PIERS AND MOUNTING BOLTS PER MANUFACTURER'S RECOMMENDATION.
4. THE CONTRACTOR SHALL ANALYZE THE PLACEMENT OF THE NEW PAPI LIGHT UNITS IN RELATION TO THE RUNWAY ELEVATION.
5. LIGHT OUTPUT IS DIRECTED TOWARD THE THRESHOLD.
6. DRILL HOLES AND INSTALL EXPANSION TYPE ANCHOR BOLTS WHEN PAPI UNITS HAVE BEEN ACCURATELY LOCATED.
7. 2" EMT LENGTH AS REQUIRED.
8. CONTRACTOR SHALL ALIGN AND CALIBRATE PAPI SYSTEM PER FAA CRITERIA.
9. PAPI INSTALLATION SHALL MEET FAA AND THE MANUFACTURER'S RECOMMENDATIONS.
10. PAPI UNITS SHALL BE EQUIPPED WITH AIMING DEVICES.
11. ALL MATERIALS AND EQUIPMENT SHALL BE PROVIDED BY THE CONTRACTOR UNLESS OTHERWISE LABELED "BY OWNER"
12. ALL ASSOCIATED COSTS TO INSTALL THE PAPI UNITS ARE INCIDENTAL TO THE LINE ITEM FOR THE L-880 PAPI.



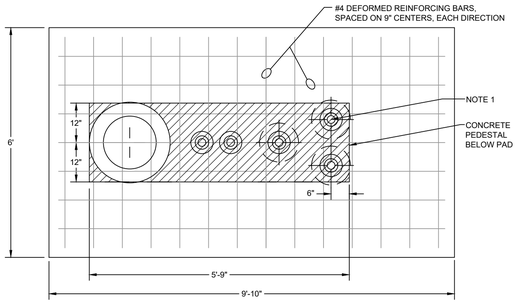
PAPI AIMING/INSTALLATION DETAIL (RWY 9/27)

NOT TO SCALE

PAPI AIMING TABLE						
			AIMING ANGLE			
RUNWAY	PAPI ANGLE	TCH	LHA#1	LHA#2	LHA#3	LHA#4
9	3°	45'	3°- 30'	3°- 10'	2°- 50'	2°- 30'
27	3°	45'	3°- 30'	3°- 10'	2°- 50'	2°- 30'

PAPI DETAIL NOTES:

1. HEIGHT OF PAPI BEAM CENTER TO ±1" AT CROWN OF RUNWAY CENTERLINE.
2. REINFORCING BARS SPACING: 4 VERTICAL SPACES ON 9" CENTERS (TYPICAL FOR ALL PEDESTALS)
3. SPACING FOR SUPPORT PIERS AND MOUNTING BOLTS PER MANUFACTURER'S RECOMMENDATION.
4. THE CONTRACTOR SHALL ANALYZE THE PLACEMENT OF THE NEW PAPI LIGHT UNITS IN RELATION TO THE RUNWAY ELEVATION.
5. LIGHT OUTPUT IS DIRECTED TOWARD THE THRESHOLD.
6. DRILL HOLES AND INSTALL EXPANSION TYPE ANCHOR BOLTS WHEN PAPI UNITS HAVE BEEN ACCURATELY LOCATED.
7. 2" EMT LENGTH AS REQUIRED.
8. CONTRACTOR SHALL ALIGN AND CALIBRATE PAPI SYSTEM PER FAA CRITERIA.
9. PAPI INSTALLATION SHALL MEET FAA AND THE MANUFACTURER'S RECOMMENDATIONS.
10. PAPI UNITS SHALL BE EQUIPPED WITH AIMING DEVICES.
11. ALL MATERIALS AND EQUIPMENT SHALL BE PROVIDED BY THE CONTRACTOR UNLESS OTHERWISE LABELED "BY OWNER"
12. ALL ASSOCIATED COSTS TO INSTALL THE PAPI UNITS ARE INCIDENTAL TO THE LINE ITEM FOR THE L-880 PAPI.

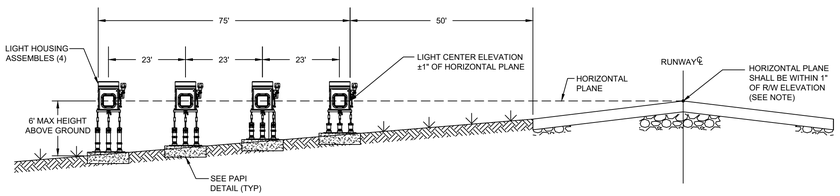


LHA #4 PAPI CONCRETE PAD PLAN VIEW

NOT TO SCALE

NOTE:

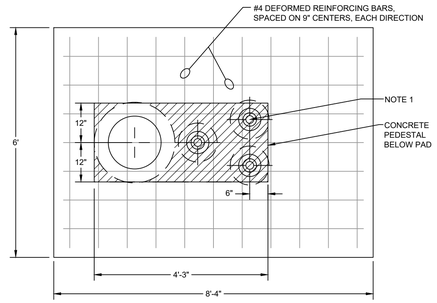
1. CONTRACTOR SHALL VERIFY LEG SPACING WITH MANUFACTURER'S INSTALLATION GUIDE.



PAPI CROSS SECTION

NOT TO SCALE

NOTE:
CONTRACTOR TO PROVIDE A SURVEYOR TO VERIFY THE RUNWAY CENTERLINE ELEVATION FOR CORRECT LIGHT HOUSING ASSEMBLY INSTALLATION.



LHA #1, LHA #2, & LHA #3 PAPI CONCRETE PAD PLAN VIEW

NOT TO SCALE

NOTE:

1. CONTRACTOR SHALL VERIFY LEG SPACING WITH MANUFACTURER'S INSTALLATION GUIDE.

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REV.	DESCRIPTION/ REVISIONS	DATE

PAPI INSTALLATION & DETAILS
Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25
Louisa County Airport/Freeman Field - Louisa, Virginia

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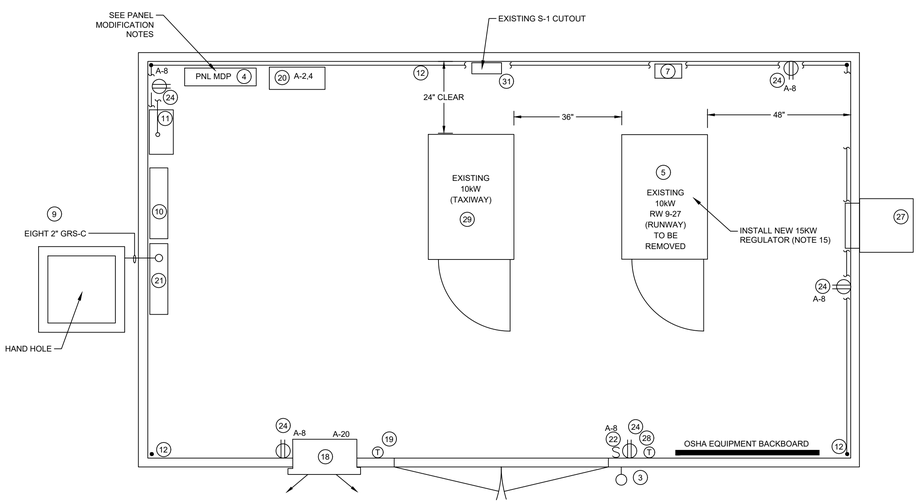
PANEL MODIFICATION NOTES:

1. THE CONTRACTOR SHALL LOCATE, WITHIN THE EXISTING ELECTRICAL VAULT, THE EXISTING CIRCUITS IMPACTED WITH THE PROPOSED IMPROVEMENTS. THIS SHALL INCLUDE INVESTIGATION OF JUNCTION BOXES, CONDUITS, AND THE MAIN DISTRIBUTION PANEL.
2. THE CONTRACTOR SHALL DISCONNECT THE EXISTING RUNWAY 9 PAPI WIRING FROM THE MAIN DISTRIBUTION PANEL AND RE-INSTALL NEW CABLE.
3. THE CONTRACTOR SHALL REPLACE THE EXISTING 20AMP BREAKER WITH A NEW 20AMP BREAKER COMPATIBLE WITH THE EXISTING PANEL.



EXISTING FLOOR PLAN

SCALE: 1" = 2'

PANEL : "MDP"

SERVICE: 120/240V, 1 PH, 3W

MAINS: 400A MAIN BREAKER (LA FRAME)

MOUNTING: SURFACE

TYPE: SQUARE D "I-LINE"

DESIGNATION TO BE TYPED ON DIRECTORY	CONDUIT	GND SIZE	WIRE SIZE	FRAME	BKR. AMP RTG.	CKT. NO.
10 kW CCR	1"	10	6	FA	60	1
RWY 9-27			6			3
LOCALIZER BLDG.	2"	8	1	FA	100	5
			1			7
MPZ	1-1/4"	8	4	FA	80	9
		4	4			11
10 kW CCR	1"	10	6	FA	60	13
TAXIWAY			6			15
SPACE			—	FA		17
SPACE			—	FA		19
SPACE			—	FA		21
SPACE			—	FA		23
SPACE			—	FA		25
SPACE			—	FA		27
SPACE			—	FA		29
SPACE			—	FA		31
SPACE			—	FA		33
SPACE			—	FA		35
SPACE			—	FA		37
SPACE			—	FA		39
SPACE			—	FA		41

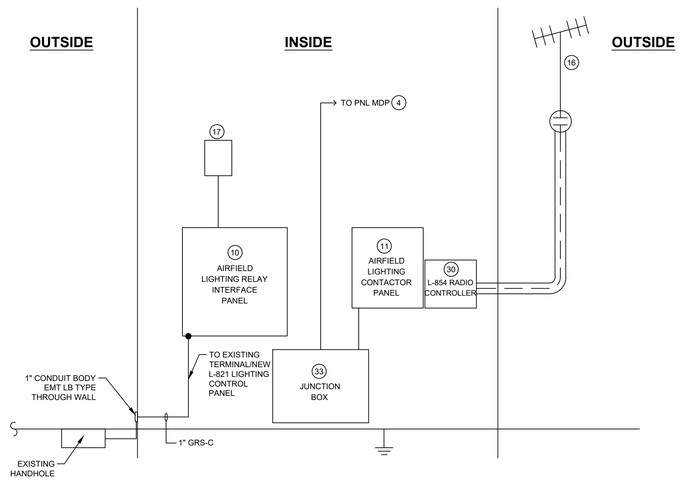
A C

CKT. NO.	BKR. AMP RTG.	FRAME	WIRE SIZE	GND SIZE	CONDUIT	DESIGNATION TO BE TYPED ON DIRECTORY
2	30	FA	10	10	3/4"	HTR
4			10			
6	20		12	12	1/2"	VAULT LIGHTS
8	20		12	12	1/2"	VAULT RECEPT
10	20		12	12	1/2"	CONTROL POWER
12	20		8	8	1"	SPARE
14			8			
16	20		12	12	1/2"	RADIO
18	20		8	8	1"	PAPI - RWY 9
20	15		12	12	1/2"	EXHAUST FAN
22	20					SPARE
24	20					SPARE
26	20					SPARE
28	20					SPARE
30	—					SPACE
32	—					
34	—					
36	—					
38	—					
40	—					
42	—					

NOTES:

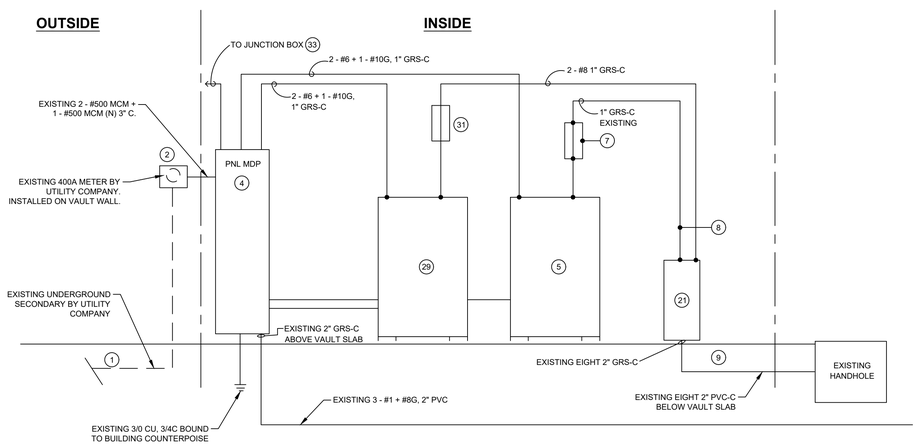
VAULT MODIFICATION NOTES:

1. AIRPORT LIGHTING EQUIPMENT AND MATERIALS COVERED BY ADVISORY CIRCULARS (AC) SHALL BE CERTIFIED IN AC 150/5345-53, AIRPORT LIGHTING EQUIPMENT CERTIFICATION PROGRAM (ALECP) AND LISTED IN THE ALECP ADDENDUM.
2. ALL OTHER EQUIPMENT AND MATERIALS COVERED BY OTHER REFERENCED SPECIFICATIONS SHALL BE SUBJECT TO ACCEPTANCE THROUGH MANUFACTURER'S CERTIFICATION OF COMPLIANCE WITH THE APPLICABLE SPECIFICATION WHEN REQUESTED BY THE RPR.
3. MANUFACTURER'S CERTIFICATIONS SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO PROVIDE MATERIALS PER THESE SPECIFICATIONS. MATERIALS SUPPLIED AND/OR INSTALLED THAT DO NOT COMPLY WITH THESE SPECIFICATIONS SHALL BE REMOVED (WHEN DIRECTED BY THE RPR) AND REPLACED WITH MATERIALS THAT COMPLY WITH THESE SPECIFICATIONS AT THE CONTRACTOR'S COST.
4. ALL MATERIALS AND EQUIPMENT USED TO CONSTRUCT THIS ITEM 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. SUBMITTAL DATA SHALL BE PRESENTED IN A CLEAR, PRECISE AND THOROUGH MANNER. ORIGINAL CATALOG SHEETS ARE PREFERRED. PHOTOCOPIES ARE ACCEPTABLE PROVIDED THEY ARE AS GOOD A QUALITY AS THE ORIGINAL. CLEARLY AND BOLDLY MARK EACH COPY TO IDENTIFY PRODUCTS OR MODELS APPLICABLE TO THIS PROJECT. INDICATE ALL OPTIONAL EQUIPMENT AND DELETE ANY NON-PERTINENT DATA. SUBMITTALS FOR COMPONENTS OF ELECTRICAL EQUIPMENT AND SYSTEMS SHALL IDENTIFY THE EQUIPMENT TO WHICH THEY APPLY ON EACH SUBMITTAL SHEET. MARKINGS SHALL BE MADE BOLD AND CLEAR WITH ARROWS OR CIRCLES (HIGHLIGHTING IS NOT ACCEPTABLE). THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DELAYS IN THE PROJECT THAT MAY ACCRUE DIRECTLY OR INDIRECTLY FROM LATE SUBMISSIONS OR RESUBMISSIONS OF SUBMITTALS.
5. 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 PROVIDED IN ELECTRONIC PDF FORMAT, TABBED BY SPECIFICATION SECTION. THE RPR RESERVES THE RIGHT TO REJECT ANY AND ALL EQUIPMENT, MATERIALS OR PROCEDURES THAT DO NOT MEET THE SYSTEM DESIGN AND THE STANDARDS AND CODES, SPECIFIED IN THIS DOCUMENT.
6. 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.
7. RIGID STEEL CONDUIT AND FITTINGS SHALL BE PER UNDERWRITERS LABORATORIES STANDARDS 6 AND 514B.
8. PLASTIC CONDUIT AND FITTINGS SHALL CONFORM TO THE REQUIREMENTS OF UL-651 AND UL-654 SCHEDULE 40 POLYVINYL CHLORIDE (PVC) SUITABLE FOR USE ABOVE OR BELOW GROUND.
9. THE CONSTANT CURRENT REGULATOR SHALL BE L-829 FAA APPROVED AS PER AC150/5345-10 - SPECIFICATION FOR CONSTANT CURRENT REGULATORS AND REGULATOR MONITORS.
10. DISTRIBUTION TRANSFORMERS, OIL SWITCHES, CUTOUTS, RELAYS, TERMINAL BLOCKS, TRANSFER RELAYS, CIRCUIT BREAKERS, AND ALL OTHER REGULARLY USED COMMERCIAL ITEMS OF ELECTRICAL EQUIPMENT NOT COVERED BY FAA EQUIPMENT SPECIFICATIONS AND ACS SHALL CONFORM TO THE APPLICABLE RULINGS AND STANDARDS OF THE INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE) OR THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA). WHEN SPECIFIED, TEST REPORTS FROM A TESTING LABORATORY INDICATING THAT THE EQUIPMENT MEETS THE SPECIFICATIONS SHALL BE SUPPLIED. IN ALL CASES, EQUIPMENT SHALL BE NEW AND A FIRST-GRADE PRODUCT. THIS EQUIPMENT SHALL BE SUPPLIED IN THE QUANTITIES REQUIRED FOR THE SPECIFIC PROJECT AND SHALL INCORPORATE THE ELECTRICAL AND MECHANICAL CHARACTERISTICS SPECIFIED IN THE PROPOSAL AND PLANS. EQUIPMENT SELECTED AND INSTALLED BY THE CONTRACTOR SHALL MAINTAIN THE INTERRUPTING CURRENT RATING OF THE EXISTING SYSTEMS OR SPECIFIED RATING WHICHEVER IS GREATER.
11. THE CONTRACTOR SHALL FURNISH, INSTALL, AND CONNECT ALL EQUIPMENT, EQUIPMENT ACCESSORIES, CONDUIT, CABLES, WIRES, BUSES, GROUNDS, AND SUPPORT NECESSARY TO ENSURE A COMPLETE AND OPERABLE ELECTRICAL DISTRIBUTION CENTER FOR THE AIRPORT LIGHTING SYSTEM AS SPECIFIED HEREIN AND SHOWN IN THE PLANS. THE EQUIPMENT INSTALLATION AND MOUNTING SHALL COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE AND LOCAL CODE AGENCY HAVING JURISDICTION. ALL ELECTRICAL WORK SHALL COMPLY WITH THE NEC AND LOCAL CODE AGENCY HAVING JURISDICTION INCLUDING THE SEPARATION OF UNDER 600V WORK FROM 5,000V WORK."
12. TRANSFORMERS, REGULATORS, BOOSTER TRANSFORMERS, AND OTHER POWER SUPPLY EQUIPMENT ITEMS SHALL BE FURNISHED AND INSTALLED AT THE LOCATION SHOWN IN THE PLANS OR AS DIRECTED BY THE RPR. THE POWER SUPPLY EQUIPMENT SHALL BE SET ON STEEL "H" SECTIONS, "I" BEAMS, CHANNELS, OR CONCRETE BLOCKS TO PROVIDE A MINIMUM SPACE OF 1-1/2 INCH (38 MM) BETWEEN THE EQUIPMENT AND THE FLOOR. THE EQUIPMENT SHALL BE PLACED SO AS NOT TO OBSTRUCT THE OIL-SAMPLING PLUGS OF THE OIL-FILLED UNITS; AND NAME-PLATES SHALL, SO FAR AS POSSIBLE, NOT BE OBSCURED.
13. THE CONTRACTOR SHALL MAKE ALL NECESSARY ELECTRICAL CONNECTIONS IN THE VAULT PER THE WIRING DIAGRAMS FURNISHED AND AS DIRECTED BY THE RPR. IN WIRING TO THE TERMINAL BLOCKS, THE CONTRACTOR SHALL LEAVE SUFFICIENT EXTRA LENGTH ON EACH CONTROL LEAD TO MAKE FUTURE CHANGES IN CONNECTIONS AT THE TERMINAL BLOCK. THIS SHALL BE ACCOMPLISHED BY RUNNING EACH CONTROL LEAD THE LONGEST WAY AROUND THE BOX TO THE PROPER TERMINAL. LEADS SHALL BE NEATLY LACED IN PLACE.
14. ALL EQUIPMENT, CONTROL WIRES, TERMINAL BLOCKS, ETC., SHALL BE TAGGED, MARKED, OR LABELED AS SPECIFIED BELOW:
    A. WIRE IDENTIFICATION. THE CONTRACTOR SHALL FURNISH AND INSTALL SELF-STICKING WIRE LABELS OR IDENTIFYING TAGS ON ALL CONTROL WIRES AT THE POINT WHERE THEY CONNECT TO THE CONTROL EQUIPMENT OR TO THE TERMINAL BLOCKS. WIRE LABELS, IF USED, SHALL BE OF THE SELF-STICKING PREPRINTED TYPE AND OF THE MANUFACTURER'S RECOMMENDED SIZE FOR THE WIRE INVOLVED. IDENTIFICATION -MARKINGS DESIGNATED IN THE PLANS SHALL BE FOLLOWED. TAGS, IF USED, SHALL BE OF FIBER NOT LESS THAN 3/4 INCH (19 MM) IN DIAMETER AND NOT LESS THAN 1/32 INCH (1 MM) THICK. IDENTIFICATION MARKINGS DESIGNATED IN THE PLANS SHALL BE STAMPED ON TAGS BY MEANS OF SMALL TOOL DIES. EACH TAG SHALL BE SECURELY TIED TO THE PROPER WIRE BY A NONMETALLIC CORD.
    B. LABELS. THE CONTRACTOR SHALL STENCIL IDENTIFYING LABELS ON THE CASES OF REGULATORS, BREAKERS, AND DISTRIBUTION AND CONTROL RELAY CASES WITH WHITE OIL PAINT AS DESIGNATED BY THE RPR. THE LETTERS AND NUMERALS SHALL BE NOT LESS THAN ONE INCH (25 MM) IN HEIGHT AND SHALL BE OF PROPORTIONATE WIDTH. THE CONTRACTOR SHALL ALSO MARK THE CORRECT CIRCUIT DESIGNATIONS PER THE WIRING DIAGRAM ON THE TERMINAL MARKING STRIPS, WHICH ARE A PART OF EACH TERMINAL BLOCK.
15. THE EXISTING RUNWAY CABLING SHALL BE DISCONNECTED FROM THE EXISTING RUNWAY REGULATOR. THE EXISTING REGULATOR SHALL BE STORED AS DIRECTED BY THE OWNER. INSTALL NEW 10 kW RUNWAY REGULATOR PER MANUFACTURER'S RECOMMENDATION.



ELEVATION - CONTROL

NOT TO SCALE



POWER RISER DIAGRAM

NOT TO SCALE

NOTE: VERIFY LENGTHS OF CONDUIT REQUIRED IN THE FIELD.

VAULT EQUIPMENT SCHEDULE:

1	EXISTING UNDERGROUND SECONDARY ELECTRIC SERVICE
2	EXISTING 400A KWH METER
3	EXISTING EXTERIOR WALL MOUNTED HID FIXTURE
4	EXISTING 400A PANELBOARD
5	L-823 CONSTANT CURRENT REGULATOR, 10kW, 3 STEP, 240V, 1 PHASE
7	EXISTING H.V. CUTOUT SWITCH - S1
8	EXISTING H.V. CABLE, 5kV IN 1" GRS CONDUIT
9	EXISTING 2" RIGID GALVANIZED STEEL CONDUITS
10	EXISTING AIRFIELD LIGHTING RELAY INTERFACE PANEL
11	EXISTING AIRFIELD LIGHTING CONTACTOR PANEL
12	EXISTING COPPER GROUND BUS BAR
16	EXISTING RADIO ANTENNA AND CABLE
17	EXISTING PHOTO ELECTRIC CONTROL
18	EXISTING SIDE WALL EXHAUST FAN
19	EXISTING LINE VOLTAGE THERMOSTAT
20	EXISTING HEATER 5000W
21	EXISTING AC POWER PULL BOX
22	EXISTING SINGLE POLE SWITCH
24	EXISTING RECEPTACLES
25	EXISTING COAX CABLE
27	EXISTING 30" x 30" FIXED ALUMINUM LOUVER
28	EXISTING LINE VOLTAGE THERMOSTAT
29	EXISTING L-823 CONSTANT CURRENT REGULATOR, 10kW, 3 STEP, 240V, 1 PHASE
30	EXISTING L-854 RADIO CONTROLLER
31	EXISTING S-1 CUTOUT
32	EXISTING L-821 AIRPORT LIGHTING CONTROL PANEL (TERMINAL) TYPE 1, CLASS W, STYLE 1, MODE 1
33	EXISTING JUNCTION BOX

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REV.	DESCRIPTION/REVISIONS	DATE

ELECTRICAL VAULT DETAILS

Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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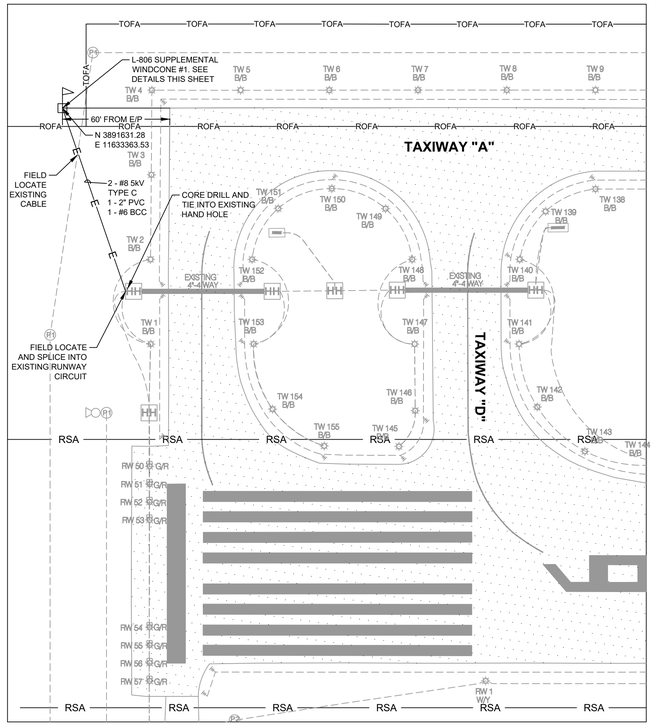
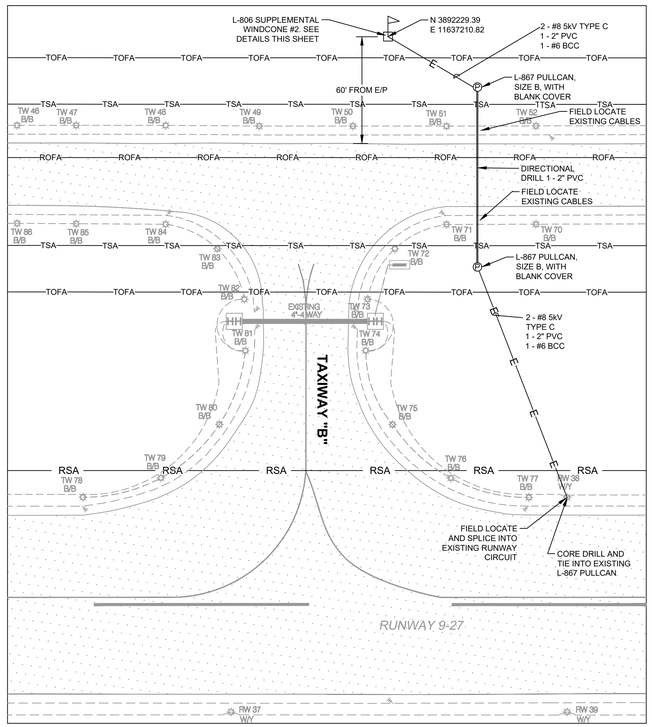


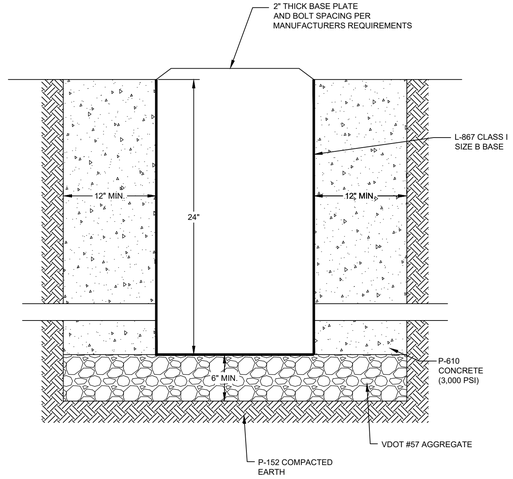
SUPPLEMENTAL WIND CONE #1 INSTALLATION

SCALE: 1" = 40'



SUPPLEMENTAL WIND CONE #2 INSTALLATION

SCALE: 1" = 40'

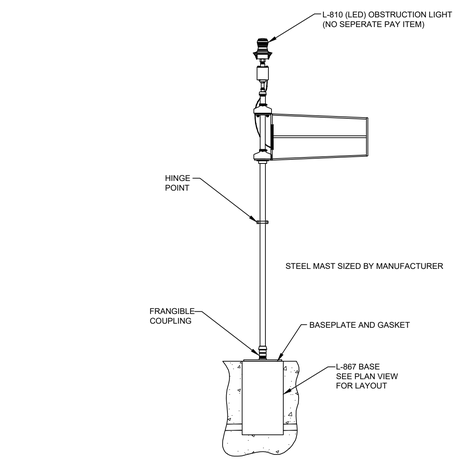


L-806 FOUNDATION DETAIL

NOT TO SCALE

NOTES:

1. GROUNDING FOR WIND CONE SHALL BE IN ACCORDANCE TO SPECIFICATION L-107.
2. ALL COST FOR FOUNDATION SHALL BE INCLUDED IN THE WIND CONE PAY ITEM.



STANDARD ILLUMINATED FRANGIBLE
457mm (18") WIND CONE ASSEMBLY

L-806(L) WIND CONE ASSEMBLY (FRANGIBLE)

NOT TO SCALE

NOTES:

1. L-806 WIND CONE SHALL BE SIZE 1 AND LIGHTED STYLE IB (INTERNAL). LIGHTING SHALL BE LED. POWER SOURCE IS THE EXISTING RUNWAY CIRCUIT (CONSTANT CURRENT).
2. L-810 OBSTRUCTION LIGHT IS REQUIRED. LIGHTING SHALL BE LED. ALL COSTS FOR THE OBSTRUCTION LIGHT SHALL BE INCLUDED IN THE WIND CONE PAY ITEM.
3. LIGHTING EQUIPMENT SHALL BE LISTED ON THE FAA'S APPROVED AIRPORT LIGHTING EQUIPMENT LIST AT THE TIME OF BID OPENING, AND SHALL BE ETL CERTIFIED TO FAA AC 150/5345-27F.

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REV.	DESCRIPTION/ REVISIONS	DATE

SUPPLEMENTAL WINDCONE INSTALLATION & DETAILS
Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
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DOAV Project No. CS0078-25
Louisa County Airport/Freeman Field - Louisa, Virginia

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LEGEND		
	EXISTING	PROPOSED
RUNWAY LIGHT	✳	
TAXIWAY LIGHT	✳	
L-859F ODAL		⊗
GUIDANCE SIGN		
ELECTRICAL BOX		
ELECTRICAL HAND HOLE	EHH	
LIGHT BASE (TOP)		
POWER POLE		
TREE LINE		
OVERHEAD ELECTRIC	OHE	
FENCE	X	
PAINTED U/G ELECTRIC	PUE	
PAINTED U/G UNKNOWN UTILITY	PUNK	
INDEX CONTOUR	465	
INTERMEDIATE CONTOUR	464	
BITUMINOUS PAVEMENT		
CONCRETE		
GRAVEL		
RUNWAY SAFETY AREA	RSA	RSA
TAXIWAY SAFETY AREA	TSA	TSA

AIRPORT PROPERTY LINE

NAD 83, VA SOUTH

EXISTING 8' CHAIN LINK FENCE

LEVEL SPREADER (TO BE CONSTRUCTED DEQ PERMIT VAR 10V234)

SIGN W/ METAL ACCESS "A-27"

CONC. DITCH

RIP/RAP

ODAL LIGHT #6B

EXISTING REIL TO BE REMOVED. CAP CONDUITS AND REMOVE ALL EQUIPMENT, CABLE AND CONDUIT ABOVE THE FOUNDATION SURFACE.

H&B CTRL #6500
N=3892097.84
E=1637945.29
ELEV=484.30
CTRL PT:

EXISTING RUNWAY END IDENTIFICATION LIGHT

H&B CTRL #64
N=3891979.58
E=1637716.09
ELEV=493.46
CTRL PT: PKNAIL

2 - #8 5KV
1 - #6 BCC
1 - 2" PVC

FIELD LOCATE EXISTING RUNWAY CIRCUIT

EXISTING REIL TO BE REMOVED. CAP CONDUITS AND REMOVE ALL EQUIPMENT, CABLE AND CONDUIT ABOVE THE FOUNDATION SURFACE.

ODAL LIGHT #6A

2 - #8 5KV
1 - #6 BCC
1 - 2" PVC

EXISTING ELECTRIC HAND HOLE

SPLICE INTO EXISTING RUNWAY CIRCUIT

12' GRAVEL ACCESS ROAD SEE DETAIL SHEET 16

ODAL TOWER #5
STA. 3+20
N:3892024.07
E:11638032.98
SEE DETAIL SHEET 15

18" RCP CL III
INV. IN = 478.5
INV. OUT = 478.0

2 - #8 5KV
1 - #6 BCC
1 - 2" PVC

BASELINE "A"

ODAL TOWER #4
STA. 6+00
N:3892063.00
E:11638310.26
SEE DETAIL SHEET 15

INSTALL 16' CHAIN LINK DOUBLE SWING GATE

LIMITS OF CLEARING AND GRUBBING

NOTE:
ODAL TOWER #1 TO BE INSTALLED IN A FUTURE PROJECT

ODAL TOWER #3
STA. 9+00
N:3892104.71
E:11638607.35
SEE DETAIL SHEET 15

SEE PROFILE SHEET 14

2 - #8 5KV
1 - #6 BCC
1 - 2" PVC

ODAL TOWER #2
STA. 11+80
N:3892143.64
E:11638884.63
SEE DETAIL SHEET 15

EXISTING GATE TO REMAIN

8' CHAINLINK FENCE

R100'

N:3891934.77
E:11638271.44

N:3891851.50
E:11638244.43

12' GRAVEL ACCESS ROAD SEE DETAIL SHEET 16

PROVIDE SMOOTH TRANSITION

GRAVEL AREA

DRIVE BRUSH

GRAVEL ACCESS ROAD

STATE ROUTE 767 - SCHOOL BUS DRIVE

AIRPORT PROPERTY LINE

OHE

TALBERT&BRIGHT
ENGINEERING & PLANNING CONSULTANTS
10105 KRAUSE ROAD, SUITE 100
CHESTERFIELD, VIRGINIA 23832
PHONE: 804-768-6878 FAX: 804-768-6871

REV.	DESCRIPTION	DATE
	REVISIONS	
	DEQ/COUNTY COMMENTS	4-2-26

ODAL INSTALLATION SITE PLAN

Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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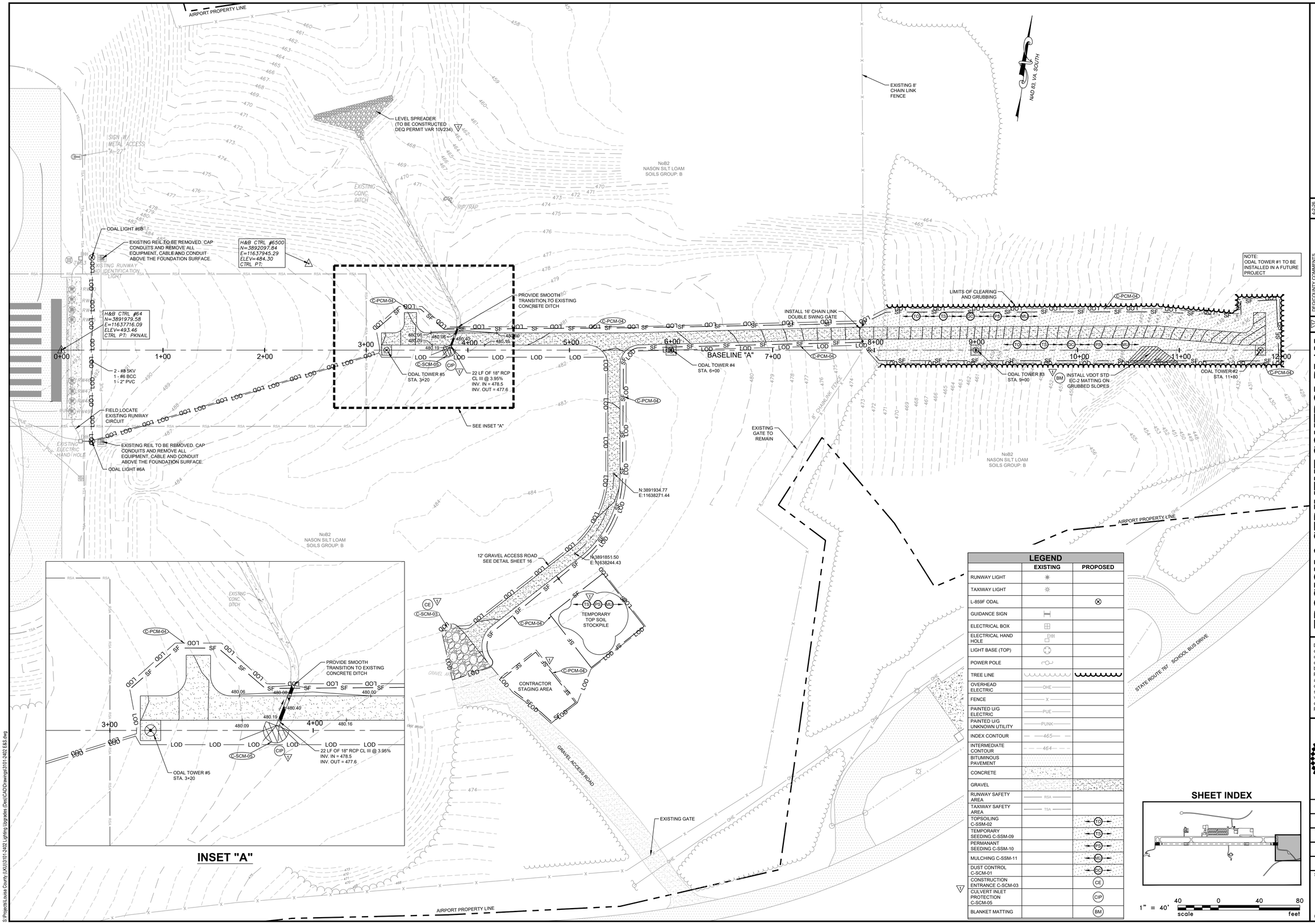
COMMONWEALTH OF VIRGINIA
STEVEN T. PETERSON
Lic. No. 038457
5-1-26
PROFESSIONAL ENGINEER

Date	MAY 2026
Scale	1" = 40'
Drawn	REK
Checked	STP
Project No.	3101-2402
Sheet No.	10
Of	18

S:\Projects\Louisa County (LKU)\3101-2402 Lighting Upgrades (Des)\CADD\drawings\3101-2402 SITE.dwg



LEGEND	EXISTING	PROPOSED
RUNWAY LIGHT		
TAXIWAY LIGHT		
L-859F ODAL		
GUIDANCE SIGN		
ELECTRICAL BOX		
ELECTRICAL HAND HOLE	EHH	
LIGHT BASE (TOP)		
POWER POLE		
TREE LINE		
OVERHEAD ELECTRIC	OHE	
FENCE	X	
PAINTED U/G ELECTRIC	PUE	
PAINTED U/G UNKNOWN UTILITY	PUNK	
INDEX CONTOUR	465	
INTERMEDIATE CONTOUR	464	
BITUMINOUS PAVEMENT		
CONCRETE		
GRAVEL		
RUNWAY SAFETY AREA	RSA	
TAXIWAY SAFETY AREA	TSA	
TOPSOILING C-SSM-02		TO
TEMPORARY SEEDING C-SSM-09		TS
PERMANANT SEEDING C-SSM-10		PS
MULCHING C-SSM-11		ML
DUST CONTROL C-SCM-01		DC
CONSTRUCTION ENTRANCE C-SCM-03		CE
CULVERT INLET PROTECTION C-SCM-05		CIP
BLANKET MATTING		BM

SHEET INDEX

1" = 40' scale: 40 0 40 80 feet

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10105 KRAUSE ROAD, SUITE 100
CHESTERFIELD, VIRGINIA 23832
PHONE: 804-768-8878 FAX: 804-768-8871

REV.	DESCRIPTION	DATE
	DEQ/COUNTY COMMENTS	4-2-26
	REVISIONS	

EROSION & SEDIMENT CONTROL PLAN

Install Precision Approach Path Indicator (RWY 9 & 27) &
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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S:\Projects\Louisa County (LKU)\3101-2402 Lighting Upgrades (Dwb)\CAD\Drawings\3101-2402 E&S.dwg

9 VAC25-875-560. MINIMUM STANDARDS.

A VESCP MUST BE CONSISTENT WITH THE FOLLOWING CRITERIA, TECHNIQUES AND METHODS:

1. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.

2. DURING CONSTRUCTION OF THE PROJECT, SOIL STOCK PILES AND BORROW AREAS SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE APPLICANT IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON SITE AS WELL AS BORROW AREAS AND SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.

3. A PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON DENUDED AREAS NOT OTHERWISE PERMANENTLY STABILIZED. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION.

4. SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.

5. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.

6. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL BE DESIGNED AND CONSTRUCTED BASED UPON THE TOTAL DRAINAGE AREA TO BE SERVED BY THE TRAP OR BASIN.

   A. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT TRAP SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA AND THE TRAP SHALL ONLY CONTROL DRAINAGE AREAS LESS THAN THREE ACRES.
   B. SURFACE RUNOFF FROM DISTURBED AREAS THAT IS COMPRISED OF FLOW FROM DRAINAGE AREAS GREATER THAN OR EQUAL TO THREE ACRES SHALL BE CONTROLLED BY A SEDIMENT BASIN. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT BASIN SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA. THE OUTFALL SYSTEM SHALL, AT A MINIMUM, MAINTAIN THE STRUCTURAL INTEGRITY OF THE BASIN DURING A 25-YEAR STORM OF 24-HOUR DURATION. RUNOFF COEFFICIENTS USED IN RUNOFF CALCULATIONS SHALL CORRESPOND TO A BARE EARTH CONDITION OR THOSE CONDITIONS EXPECTED TO EXIST WHILE THE SEDIMENT BASIN IS UTILIZED.

7. CUT AND FILL SLOPES SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES THAT ARE FOUND TO BE ERODING EXCESSIVELY WITHIN ONE YEAR OF PERMANENT STABILIZATION SHALL BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES UNTIL THE PROBLEM IS CORRECTED.

8. CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME OR SLOPE DRAIN STRUCTURE.

9. WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.

10. ALL STORM SEWER INLETS THAT ARE MADE OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SEDIMENT-LADEN WATER CANNOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR OTHERWISE TREATED TO REMOVE SEDIMENT.

11. BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS OR PIPES ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE CHANNEL AND RECEIVING CHANNEL.

12. WHEN WORK IN A LIVE WATERCOURSE IS PERFORMED, PRECAUTIONS SHALL BE TAKEN TO MINIMIZE ENCROACHMENT, CONTROL SEDIMENT TRANSPORT AND STABILIZE THE WORK AREA TO THE GREATEST EXTENT POSSIBLE DURING CONSTRUCTION. NON-ERODIBLE MATERIAL SHALL BE USED FOR THE CONSTRUCTION OF CAUSEWAYS AND COFFERDAMS. EARTHEN FILL MAY BE USED FOR THESE STRUCTURES IF ARMORED BY NON-ERODIBLE COVER MATERIALS.

13. WHEN A LIVE WATERCOURSE MUST BE CROSSED BY CONSTRUCTION VEHICLES MORE THAN TWICE IN ANY SIX-MONTH PERIOD, A TEMPORARY VEHICULAR STREAM CROSSING CONSTRUCTED OF NON-ERODIBLE MATERIAL SHALL BE PROVIDED.

14. ALL APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS PERTAINING TO WORKING IN OR CROSSING LIVE WATERCOURSES SHALL BE MET.

15. THE BED AND BANKS OF A WATERCOURSE SHALL BE STABILIZED IMMEDIATELY AFTER WORK IN THE WATERCOURSE IS COMPLETED.

16. UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE CRITERIA:

   a. NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.
   b. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
   c. EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED OR PASSED THROUGH AN APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH, AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF-SITE PROPERTY.
   d. MATERIAL USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ORDER TO MINIMIZE EROSION AND PROMOTE STABILIZATION.
   e. RESTABILIZATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THIS CHAPTER.
   f. APPLICABLE SAFETY REQUIREMENTS SHALL BE COMPLIED WITH.

17. WHERE CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED OR PUBLIC ROADS, PROVISIONS SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT BY VEHICULAR TRACKING ONTO THE PAVED SURFACE. WHERE SEDIMENT IS TRANSPORTED ONTO A PAVED OR PUBLIC ROAD SURFACE, THE ROAD SURFACE SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING SHALL BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER. THIS PROVISION SHALL APPLY TO INDIVIDUAL DEVELOPMENT LOTS AS WELL AS TO LARGER LAND-DISTURBING ACTIVITIES.

18. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE VESCP AUTHORITY. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.

19. PROPERTIES AND WATERWAYS DOWNSTREAM FROM DEVELOPMENT SITES SHALL BE PROTECTED FROM SEDIMENT DEPOSITION, EROSION AND DAMAGE DUE TO INCREASES IN VOLUME, VELOCITY AND PEAK FLOW RATE OF STORMWATER RUNOFF FOR THE STATED FREQUENCY STORM OF 24-HOUR DURATION IN ACCORDANCE WITH THE FOLLOWING STANDARDS AND CRITERIA. STREAM RESTORATION AND RELOCATION PROJECTS THAT INCORPORATE NATURAL CHANNEL DESIGN CONCEPTS ARE NOT MAN-MADE CHANNELS AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS:

   a. CONCENTRATED STORMWATER RUNOFF LEAVING A DEVELOPMENT SITE SHALL BE DISCHARGED DIRECTLY INTO AN ADEQUATE NATURAL OR MAN-MADE RECEIVING CHANNEL, PIPE OR STORM SEWER SYSTEM. FOR THOSE SITES WHERE RUNOFF IS DISCHARGED INTO A PIPE OR PIPE SYSTEM, DOWNSTREAM STABILITY ANALYSES AT THE OUTFALL OF THE PIPE OR PIPE SYSTEM SHALL BE PERFORMED.
   b. ADEQUACY OF ALL CHANNELS AND PIPES SHALL BE VERIFIED IN THE FOLLOWING MANNER:
      (1) THE APPLICANT SHALL DEMONSTRATE THAT THE TOTAL DRAINAGE AREA TO THE POINT OF ANALYSIS WITHIN THE CHANNEL IS 100 TIMES GREATER THAN THE CONTRIBUTING DRAINAGE AREA OF THE PROJECT IN QUESTION; OR
      (2) (a) NATURAL CHANNELS SHALL BE ANALYZED BY THE USE OF A TWO-YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP CHANNEL BANKS NOR CAUSE EROSION OF CHANNEL BED OR BANKS.
      (b) ALL PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS SHALL BE ANALYZED BY THE USE OF A 10YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP ITS BANKS AND BY THE USE OF A TWO YEAR STORM TO DEMONSTRATE THAT STORMWATER WILL NOT CAUSE EROSION OF CHANNEL BED OR BANKS; AND
      (c) PIPES AND STORM SEWER SYSTEMS SHALL BE ANALYZED BY THE USE OF A 10-YEAR STORM TO VERIFY THAT STORMWATER WILL BE CONTAINED WITHIN THE PIPE OR SYSTEM.
   c. IF EXISTING NATURAL RECEIVING CHANNELS OR PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS OR PIPES ARE NOT ADEQUATE, THE APPLICANT SHALL:
      (1) IMPROVE THE CHANNELS TO A CONDITION WHERE A 10-YEAR STORM WILL NOT OVERTOP THE BANKS AND A TWO-YEAR STORM WILL NOT CAUSE EROSION TO THE CHANNEL, THE BED, OR THE BANKS; OR
      (2) IMPROVE THE PIPE OR PIPE SYSTEM TO A CONDITION WHERE THE 10-YEAR STORM IS CONTAINED WITHIN THE APPURTENANCES;
      (3) DEVELOP A SITE DESIGN THAT WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A TWO-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A NATURAL CHANNEL OR WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A 10-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A MAN-MADE CHANNEL; OR
      (4) PROVIDE A COMBINATION OF CHANNEL IMPROVEMENT, STORMWATER DETENTION OR OTHER MEASURES WHICH IS SATISFACTORY TO THE VESCP AUTHORITY TO PREVENT DOWNSTREAM EROSION.
   d. THE APPLICANT SHALL PROVIDE EVIDENCE OF PERMISSION TO MAKE THE IMPROVEMENTS.
   e. ALL HYDROLOGIC ANALYSES SHALL BE BASED ON THE EXISTING WATERSHED CHARACTERISTICS AND THE ULTIMATE DEVELOPMENT CONDITION OF THE SUBJECT PROJECT.
   f. IF THE APPLICANT CHOOSES AN OPTION THAT INCLUDES STORMWATER DETENTION, HE SHALL OBTAIN APPROVAL FROM THE VESCP OF A PLAN FOR MAINTENANCE OF THE DETENTION FACILITIES. THE PLAN SHALL SET FORTH THE MAINTENANCE REQUIREMENTS OF THE FACILITY AND THE PERSON RESPONSIBLE FOR PERFORMING THE MAINTENANCE.
   g. OUTFALL FROM A DETENTION FACILITY SHALL BE DISCHARGED TO A RECEIVING CHANNEL, AND ENERGY DISSIPATERS SHALL BE PLACED AT THE OUTFALL OF ALL DETENTION FACILITIES AS NECESSARY TO PROVIDE A STABILIZED TRANSITION FROM THE FACILITY TO THE RECEIVING CHANNEL.
   h. ALL ON-SITE CHANNELS MUST BE VERIFIED TO BE ADEQUATE.
   i. INCREASED VOLUMES OF SHEET FLOWS THAT MAY CAUSE EROSION OR SEDIMENTATION ON ADJACENT PROPERTY SHALL BE DIVERTED TO A STABLE OUTLET, ADEQUATE CHANNEL, PIPE, OR PIPE SYSTEM, OR TO A DETENTION FACILITY.
   j. IN APPLYING THESE STORMWATER MANAGEMENT CRITERIA, INDIVIDUAL LOTS OR PARCELS IN A RESIDENTIAL, COMMERCIAL OR INDUSTRIAL DEVELOPMENT SHALL NOT BE CONSIDERED TO BE SEPARATE DEVELOPMENT PROJECTS. INSTEAD, THE DEVELOPMENT, AS A WHOLE, SHALL BE CONSIDERED TO BE A SINGLE DEVELOPMENT PROJECT. HYDROLOGIC PARAMETERS THAT REFLECT THE ULTIMATE DEVELOPMENT CONDITION SHALL BE USED IN ALL ENGINEERING CALCULATIONS.
   k. ALL MEASURES USED TO PROTECT PROPERTIES AND WATERWAYS SHALL BE EMPLOYED IN A MANNER WHICH MINIMIZES IMPACTS ON THE PHYSICAL, CHEMICAL AND BIOLOGICAL INTEGRITY OF RIVERS, STREAMS AND OTHER WATERS OF THE STATE.
   l. ANY PLAN APPROVED PRIOR TO JULY 1, 2014, THAT PROVIDES FOR STORMWATER MANAGEMENT THAT ADDRESSES ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MANMADE CHANNELS SHALL SATISFY THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS IF THE PRACTICES ARE DESIGNED TO (I) DETAIN THE WATER QUALITY VOLUME AND TO RELEASE IT OVER 48 HOURS; (II) DETAIN AND RELEASE OVER A 24-HOUR PERIOD THE EXPECTED RAINFALL RESULTING FROM THE ONE YEAR, 24-HOUR STORM; AND (III) REDUCE THE ALLOWABLE PEAK FLOW RATE RESULTING FROM THE 1.5, 2, AND 10-YEAR, 24-HOUR STORMS TO A LEVEL THAT IS LESS THAN OR EQUAL TO THE PEAK FLOW RATE FROM THE SITE ASSUMING IT WAS IN A GOOD FORESTED CONDITION, ACHIEVED THROUGH MULTIPLICATION OF THE FORESTED PEAK FLOW RATE BY A REDUCTION FACTOR THAT IS EQUAL TO THE RUNOFF VOLUME FROM THE SITE WHEN IT WAS IN A GOOD FORESTED CONDITION DIVIDED BY THE RUNOFF VOLUME FROM THE SITE IN ITS PROPOSED CONDITION, AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS AS DEFINED IN ANY REGULATIONS PROMULGATED PURSUANT TO § 62.1-44.15:54 OR 62.1-44.15:65 OF THE ACT.
   m. FOR PLANS APPROVED ON AND AFTER JULY 1, 2014, THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS OF § 62.1-44.15:52 A OF THE ACT AND THIS SUBSECTION SHALL BE SATISFIED BY COMPLIANCE WITH WATER QUANTITY REQUIREMENTS IN THE STORMWATER MANAGEMENT ACT (§ 62.1-44.15:24 ET SEQ. OF THE CODE OF VIRGINIA) AND ATTENDANT REGULATIONS, UNLESS SUCH LAND-DISTURBING ACTIVITIES (I) ARE IN ACCORDANCE WITH PROVISIONS FOR TIME LIMITS ON APPLICABILITY OF APPROVED DESIGN CRITERIA IN 9VAC25-875-480 OR GRANDFATHERING IN 9VAC25-875-490 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) REGULATION, IN WHICH CASE THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS OF § 62.1-44.15:52 A OF THE ACT SHALL APPLY, OR (II) ARE EXEMPT PURSUANT TO § 62.1-44.15:34 C 7 OF THE ACT.
   n. COMPLIANCE WITH THE WATER QUANTITY MINIMUM STANDARDS SET OUT IN 9VAC25-870-600 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) REGULATION SHALL BE DEEMED TO SATISFY THE REQUIREMENTS OF THIS SUBDIVISION 19.

STATUTORY AUTHORITY

§ 62.1-44.15:52 OF THE CODE OF VIRGINIA.

HISTORICAL NOTES

DERIVED FROM VIRGINIA REGISTER VOLUME 40, ISSUE 8, EFF. JULY 1, 2024

Table C-SSM-11-5 Organic Mulch Materials and Application Rates

Mulches	Rates		Notes
	Per Acre	Per 1,000 ft²	
Straw or Hay	1.5 to 2 tons	70 to 90 lbs.	Free from weeds and coarse matter. Must be anchored. Spread with mulch blower or by hand. Use a minimum of 2 tons per acre for winter cover.
Fiber Mulch	1,500 lbs.	35 lbs.	Do not use as mulch for winter cover or during hot, dry periods. Apply as slurry. When fiber mulch is the only available mulch during periods when straw should be used, apply at a minimum rate of 2000 lbs./acre or 45 lbs./1,000 ft².
Corn Stalks	4 to 6 tons	185 to 275 lbs.	Cut or shredded in 4- to 6-inch lengths. Air-dried. Do not use in fine turf areas. Apply with mulch blower or by hand.
Wood Chips	4 to 6 tons	185 to 275 lbs.	Free of coarse matter. Air-dried. Treat with 12 lbs. nitrogen per ton. Do not use in fine turf areas. Apply with mulch blower, chip handler, or by hand.
Bark Chips or Shredded Bark	50 to 70 cy	1 to 2 cy	Free of coarse matter. Air-dried. Do not use in fine turf areas. Apply with mulch blower, chip handler, or by hand.

Source: Va. DSWC

Table C-SSM-09-3 Plant Material for Temporary Seeding

Acceptable Temporary Seeding Plant Materials "Quick Reference for all Regions"

Planting Dates	Species	Rate (pounds per acre)
Sept. 1 – Feb. 15	50/50 Mix of annual ryegrass (*Lolium multi-florum*) & cereal (winter) rye (*Secale cereale*)	50 – 100
Feb. 16 – Apr. 30*	Annual ryegrass (*Lolium multi-florum*)	60 – 100
May 1* – Aug. 31	German millet (*Setaria italica*)	50

* The shift date for annual rye to German millet should be April 15 for the Piedmont and Coastal Plain, rather than May 1.

SEQUENCE OF CONSTRUCTION

1. OBTAIN ALL REQUIRED PERMITS INCLUDING, BUT NOT LIMITED TO, A LOUISA COUNTY LAND DISTURBING PERMIT AND DEQ VSMP FOR CONSTRUCTION ACTIVITIES PRIOR TO THE START OF CONSTRUCTION. THIS PROJECT IS CONSIDERED A COMMON PLAN OF DEVELOPMENT AND THEREFORE THE DEQ STORMWATER PERMIT FOR CONSTRUCTION ACTIVITIES (VSMP) WILL BE REQUIRED.

2. PRE-CONSTRUCTION MEETING WITH LOUISA COUNTY EROSION AND SEDIMENT CONTROL INSPECTOR, OWNER, ENGINEER, ONSITE INSPECTOR, AND CONTRACTOR SHALL TAKE PLACE PRIOR TO START OF CONSTRUCTION. THE PERMIT HOLDER MUST GIVE 48 HOURS NOTIFICATION TO SCHEDULE AN ON-SITE PRE-CONSTRUCTION MEETING FOR THE ISSUANCE OF THE LOUISA COUNTY LAND DISTURBANCE PERMIT.

3. ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THE PLANS ARE TO BE CONSTRUCTED, MAINTAINED, AND REMOVED IN ACCORDANCE WITH THE CURRENT EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND VIRGINIA REGULATION 9VAC25-875-560.

4. PRIOR TO ANY LAND-DISTURBING ACTIVITIES, INSTALL PRELIMINARY EROSION AND SEDIMENT CONTROL MEASURES INCLUDING CONSTRUCTION ENTRANCE AND SILT FENCE. NO CONSTRUCTION SHALL BEGIN UNTIL ALL PRELIMINARY EROSION CONTROL DEVICES ARE IN PLACE AND APPROVED BY THE EROSION AND SEDIMENT CONTROL INSPECTOR.

5. ESTABLISH CONTRACTOR'S STAGING AREA AS PER PLAN.

ODAL INSTALLATION

6. BEGIN REMOVAL OF GRASS AND TOPSOIL FROM THE SITE. PLACE TOPSOIL IN STOCKPILE AREA AS NOTED ON THE PLANS. INSTALL SILT FENCE AROUND THE STOCKPILE IMMEDIATELY. TOPSOIL SHALL BE PROTECTED FOR FUTURE PLACEMENT.

7. BEGIN CONSTRUCTION OF GRAVEL ROAD. CONSTRUCT SUFFICIENT AMOUNT TO ACCESS THE AREA TO BE CLEARED AND GRUBBED.

8. BEGIN CLEARING AND GRUBBING. REMOVE ALL STUMPS AND ROOT MAT. PLACE TOPSOIL, SEED AND MULCH AREA AS PER PLAN.

9. BEGIN ROUGH GRADING OF ACCESS ROAD AND PLACEMENT OF STONE.

10. INSTALL 18" RCP AND CULVERT INLET PROTECTION AS PER PLAN.

11. TEMPORARY SEED SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS IF THEY ARE ANTICIPATED TO REMAIN DORMANT FOR LONGER THAN 30 DAYS.

12. BEGIN CONSTRUCTION AND INSTALLATION OF THE OMNI-DIRECTIONAL APPROACH LIGHTING SYSTEM LIGHT UNITS #2 - #5.

13. COORDINATE WITH OWNER TO ISSUE A NOTAM FOR THE TEMPORARY CLOSURE OF RUNWAY 9-27.

14. INSTALL LIGHT UNITS #6A AND #6B.

15. CONTINUING MAINTENANCE PRACTICES SHALL BE PERFORMED TO ENSURE PROTECTION OF DOWNSTREAM PROPERTIES.

16. INSTALL PERMANENT SEEDING WITHIN 7 DAYS UPON COMPLETION OF FINAL GRADING IN WORK AREAS.

17. NO EROSION CONTROL DEVICES SHALL BE REMOVED UNTIL AN ADEQUATE STAND OF GRASS HAS BEEN OBTAINED (MINIMUM STANDARD #3) AND THE REMOVAL OF THE DEVICES HAVE BEEN APPROVED BY THE LOUISA COUNTY EROSION CONTROL OFFICER. PRIOR TO THE REMOVAL OF THE DEVICES, ALL SILT AND DEBRIS SHALL BE REMOVED.

PAPI/SUPPLEMENTAL WINDCONE INSTALLATION - TO BE CONSTRUCTED CONCURRENTLY WITH THE ODALS

18. COORDINATE WITH THE OWNER TO ISSUE NOTAMS ADVISING PILOTS THAT THE PRECISION APPROACH PATH INDICATOR (PAPI) FOR RUNWAY 9 IS OUT OF SERVICE.

19. REMOVE THE EXISTING RW 9 APPROACH 2-BOX PAPI. INSTALL NEW 4-BOX PAPI.

20. COORDINATE WITH THE OWNER TO ISSUE NOTAMS ADVISING PILOTS THAT THE PRECISION APPROACH PATH INDICATOR (PAPI) FOR RUNWAY 27 IS OUT OF SERVICE.

21. REMOVE THE EXISTING RW 27 APPROACH 2-BOX PAPI. INSTALL NEW 4-BOX PAPI.

22. INSTALL SUPPLEMENTAL WINDCONES.

PROJECT SOIL TYPES

NoB2 - NASON SILT LOAM, 2 TO 7 PERCENT SLOPES, ERODED.
ERODIBILITY - K = 0.43
PERMEABILITY - 0.57 TO 1.98 IN/HR
DEPTH - 48" TO 60"
TEXTURE - SILT LOAM
HSG - B

Table C-SSM-10-7 Site-Specific Seeding Mixtures for Piedmont Area

Site Condition	Seed Mix		Application Rate (pounds per acre)
Minimum-Care Lawn Commercial or Residential	Turf-Type Tall Fescue	95-100%	150 – 200
	Improved Perennial Ryegrass	0-5%	
	Kentucky Bluegrass	0-5%	
High-Maintenance Lawn	Improved (VCIA) Turf-Type Tall Fescue	100%	150 – 200
General Slope (3H:1V or less)	Tall Fescue***		50 – 75
	Red Top or Red/Hard Fescue		10 – 20
	White Clover and/or Birdsfoot Trefoil**		10 – 20
	Seasonal Nurse Crop*		30 – 40
	Tall Fescue		50 – 75
Low-Maintenance Slope (> 3:1) or Inaccessible Area***	Red Top and/or Hard Fescue		5 – 10
	White Clover and/or Birdsfoot Trefoil**		15 – 20
	Annual Lespedeza**		10 – 15
	Seasonal Nurse/Cover Crop		20-30

* Use seasonal nurse crop in accordance with seeding dates as stated below: February 16 through April annual rye

February 16 through April – annual/cereal rye

May 1 through August 15 – foxtail/German millet

August 16 through February 15 – annual/cereal rye

** Use legume seed that is properly inoculated with specified Rhizobia. Legumes recommended unless periodic N fertilization is intended. Weeping lovegrass may be added to any slope or low-maintenance mix during warmer seeding periods; add 10 to 20 lbs/acre in mixes.

*** Increase seeding rate if KY-31 is used rather than VCIA/VDOT improved varieties.

Bermudagrass can be added to substitute for Tall or Hard Fescue in the Low Maintenance mixes for the Southern Piedmont, particularly on sandy soils or hot (S and W) facing slopes. May through October, use hulled seed. All other seeding periods, use un-hulled seed.

Note: Seed mixes are suggested and subject to modification based on site-specific conditions by an agronomist or other qualified revegetation professionals. All seed rates expressed as PLS (Pure Live Seed; see Table C-SSM-10-9).

EROSION AND SEDIMENT CONTROL NARRATIVE AND NOTES

I. PROJECT DESCRIPTION
THE TOTAL LIMITS OF DISTURBANCE (LOD) FOR THE PROPOSED PROJECT IS 1.33 ACRES. THE PROPOSED DEVELOPMENT CONSISTS OF INSTALLATION OF EROSION AND SEDIMENT CONTROL MEASURES, REMOVAL OF TOPSOIL, CLEARING AND GRUBBING, GRAVEL ROAD CONSTRUCTION, AND INSTALLATION OF PAPIS, SUPPLEMENTAL WINDCONES AND AN ODAL SYSTEM.

II. EXISTING SITE CONDITIONS
ODAL INSTALLATION
THE SITE IS LOCATED ON THE EAST END OF THE AIRPORT PROPERTY WITHIN THE APPROACH TO RUWNAY 27 WITH MODERATE SLOPING TERRAIN. ELEVATIONS WITH IN THE PROJECT AREA RANGE FROM 492 MSL TO 429 MSL. THE EXISTING AREA IS COVERED WITH GRASS AND TREES. THERE IS ALSO AN EXISTING GRAVEL ROAD ON THE SOUTH SIDE OF THE PROJECT AREA THAT WILL BE USED FOR INITIAL ACCESS. THE AREAS ADJACENT TO THE PROJECT ARE PAVED RUNWAY TO THE WEST AND UNDEVELOPED AREA TO THE SOUTH.

PAPI AND SUPPLEMENTAL WINDCONE INSTALLATION
THE SITES FOR THE INSTALLATION OF THESE VISAIDS ARE LOCATED ADJACENT TO THE EXSITING RUNWAY AND TAXIWAY. THE INSTALLATION INCLUDES THE CONSTRUCTION OF FOUNDATIONS AND POWER CABLING. THE SITES ARE CURRENTLY UNDEVELOPED GRASSY AREAS.

III. ADJACENT AREAS
ODAL INSTALLATION
THE PROJECT SITES ARE LOCATED OFF THE END OF RUNWAY 27 AND ADJACENT TO THE EXISTING TAXIWAY AND RUNWAY 9. THE AREA IS UNDEVELOPED AND CONSISTS OF GRASS AND TREES. THE SITE DRAINS TO AN EXISTING CHANNEL THAT FLOWS UNDER S.R. 767 (SCHOOL BUS ROAD).

IV. SOILS
TYPICAL SOILS CHARACTERISTICS FOR THE AIRPORT AND GENERAL LOCATION OF THE PROPOSED DEVELOPMENT IS TYPICALLY COVERED WITH 6" OF TOPSOIL AS SURFACE COVER. THE SOILS BENEATH THE SURFACE CONTAIN INTERMIXED DEPOSITS OF LEAN CLAY (CL), SILTY SAND (SM), SANDY SILT (ML), CLAYEY SAND (SC), AND FAT CLAY (CH).

V. CRITICAL EROSION AREAS
THE POTENTIAL CRITICAL AREAS ARE THE EXISTING MINIMAL SLOPING TERRAIN ALLOWING FOR RUNOFF FROM THE PROJECT SITE. SILT FENCE WILL BE USED TO PROTECT ADJACENT AND OFFSITE AREAS FROM SEDIMENT DEPOSITION. POST GRADING WILL INCLUDE SEEDING AND MULCHING AND THE INSTALLATION OF SOIL STABILIZATION FABRIC.

VI. MANAGEMENT STRATEGIES AND SEQUENCE OF EROSION CONTROL MEASURES
UNLESS OTHERWISE INDICATED, ALL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE MINIMUM STANDARDS AND SPECIFICATIONS OF THE LATEST EDITION OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (VSMH).

1. THE FOLLOWING SEQUENCE OF EVENTS FOR EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INCORPORATED INTO THE CONSTRUCTION SCHEDULE FOR THIS PROJECT AND SHALL APPLY TO ALL CONSTRUCTION ACTIVITIES WITHIN THE PROJECT LIMITS:

A. TEMPORARY CONSTRUCTION ENTRANCE(S) SHALL BE PROVIDED AT THE LOCATION(S) SHOWN ON THE PLANS. THIS ENTRANCE(S) SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE VSMH (SPEC. C-SCM-03). WASH RACKS ARE TO BE PROVIDED WHERE WATER IS AVAILABLE.

B. WHERE CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED PUBLIC ROADS, PROVISIONS SHALL BE MADE TO MINIMIZE SURFACE. WHERE SEDIMENT IS TRANSPORT OF SEDIMENT ONTO THE PAVED IS TRANSPORTED ONTO PUBLIC ROAD SURFACE, THE ROAD SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO AN APPROVED LOCATION WHEN SEDIMENT IS REMOVED IN THE MANNER.

C. CONSTRUCTION TRAFFIC SHALL BE LIMITED TO ACCESS ROADS. AS TRAFFIC IS PROHIBITED FROM CROSSING DRAINAGE SWALES AND STREAMS EXCEPT WHERE ABSOLUTELY NECESSARY (VSMH SPEC. C-ENV-03).

2. SILT FENCE AND CONSTRUCTION ENTRANCE ARE TO BE PLACED PRIOR TO CLEARING AND GRUBBING OR PRIOR TO THE FIRST PHASE OF CONSTRUCTION.

3. ALL EROSION CONTROL IS TO BE INSTALLED AND MADE OPERATIONAL AT THE START OF ACCESS ROAD CONSTRUCTION AND TREE CLEARING.

4. A PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON DENUDED AREAS NOT OTHERWISE PERMANENTLY STABILIZED. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT, IN THE OPINION OF THE LOCAL PROGRAM ADMINISTRATOR OR HIS DESIGNATED AGENT, IS UNIFORM AND MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION. VEGETATIVE COVER SHALL BE ESTABLISHED AS FOLLOWS:

PERMANENT SEED	200 #/ACRE (KENTUCKY 31 OR TURF TYPE TALL FESCUE)
TOPSOIL	4" THICK
LIME	4,000 #/ACRE
FERTILIZER	1,000 #/ACRE OF 10-20-10
MULCH	2,000 #/ACRE
TEMPORARY SEED	SEE TABLE (THIS SHEET)

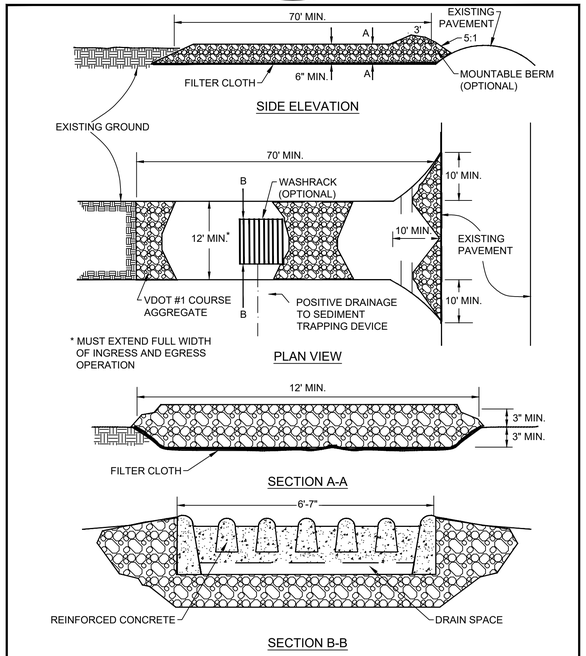
STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIVERSIONS, DITCHES, WATER COURSE BEDS AND BANKS IMMEDIATELY AFTER INSTALLATION (VSMH SPEC. C-SSM-05).

5. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN THIRTY (30) DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED UNLESS OTHERWISE AUTHORIZED BY THE LOCAL PROGRAM ADMINISTRATOR. TRAPPED SEDIMENT AND THE DISTURBED SOILS AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FUTURE EROSION AND SEDIMENTATION.

6. RESPONSIBLE LAND DISTURBER (FOR DESIGN ONLY): STEVEN T. PETERSON, PE # 038457 PHONE - (804) 768-6878.

7. W

C-SCM-03



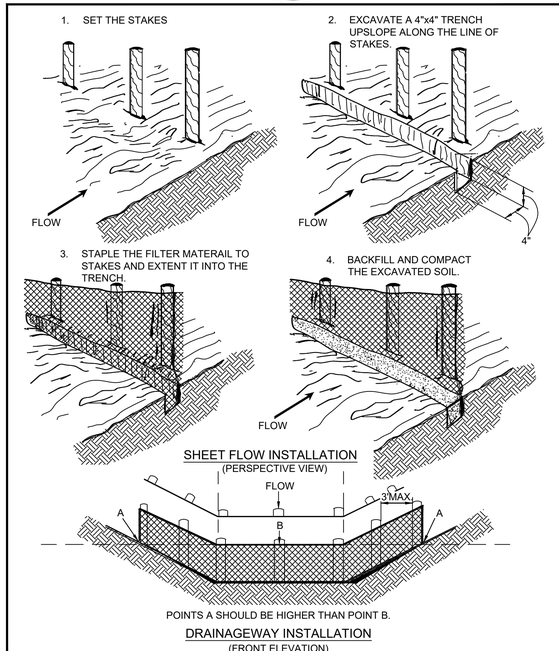
STONE CONSTRUCTION ENTRANCE

DEQ VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

v1.1 SOURCE: VA. DSWC, MD ESC STDS

C-SCM-03-1

C-PCM-04



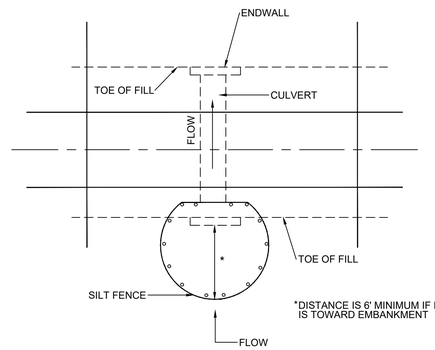
CONSTRUCTION OF SILT FENCE WITHOUT WIRE SUPPORT

DEQ VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

v1.1 SOURCE: ADAPTED FROM STRAW & FAB. BARRIERS, SHERWOOD & WYANT

C-PCM-04-4

C-SCM-05



**VDOT #3, #357, #5, #56 OR #57 COARSE AGGREGATE TO REPLACE SILT FENCE IN " HORSESHOE " WHEN ~~HIGH VELOCITY OF FLOW IS EXPECTED~~

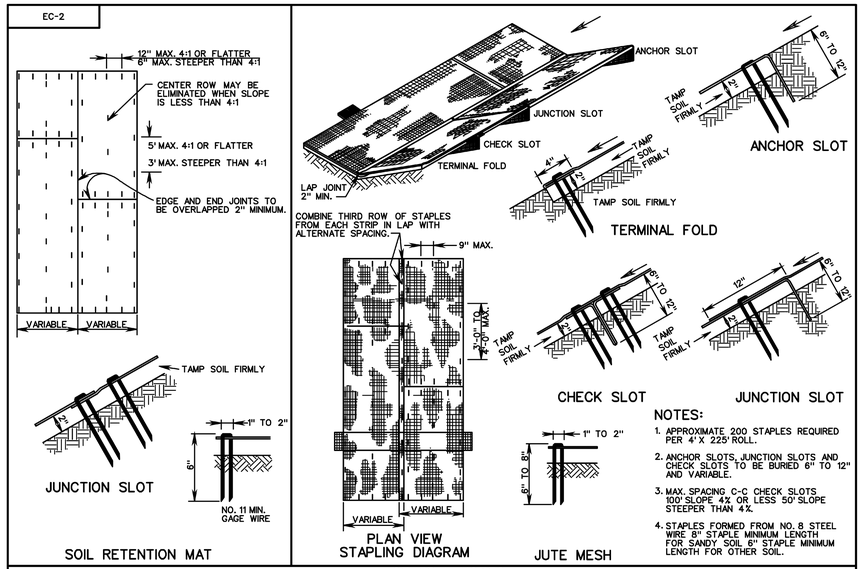
SILT FENCE CULVERT INLET PROTECTION

DEQ VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

v1.1 SOURCE: VA. DSWC, VDOT

C-SCM-05-1

EC-2



NOTES:

1. APPROXIMATE 200 STAPLES REQUIRED PER 4'X 225' ROLL.
2. ANCHOR SLOTS, JUNCTION SLOTS AND CHECK SLOTS TO BE BURIED 6" TO 12" AND VARIABLE.
3. MAX. SPACING C-C CHECK SLOTS 100' SLOPE 4% OR LESS 50' SLOPE STEEPER THAN 4%.
4. STAPLES FORMED FROM NO. 8 STEEL WIRE 8" STAPLE MINIMUM LENGTH FOR SANDY SOIL 6" STAPLE MINIMUM LENGTH FOR OTHER SOIL.

GENERAL NOTES:

1. BASIS OF PAYMENT TO BE SQUARE YARDS OF PROTECTIVE COVERING COMPLETE IN PLACE. PROTECTIVE COVERING IS TO BE LOCATED AS INDICATED ON THE PLANS IN ACCORDANCE WITH THE DIMENSIONS SPECIFIED ON TYPICAL SECTION.
2. "T-TOP" STAPLES OR OTHER MANUFACTURER'S DESIGN APPROVED BY THE ENGINEER MAY BE SUBSTITUTED FOR THE STAPLES SHOWN.
3. JUTE MESH OR SOIL RETENTION MAT IN ACCORDANCE WITH THE SPECIFICATIONS MAY BE USED AT THE OPTION OF THE CONTRACTOR.
4. WIDTH OF MATERIAL MAY VARY FROM MINIMUM DIMENSION BY INCREMENTS OF 4 OR 5 FEET.
5. FOR SOURCES OF APPROVED MATERIAL SEE VDOT'S APPROVED PRODUCTS LIST FOR ST'D. EC-2 MATERIAL.

VDOT ROAD AND BRIDGE STANDARDS

SHEET 1 OF 1 | REVISION DATE

113.02

PROTECTIVE COVERING INSTALLATION CRITERIA

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE: 244, 606

TALBERT&BRIGHT

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CHESTERFIELD, VIRGINIA 23832
PHONE: 804-768-8878 FAX: 804-768-8871

REV.	DESCRIPTION	DATE
	REVISIONS	
	DEQ/COUNTY COMMENTS	4-2-26

EROSION & SEDIMENT CONTROL DETAILS
Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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STEVEN T. PETERSON
Lic. No. 038457
5-1-26
PROFESSIONAL ENGINEER

Date	MAY 2026
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Drawn	JPM
Checked	STP
Project No.	3101-2402
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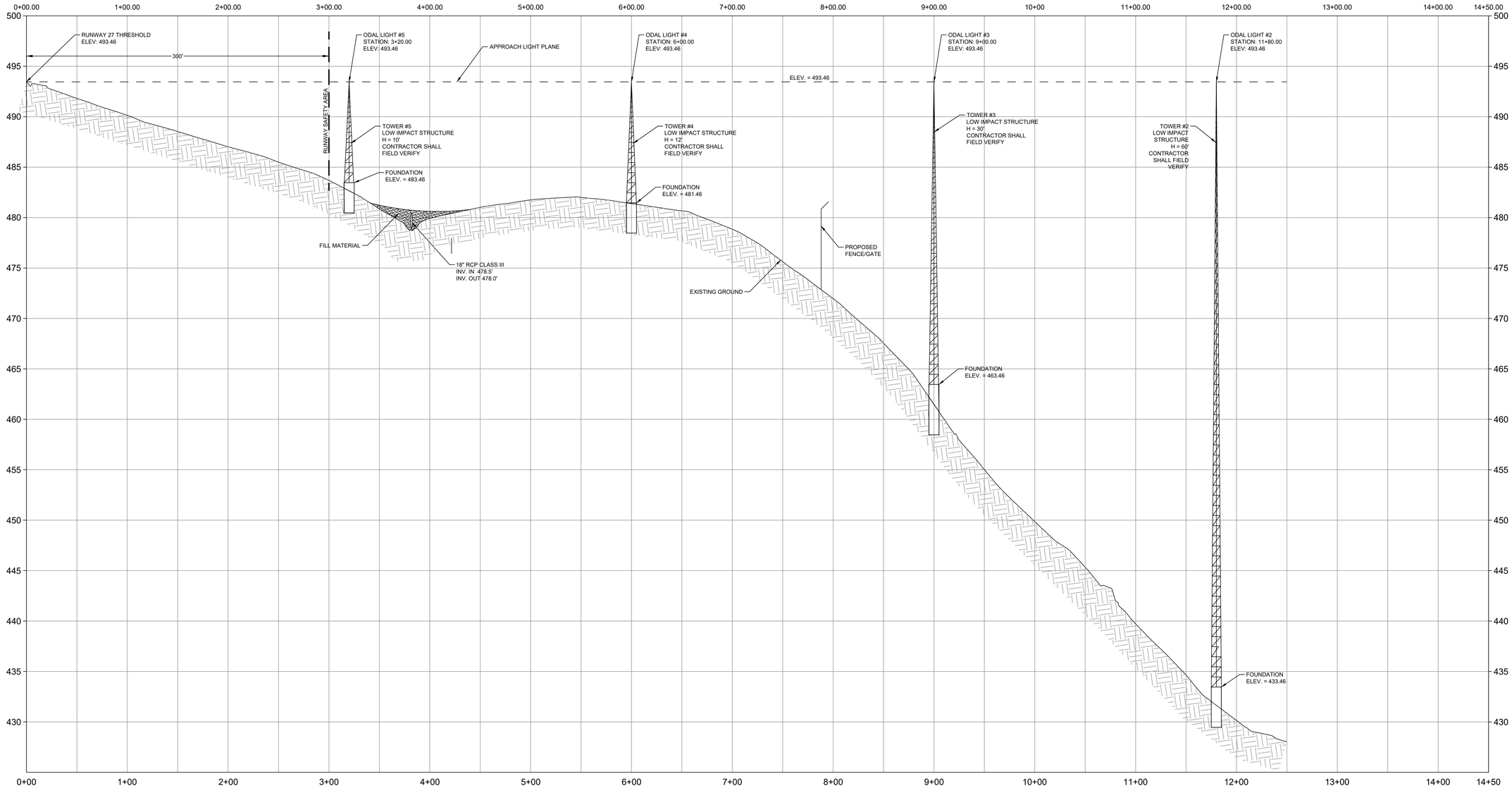

BASELINE "A"

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CHESTERFIELD, VIRGINIA 23832
PHONE: 804-768-8878 FAX: 804-768-8871

REV.	DESCRIPTION	DATE
	REVISIONS	

ODAL CENTERLINE PROFILE

Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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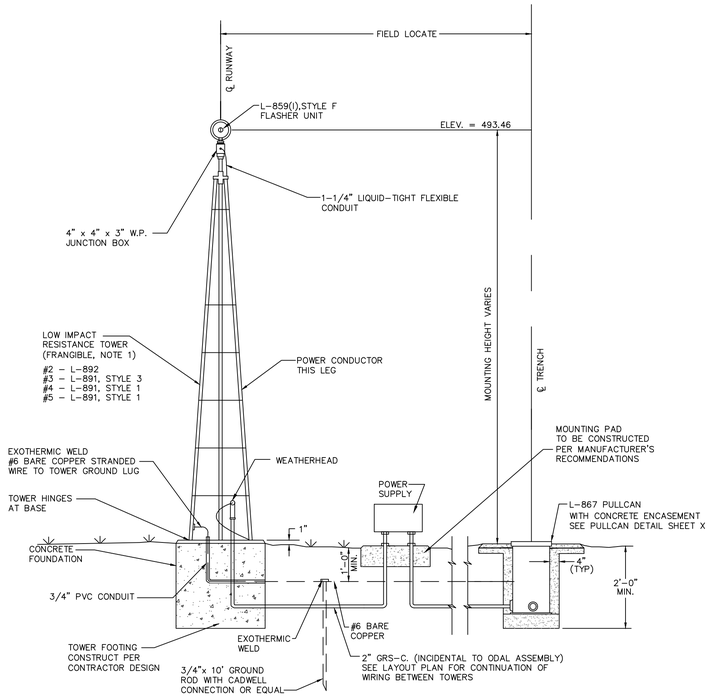
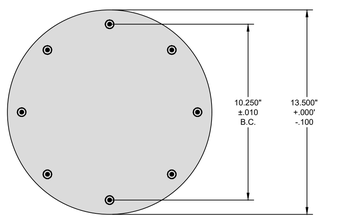


L-859(I) ODAL FLASHING LIGHT AND LOW IMPACT RESISTANT STRUCTURE

NOT TO SCALE

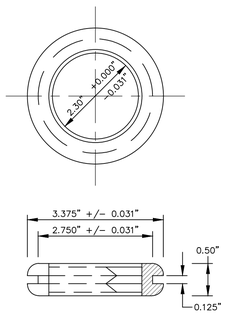
NOTES:

1. PROVIDE AND INSTALL TOWERS MANUFACTURED BY JAQUITH INDUSTRIES OR APPROVED EQUIVALENT. (AC 150/5345-45).
2. PROVIDE AND INSTALL "DANGER HIGH VOLTAGE – KEEP OFF" STANDARD ALUMINUM WARNING SIGN ON EACH TOWER. 3'± ABOVE FOUNDATION.
3. FRANGIBLE TOWERS, FOUNDATIONS, MAINTENANCE STANDS, MAINTENANCE AREAS, WEATHERHEADS AND GROUND RODS ARE INCIDENTAL TO THE MALS.
4. EACH LIGHT STATION SHALL BE STAKED BY A LICENSED SURVEYOR AND INSPECTED BY THE ENGINEER PRIOR TO CONSTRUCTION.



L-867 BLANK COVER (SIZE B)

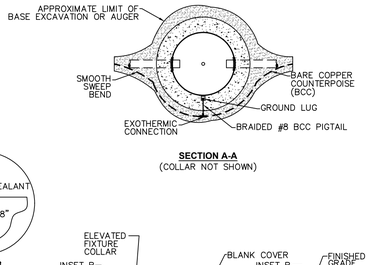
NOT TO SCALE



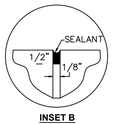
NOTE:
GROMMET MATERIAL SHALL HAVE A HARDNESS 50 +/- 5 AS DETERMINED BY A DUROMETER (ASTM. D-2240).

L-867 LIGHT BASE GROMMET DETAIL

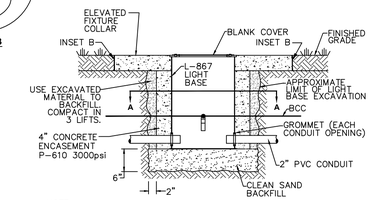
NOT TO SCALE



SECTION A-A
(COLLAR NOT SHOWN)



INSET B

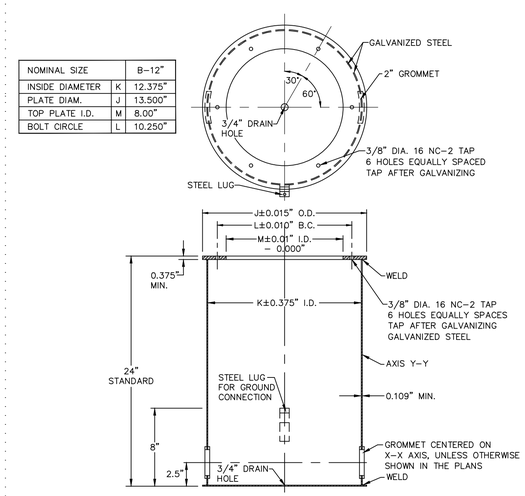


NOTE:
1. CONDUCTORS, CONNECTORS, AND TRANSFORMER NOT SHOWN FOR CLARITY.

L-867 BASE INSTALLATION

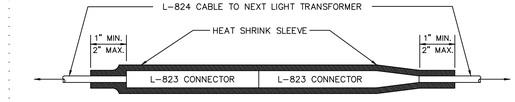
NOT TO SCALE

NOMINAL SIZE		B-12"
INSIDE DIAMETER	K	12.375"
PLATE DIAM.	J	13.500"
TOP PLATE I.D.	M	8.00"
BOLT CIRCLE	L	10.250"



L-867 LIGHT BASE CLASS I

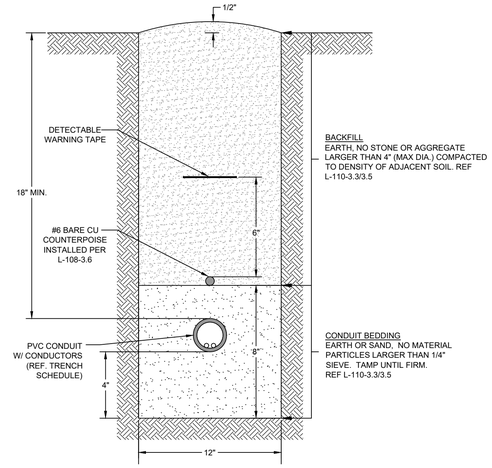
NOT TO SCALE



NOTE: FOLLOW HEAT SHRINK SLEEVE MANUFACTURER'S INSTRUCTIONS. PROVIDE ON ALL AIRPORT LIGHTING CONNECTIONS.

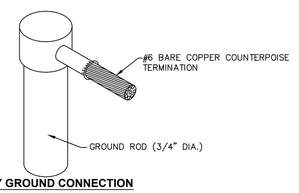
L-823 CONNECTOR SECTION THRU HEAT SHRINK SLEEVE

NOT TO SCALE

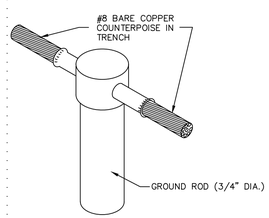


CABLE TRENCH (CABLES IN CONDUIT)

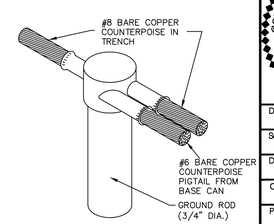
NOT TO SCALE



1-WAY GROUND CONNECTION



2-WAY GROUND CONNECTION



3-WAY GROUND CONNECTION

EXOTHERMIC CONNECTIONS

NOT TO SCALE

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ELECTRICAL DETAILS
Install Precision Approach Path Indicator (RWY 9 & 27)
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DOAV Project No. CS0078-25
Louisa County Airport/Freeman Field - Louisa, Virginia

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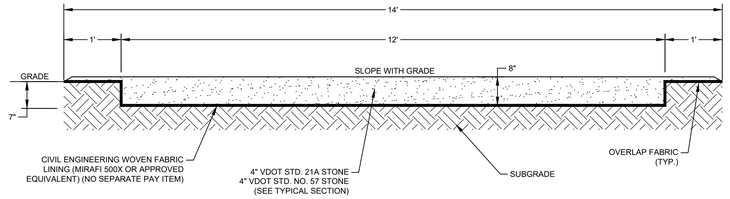


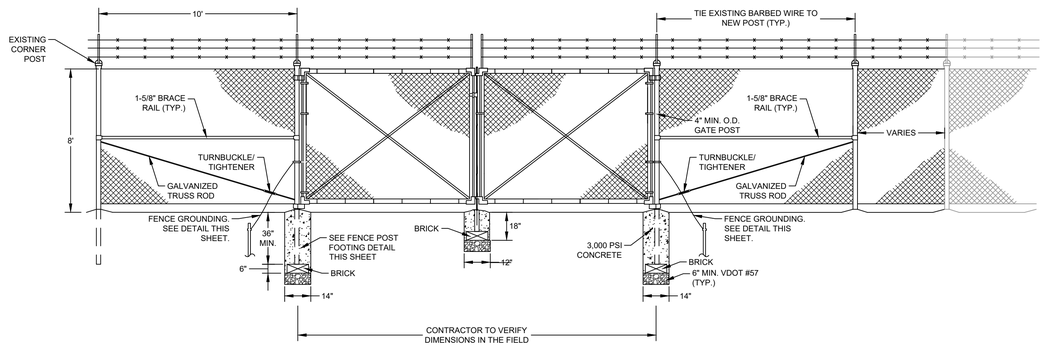
TYPICAL SECTION

GRAVEL ACCESS ROAD DETAIL

NOT TO SCALE

NOTES:

1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL AND MAINTAIN THE ACCESS ROAD UNTIL THE ROAD IS ACCEPTED AT THE FINAL INSPECTION.

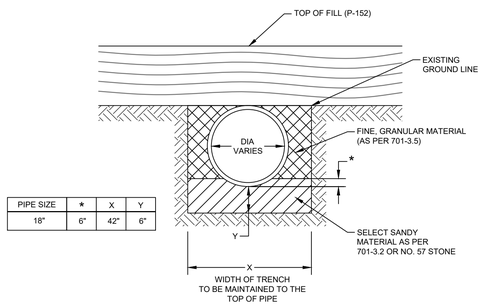


16' GALVANIZED DOUBLE SWING GATE

NOT TO SCALE

NOTE:

CONTRACTOR SHALL FIELD LOCATE EXISTING FENCE POSTS AND COORDINATE LOCATION OF GATE WITH PROPOSED ACCESS ROAD. THE FIRST LINE POST ON EITHER SIDE OF THE GATE TERMINAL POST SHALL BE LOCATED A DISTANCE OF 10 FEET FOR INSTALLATION OF THE BRACE RAIL AND TRUSS ROD. IT IS ANTICIPATED DISTANCE TO THE NEXT LINE POST ON BOTH SIDES WILL BE LESS THAN 10 FEET.



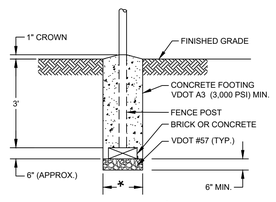
PIPE SIZE	*	X	Y
18"	6"	42"	6"

CLASS "B" PIPE BEDDING DETAIL

NOT TO SCALE

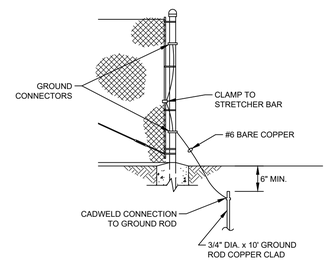
NOTES:

1. THE OWNER'S ACCEPTANCE TESTING FIRM SHALL BE ONSITE TO DETERMINE IF UNDERCUT OR ADDITIONAL BACKFILL IS REQUIRED IN THE PIPE TRENCH. BACKFILL MATERIAL SHALL BE OBTAINED FROM OFF-SITE SOURCES AND SHALL BE COMPACTED TO THE SATISFACTION OF THE ENGINEER PRIOR TO THE PLACEMENT OF PIPE BEDDING MATERIAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEWATERING OF ALL TRENCHES AS NECESSARY TO PERFORM THE WORK.
2. WRAP ALL CONCRETE PIPE JOINTS WITH GEOTEXTILE FABRIC, MIRAFI 140N OR APPROVED EQUIVALENT, AND OVERLAP 12" MIN. NO SEPARATE PAY ITEM.



FENCE POST FOOTING DETAIL

NOT TO SCALE



FENCE GROUNDING DETAIL

NOT TO SCALE

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REV.	DESCRIPTION/REVISIONS	DATE

MISCELLANEOUS DETAILS
Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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STEVEN T. PETERSON
Lic. No. 038457
5-1-26
PROFESSIONAL ENGINEER

Date	MAY 2026
Scale	NONE
Drawn	REK
Checked	STP
Project No.	3101–2402
Sheet No.	16
Of	18

S:\Projects\Louisa County (KIU)\3101-2402 Lighting Upgrades (Design)\CAD\Drawings\3101-2402 Misc Details.dwg

LEGEND		
	EXISTING	PROPOSED
PAVEMENT		
DRAINAGE BOUNDARY LINE		
1' CONTOUR	473	2688
5' CONTOUR	475	2690
DRAINAGE PIPE		
TIME OF CONCENTRATION FLOW PATH		TOC

NAD 83, VA. SOUTH

AIRPORT PROPERTY LINE

LEVEL SPREADER, SEE APPROVED PLANS - DEQ SWM NO. 2023-0353

POD-D

POD-C

POD-B

POD-A

DA-D

DA-C

DA-B

DA-A

DA-C = 0.47	PRE	POST
GRASS COVER B	0.47 AC	0.40 AC
IMPERVIOUS B	0.00 AC	0.07 AC
CN	61	67

DA-A = 3.46 AC	PRE	POST
GRASS COVER B	1.11 AC	1.41 AC
IMPERVIOUS B	0.00 AC	0.19 AC
WOODS B	2.35 AC	1.86 AC
CN	57	60

DA-B = 2.05 AC	PRE	POST
GRASS COVER B	1.80 AC	1.74 AC
IMPERVIOUS B	0.11 AC	0.17 AC
WOODS B	0.14 AC	0.14 AC
CN	63	64

DA-D = 6.31 AC

SEE APPROVED PLANS DEQ SWM NO. 2023-0353

*SEE DRAINAGE MANUAL FOR APPROVED LEVEL SPREADER DESIGN

LINE (POINT) OF DISCHARGE C (POD-C)

LINE (POINT) OF DISCHARGE A (POD-A)

LINE (POINT) OF DISCHARGE B (POD-B)

TIME OF CONCENTRATION = 15.37 MIN.

TIME OF CONCENTRATION = 5 MIN.

TIME OF CONCENTRATION = 11.35 MIN.

MANAGED TURF

MANAGED TURF WITHIN LOD = 0.81 AC

FOREST WITHIN LOD = 0.49 AC

IMPERVIOUS WITHIN LOD = 0.03 AC

IMPERVIOUS

GRASS

WOODS

LAND USES WITHIN LOD	PRE	POST
FOREST B	0.49 AC	0.00 AC
MANAGED TURF B	0.81 AC	0.94 AC
IMPERVIOUS B	0.03 AC	0.39 AC
LOD TOTAL	1.33 AC	

STATE ROUTE 697 SCHOOL BUS ROAD

1" = 60' scale 60 0 60 120 feet

TALBERT&BRIGHT

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REV.	DESCRIPTION	DATE
1	DEQ/COUNTY COMMENTS	4-2-26

PRE-DEVELOPED DRAINAGE AREA MAP

Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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Date	MAY 2026
Scale	1" = 60'
Drawn	REK
Checked	STP
Project No.	3101-2402
Sheet No.	17
Of	18

S:\Projects\Louisa County (LKI)\3101-2402 Lighting Upgrades (Des)\CAD\Drawings\3101-2402 DRAIN MAP Pre.dwg

Permissible Velocity & Permissible Depths (VA Stormwater Management Handbook Section 5.3.2.2)

Point of Discharge	CFS	LSF max (ft)	LSFmea (ft)	Flow Depth (ft)	V target (fps)*	Vcal (fps)	Notes
POD-A	7.98	35.79	30.00	0.08	3.00	0.85	0.85 < 3.00 - Good
POD-B	5.26	143.13	100.00	0.02	2.25	0.46	0.46 < 2.25 - Good
POD-C	1.31	74.54	43.00	0.01	3.75	0.37	0.37 < 3.75 - Good

* V target = 75% of V Permissible

Sheet Flow Analysis in accordance with 9VAC25-875-600.D

d = (Q/(3.0*L))^(2/3) V = Q/A
A = d*L LSF = (100*(S)^0.5)/n

DA-A

n =	0.80	LSF max (ft) =	35.79	cover	grass	imp	woods
S (ft/ft) =	0.082	d (ft) =	0.08	area (sf)	61349	8454	81075
LSF measured (ft)=	30	A (sf) =	9.44	C	0.35	0.9	0.30
		V (fps) =	0.85	area (ac)	1.41	0.19	1.86
area (sf) =	150878	permissible V (fps) =	3.00	for 5-10% tall fescue			
area (ac) =	3.46			reduced by 25% for K > 0.35			
C =	0.35						
I =	6.51	(highest intensity)					
Q_{10} (cfs) =	7.98						
L (ft) =	119						

DA-B

n =	0.24	LSF max (ft) =	143.13	cover	grass	imp	woods
S (ft/ft) =	0.118	d (ft) =	0.02	area (sf)	75787	7579	6085
LSF measured (ft)=	100	A (sf) =	11.41	C	0.35	0.9	0.30
		V (fps) =	0.46	area (ac)	1.74	0.17	0.14
area (sf) =	89451	permissible V (fps) =	2.25	for > 10% tall fescue			
area (ac) =	2.05			reduced by 25% for K > 0.35			
C =	0.39						
I =	6.51	(highest intensity)					
Q_{10} (cfs) =	5.26						
L (ft) =	484						

DA-C

n =	0.24	LSF max (ft) =	74.54	cover	grass	imp	woods
S (ft/ft) =	0.032	d (ft) =	0.01	area (sf)	17272	2986	0
LSF measured (ft)=	43	A (sf) =	3.56	C	0.35	0.9	0.30
		V (fps) =	0.37	area (ac)	0.40	0.07	0.00
area (sf) =	20258	permissible V (fps) =	3.75	for 0 - 5% tall fescue			
area (ac) =	0.47			reduced by 25% for K > 0.35			
C =	0.43						
I =	6.51	(highest intensity)					
Q_{10} (cfs) =	1.31						
L (ft) =	238						

LEGEND

	EXISTING	PROPOSED
PAVEMENT		
DRAINAGE BOUNDARY LINE		
1' CONTOUR	473	2688
5' CONTOUR	475	2690
DRAINAGE PIPE		
TIME OF CONCENTRATION FLOW PATH		TOC

NAD 83, VA, SOUTH

AIRPORT PROPERTY LINE

LEVEL SPREADER, SEE APPROVED PLANS - DEQ SWM NO. 2023-0353

POD-D

DA-D TO LEVEL SPREADER

DA-D = 6.31 AC

SEE APPROVED PLANS DEQ SWM NO. 2023-0353

*SEE DRAINAGE MANUAL FOR APPROVED LEVEL SPREADER DESIGN

SUB DA-D TO 18" RCP

DA-D IS PART OF A SET OF APPROVED PLANS, DEQ SWM NO. 2023-0353.

THE GRAVEL ACCESS ROAD WAS INCLUDED AND CONSIDERED FOR THE INCREASE IN IMPERVIOUSNESS IN THE DESIGN OF THE LEVEL SPREADER IN APPROVED PLANS DEQ SWM NO. 2023-0353

THE CULVERT DESIGN IS INCLUDED FOR THIS PROJECT
18" RCP
Q_{10} = 6.26 CFS
S = 5.2%
d = 6.3 INCHES

DA-C = 0.47

	PRE	POST
GRASS COVER B	0.47 AC	0.40 AC
IMPERVIOUS B	0.00 AC	0.07 AC
CN	61	67

POD-C

LINE (POINT) OF DISCHARGE C (POD-C)

TIME OF CONCENTRATION = 5 MIN.

IMPERVIOUS WITHIN LOD = 0.39 AC

DA-C

TIME OF CONCENTRATION = 11.35 MIN.

MANAGED TURF WITHIN LOD = 0.94 AC

DA-B

IMPERVIOUS

POD-B

LINE (POINT) OF DISCHARGE B (POD-B)

DA-B = 2.05 AC

	PRE	POST
GRASS COVER B	1.80 AC	1.74 AC
IMPERVIOUS B	0.11 AC	0.17 AC
WOODS B	0.14 AC	0.14 AC
CN	63	64

DA-A = 3.46 AC

	PRE	POST
GRASS COVER B	1.11 AC	1.41 AC
IMPERVIOUS B	0.00 AC	0.19 AC
WOODS B	2.35 AC	1.86 AC
CN	57	60

TIME OF CONCENTRATION = 15.37 MIN.

LINE (POINT) OF DISCHARGE A (POD-A)

PROPOSED MANAGED TURF

POD-A

DA-A

AIRPORT PROPERTY LINE

STATE ROUTE 767 SCHOOL BUS ROAD

LAND USES WITHIN LOD

	PRE	POST
FOREST B	0.49 AC	0.00 AC
MANAGED TURF B	0.81 AC	0.94 AC
IMPERVIOUS B	0.03 AC	0.39 AC
LOD TOTAL	1.33 AC	

1" = 60' scale 60 0 60 120 feet

POST-DEVELOPED DRAINAGE AREA MAP

Install Precision Approach Path Indicator (RWY 9 & 27)
Install Supplemental Windcone (RWY 9 & 27) &
Install Omni-Directional Approach Lighting System ODALS (RWY27)
DOAV Project No. CS0078-25

Louisa County Airport/Freeman Field - Louisa, Virginia

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REV.	DESCRIPTION	DATE
1	DEQ/COUNTY COMMENTS	4-2-26

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Date	MAY 2026
Scale	1" = 60'
Drawn	REK
Checked	STP
Project No.	3101-2402
Sheet No.	18
Of	18

S:\Projects\Louisa County (LKU)\3101-2402 Lighting Upgrades (Dwt)\CAD\Drawings\3101-2402 DRAIN MAP Post.dwg

SPECIFICATIONS
and
CONTRACT DOCUMENTS
FOR

INSTALL PRECISION APPROACH PATH INDICATOR (RWY 9 & 27)
INSTALL SUPPLEMENTAL WINDCONE RWY 9 & 27) & INSTALL OMNI-DIRECTIONAL APPROACH LIGHTING SYSTEM ODALS (RWY 27)

DOAV PROJECT NO. CS0078-25

IFB # LKU-26-08

Louisa County Airport / Freeman Field

Prepared For:

INDUSTRIAL DEVELOPMENT AUTHORITY OF LOUISA COUNTY

BY:

TALBERT&BRIGHT

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June 2026
TBI Project No. 3101-2402

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Section 10

Definition of Terms

When the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be defined as follows:

Paragraph Number	Term	Definition
10-01	**AASHTO**	The American Association of State Highway and Transportation Officials.
10-02	**Access Road**	The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public roadway.
10-03	**Advertisement**	A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.
10-04	**Airport**	Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; airport buildings and facilities located in any of these areas, and a heliport.
10-05	**Airport Improvement Program (AIP)**	A grant-in-aid program, administered by the Federal Aviation Administration (FAA).
10-06	**Air Operations Area (AOA)**	The term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.
10-07	**Apron**	Area where aircraft are parked, unloaded or loaded, fueled and/or serviced.
10-08	**ASTM International (ASTM)**	Formerly known as the American Society for Testing and Materials (ASTM).
10-09	**Award**	The Owner's notice to the successful bidder of the acceptance of the submitted bid.
10-10	**Bidder**	Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative,

Paragraph Number	Term	Definition
		who submits a proposal for the work contemplated.
10-11	**Building Area**	An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.
10-12	**Calendar Day**	Every day shown on the calendar.
10-13	**Certificate of Analysis (COA)**	The COA is the manufacturer's Certificate of Compliance (COC) including all applicable test results required by the specifications.
10-14	**Certificate of Compliance (COC)**	The manufacturer's certification stating that materials or assemblies furnished fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer's authorized representative.
10-15	**Change Order**	A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for work within the scope of the contract and necessary to complete the project.
10-16	**Contract**	A written agreement between the Owner and the Contractor that establishes the obligations of the parties including but not limited to performance of work, furnishing of labor, equipment and materials and the basis of payment. The awarded contract includes but may not be limited to: Advertisement, Contract form, Proposal, Performance bond, payment bond, General provisions, certifications and representations, Technical Specifications, Plans, Supplemental Provisions, standards incorporated by reference and issued addenda.
10-17	**Contract Item (Pay Item)**	A specific unit of work for which a price is provided in the contract.
10-18	**Contract Time**	The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.
10-19	**Contractor**	The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the

Paragraph Number	Term	Definition
		work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.
10-20	**Contractors Quality Control (QC) Facilities**	The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP).
10-21	**Contractor Quality Control Program (CQCP)**	Details the methods and procedures that will be taken to assure that all materials and completed construction required by the contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors.
10-22	**Control Strip**	A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification.
10-23	**Construction Safety and Phasing Plan (CSPP)**	The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.
10-24	**Drainage System**	The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
10-25	**Engineer**	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering, inspection, and/or observation of the contract work and acting directly or through an authorized representative.
10-26	**Equipment**	All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus necessary for the proper construction and acceptable completion of the work.
10-27	**Extra Work**	An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Owner's Engineer or Resident Project Representative (RPR) to be necessary to complete the work within the intended scope of the contract as previously modified.

Paragraph Number	Term	Definition
10-28	**FAA**	The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.
10-29	**Federal Specifications**	The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration.
10-30	**Force Account**	**a.** Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis. **b.** Owner Force Account - Work performed for the project by the Owner's employees.
10-31	**Intention of Terms**	Whenever, in these specifications or on the plans, the words “directed,” “required,” “permitted,” “ordered,” “designated,” “prescribed,” or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer and/or Resident Project Representative (RPR) is intended; and similarly, the words “approved,” “acceptable,” “satisfactory,” or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer and/or RPR, subject in each case to the final determination of the Owner. Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.
10-32	**Lighting**	A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.
10-33	**Major and Minor Contract Items**	A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20% of the total amount of the award contract. All other items shall be considered minor

Paragraph Number	Term	Definition
		contract items.
10-34	**Materials**	Any substance specified for use in the construction of the contract work.
10-35	**Modification of Standards (MOS)**	Any deviation from standard specifications applicable to material and construction methods in accordance with FAA Order 5300.1.
10-36	**Notice to Proceed (NTP)**	A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.
10-37	**Owner**	The term "Owner" shall mean the party of the first part or the contracting agency signatory to the contract. Where the term "Owner" is capitalized in this document, it shall mean airport Sponsor only. The Owner for this project is the County of Louisa
10-38	**Passenger Facility Charge (PFC)**	Per 14 Code of Federal Regulations (CFR) Part 158 and 49 United States Code (USC) § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls.
10-39	**Pavement Structure**	The combined surface course, base course(s), and subbase course(s), if any, considered as a single unit.
10-40	**Payment bond**	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work.
10-41	**Performance bond**	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.
10-42	**Plans**	The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications. Plans may also be referred to as 'contract drawings.'
10-43	**Project**	The agreed scope of work for accomplishing specific airport development with respect to a particular airport.

Paragraph Number	Term	Definition
10-44	**Proposal**	The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.
10-45	**Proposal guaranty**	The security furnished with a proposal to guarantee that the bidder will enter into a contract if their own proposal is accepted by the Owner.
10-46	**Quality Assurance (QA)**	Owner's responsibility to assure that construction work completed complies with specifications for payment.
10-47	**Quality Control (QC)**	Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications.
10-48	**Quality Assurance (QA) Inspector**	An authorized representative of the Engineer and/or Resident Project Representative (RPR) assigned to make all necessary inspections, observations, tests, and/or observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.
10-49	**Quality Assurance (QA) Laboratory**	The official quality assurance testing laboratories of the Owner or such other laboratories as may be designated by the Engineer or RPR. May also be referred to as Engineer's, Owner's, or QA Laboratory.
10-50	**Resident Project Representative (RPR)**	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for all necessary inspections, observations, tests, and/or observations of tests of the contract work performed or being performed, or of the materials furnished or being furnished by the Contractor, and acting directly or through an authorized representative.
10-51	**Runway**	The area on the airport prepared for the landing and takeoff of aircraft.
10-52	**Runway Safety Area (RSA)**	A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft. See the construction safety and phasing plan (CSPP) for limits of the RSA.
10-53	**Safety Plan Compliance Document (SPCD)**	Details how the Contractor will comply with the CSPP.

Paragraph Number	Term	Definition
10-54	**Specifications**	A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.
10-55	**Sponsor**	A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.
10-56	**Structures**	Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.
10-57	**Subgrade**	The soil that forms the pavement foundation.
10-58	**Superintendent**	The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the RPR, and who shall supervise and direct the construction.
10-59	**Supplemental Agreement**	A written agreement between the Contractor and the Owner that establishes the basis of payment and contract time adjustment, if any, for the work affected by the supplemental agreement. A supplemental agreement is required if: (1) in scope work would increase or decrease the total amount of the awarded contract by more than 25%: (2) in scope work would increase or decrease the total of any major contract item by more than 25%; (3) work that is not within the scope of the originally awarded contract; or (4) adding or deleting of a major contract item.
10-60	**Surety**	The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.
10-61	**Taxilane**	A taxiway designed for low speed movement of aircraft

Paragraph Number	Term	Definition
		between aircraft parking areas and terminal areas.
10-62	**Taxiway**	The portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.
10-63	**Taxiway/Taxilane Safety Area (TSA)**	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft. See the construction safety and phasing plan (CSPP) for limits of the TSA.
10-64	**Work**	The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.
10-65	**Working day**	A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days.
10-66	**VDOT**	The Virginia Department of Transportation.
10-67	**VDOT ROAD AND BRIDGE SPECIFICATIONS, CURRENT EDITION.**	The VDOT specifications where referenced shall have the same force and effect as if included in these project specifications physically.
10-68	**VDOT ROAD AND BRIDGE STANDARDS, CURRENT EDITION.**	The VDOT Standards where referenced shall have the same force and effect as if included in these project specifications physically.

END OF SECTION 10

Section 20

Proposal Requirements and Conditions

20-01 Advertisement (Notice to Bidders). See Invitation to Bid

20-02 Qualification of bidders. Each bidder shall submit evidence of competency and evidence of financial responsibility to perform the work to the Owner at the time of bid opening.

Evidence of competency, unless otherwise specified, shall consist of statements covering the bidder's past experience on similar work, and a list of equipment and a list of key personnel that would be available for the work.

Each bidder shall furnish the Owner satisfactory evidence of their financial responsibility. Evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the bidder's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the bidder shall further certify whether their financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the bidder shall qualify the public accountant's statement or report to reflect the bidder's true financial condition at the time such qualified statement or report is submitted to the Owner.

Unless otherwise specified, a bidder may submit evidence that they are prequalified with the State Highway Division and are on the current "bidder's list" of the state in which the proposed work is located. Evidence of State Highway Division prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports specified above.

20-03 Contents of proposal forms. The Owner's proposal forms state the location and description of the proposed construction; the place, date, and time of opening of the proposals; and the estimated quantities of the various items of work to be performed and materials to be furnished for which unit bid prices are asked. The proposal form states the time in which the work must be completed, and the amount of the proposal guaranty that must accompany the proposal. The Owner will accept only those Proposals properly executed on physical forms or electronic forms provided by the Owner. Bidder actions that may cause the Owner to deem a proposal irregular are given in paragraph 20-09 *Irregular proposals*.

A prebid conference is required on this project to discuss as a minimum, the following items: material requirements; submittals; Quality Control/Quality Assurance requirements; the construction safety and phasing plan including airport access and staging areas; and unique airfield paving construction requirements.

20-04 Issuance of proposal forms. The Owner reserves the right to refuse to issue a proposal form to a prospective bidder if the bidder is in default for any of the following reasons:

a. Failure to comply with any prequalification regulations of the Owner, if such regulations are cited, or otherwise included, in the proposal as a requirement for bidding.

b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force with the Owner at the time the Owner issues the proposal to a prospective bidder.

c. Documented record of Contractor default under previous contracts with the Owner.

d. Documented record of unsatisfactory work on previous contracts with the Owner.

20-05 Interpretation of estimated proposal quantities. An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the award of the contract. The Owner does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as provided in the Section 40, paragraph 40-02, Alteration of Work and Quantities, without in any way invalidating the unit bid prices.

20-06 Examination of plans, specifications, and site. The bidder is expected to carefully examine the site of the proposed work, the proposal, plans, specifications, and contract forms. Bidders shall satisfy themselves to the character, quality, and quantities of work to be performed, materials to be furnished, and to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied to the conditions to be encountered in performing the work and the requirements of the proposed contract, plans, and specifications.

Boring logs and other records of subsurface investigations and tests are available for inspection of bidders. It is understood and agreed that such subsurface information, whether included in the plans, specifications, or otherwise made available to the bidder, was obtained and is intended for the Owner's design and estimating purposes only. Such information has been made available for the convenience of all bidders. It is further understood and agreed that each bidder is solely responsible for all assumptions, deductions, or conclusions which the bidder may make or obtain from their own examination of the boring logs and other records of subsurface investigations and tests that are furnished by the Owner.

20-07 Preparation of proposal. The bidder shall submit their proposal on the forms furnished by the Owner. All blank spaces in the proposal forms, unless explicitly stated otherwise, must be correctly filled in where indicated for each and every item for which a quantity is given. The bidder shall state the price (written in ink or typed) both in words and numerals which they propose for each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

The bidder shall correctly sign the proposal in ink. If the proposal is made by an individual, their name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state where the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of their authority to do so and that the signature is binding upon the firm or corporation.

20-08 Responsive and responsible bidder. A responsive bid conforms to all significant terms and conditions contained in the Owner's invitation for bid. It is the Owner's responsibility to decide if the exceptions taken by a bidder to the solicitation are material or not and the extent of deviation it is willing to accept.

A responsible bidder has the ability to perform successfully under the terms and conditions of a proposed procurement, as defined in 2 CFR § 200.318(h). This includes such matters as Contractor integrity, compliance with public policy, record of past performance, and financial and technical resources.

20-09 Irregular proposals. Proposals shall be considered irregular for the following reasons:

a. If the proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered, or if any part of the proposal form is detached.

b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.

c. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.

d. If the proposal contains unit prices that are obviously unbalanced.

e. If the proposal is not accompanied by the proposal guaranty specified by the Owner.

f. If the applicable Disadvantaged Business Enterprise information is incomplete.

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

20-10 Bid guarantee. Each separate proposal shall be accompanied by a bid bond, certified check, or other specified acceptable collateral, in the amount specified in the proposal form. Such bond, check, or collateral, shall be made payable to the Owner.

20-11 Delivery of proposal. Each proposal submitted shall be placed in a sealed envelope plainly marked with the project number, location of airport, and name and business address of the bidder on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement or as modified by Addendum before the time specified for opening all bids. Proposals received after the bid opening time shall be returned to the bidder unopened.

20-12 Withdrawal or revision of proposals. A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the Owner in writing or by email before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

20-13 Public opening of proposals. Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

20-14 Disqualification of bidders. A bidder shall be considered disqualified for any of the following reasons:

a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.

b. Evidence of collusion among bidders. Bidders participating in such collusion shall be disqualified as bidders for any future work of the Owner until any such participating bidder has been reinstated by the Owner as a qualified bidder.

c. If the bidder is considered to be in "default" for any reason specified in paragraph 20-04, *Issuance of Proposal Forms,* of this section.

20-15 Discrepancies and Omissions. A Bidder who discovers discrepancies or omissions with the project bid documents shall immediately notify the Owner's Engineer of the matter. A bidder that has doubt as to the true meaning of a project requirement may submit to the Owner's Engineer a written request for interpretation no later than 7 days prior to bid opening.

Any interpretation of the project bid documents by the Owner's Engineer will be by written addendum issued by the Owner. The Owner will not consider any instructions, clarifications or interpretations of the bidding documents in any manner other than written addendum.

END OF SECTION 20

Section 30

Award and Execution of Contract

30-01 Consideration of proposals. After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit bid price written in words shall govern.

Until the award of a contract is made, the Owner reserves the right to reject a bidder's proposal for any of the following reasons:

a. If the proposal is irregular as specified in Section 20, paragraph 20-09, *Irregular Proposals*.

b. If the bidder is disqualified for any of the reasons specified Section 20, paragraph 20-14, *Disqualification of Bidders*.

In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.

30-02 Award of contract. The award of a contract, if it is to be awarded, shall be made within 90 calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

If the Owner elects to proceed with an award of contract, the Owner will make award to the responsible bidder whose bid, conforming with all the material terms and conditions of the bid documents, is the lowest in price.

30-03 Cancellation of award. The Owner reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with paragraph 30-07 *Approval of Contract*.

30-04 Return of proposal guaranty. All proposal guaranties, except those of the two lowest bidders, will be returned immediately after the Owner has made a comparison of bids as specified in the paragraph 30-01, *Consideration of Proposals.* Proposal guaranties of the two lowest bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful bidder's proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the Owner receives the contract bonds as specified in paragraph 30-05, *Requirements of Contract Bonds.*

30-05 Requirements of contract bonds. At the time of the execution of the contract, the successful bidder shall furnish the Owner a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

30-06 Execution of contract. The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return the signed contract to the Owner, along with the fully executed surety bond or bonds specified in paragraph 30-05, *Requirements of Contract*

Bonds, of this section, within 15 calendar days from the date mailed or otherwise delivered to the successful bidder.

30-07 Approval of contract. Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, the Owner shall complete the execution of the contract in accordance with local laws or ordinances, and return the fully executed contract to the Contractor. Delivery of the fully executed contract to the Contractor shall constitute the Owner's approval to be bound by the successful bidder's proposal and the terms of the contract.

30-08 Failure to execute contract. Failure of the successful bidder to execute the contract and furnish an acceptable surety bond or bonds within the period specified in paragraph 30-06, *Execution of Contract,* of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidated damages to the Owner.

END OF SECTION 30

Section 40

Scope of Work

40-01 Intent of contract. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 Alteration of work and quantities. The Owner reserves the right to make such changes in quantities and work as may be necessary or desirable to complete, in a satisfactory manner, the original intended work. Unless otherwise specified in the Contract, the Owner's Engineer or RPR shall be and is hereby authorized to make, in writing, such in-scope alterations in the work and variation of quantities as may be necessary to complete the work, provided such action does not represent a significant change in the character of the work.

For purpose of this section, a significant change in character of work means: any change that is outside the current contract scope of work; any change (increase or decrease) in the total contract cost by more than 25%; or any change in the total cost of a major contract item by more than 25%.

Work alterations and quantity variances that do not meet the definition of significant change in character of work shall not invalidate the contract nor release the surety. Contractor agrees to accept payment for such work alterations and quantity variances in accordance with Section 90, paragraph 90-03, *Compensation for Altered Quantities*.

Should the value of altered work or quantity variance meet the criteria for significant change in character of work, such altered work and quantity variance shall be covered by a supplemental agreement. Supplemental agreements shall also require consent of the Contractor's surety and separate performance and payment bonds. If the Owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the Owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

40-03 Omitted items. The Owner, the Owner's Engineer or the RPR may provide written notice to the Contractor to omit from the work any contract item that does not meet the definition of major contract item. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with Section 90, paragraph 90-04, *Payment for Omitted Items*.

40-04 Extra work. Should acceptable completion of the contract require the Contractor to perform an item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, Owner may issue a Change Order to cover the necessary extra work. Change orders for extra work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the RPR's opinion, is necessary for completion of the extra work.

When determined by the RPR to be in the Owner's best interest, the RPR may order the Contractor to proceed with extra work as provided in Section 90, paragraph 90-05, *Payment for Extra Work*. Extra work that is necessary for acceptable completion of the project, but is not

within the general scope of the work covered by the original contract shall be covered by a supplemental agreement as defined in Section 10, paragraph 10-59, *Supplemental Agreement*.

If extra work is essential to maintaining the project critical path, RPR may order the Contractor to commence the extra work under a Time and Material contract method. Once sufficient detail is available to establish the level of effort necessary for the extra work, the Owner shall initiate a change order or supplemental agreement to cover the extra work.

Any claim for payment of extra work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

40-05 Maintenance of traffic. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration. The Contractor shall maintain traffic in the manner detailed in the Construction Safety and Phasing Plan (CSPP).

a. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas (AOAs) of the airport with respect to their own operations and the operations of all subcontractors as specified in Section 80, paragraph 80-04, *Limitation of Operations*. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in Section 70, paragraph 70-15, *Contractor's Responsibility for Utility Service and Facilities of Others*.

b. With respect to their own operations and the operations of all subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying personnel, equipment, vehicles, storage areas, and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport in accordance with the construction safety and phasing plan (CSPP) and the safety plan compliance document (SPCD).

c. When the contract requires the maintenance of an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep the road, street, or highway open to all traffic and shall provide maintenance as may be required to accommodate traffic. The Contractor, at their expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices (MUTCD) (http://mutcd.fhwa.dot.gov/), unless otherwise specified. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways. Unless otherwise specified herein, the Contractor will not be required to furnish snow removal for such existing road, street, or highway.

40-06 Removal of existing structures. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Resident Project Representative (RPR) shall be notified prior to disturbing such structure. The disposition of existing structures so

encountered shall be immediately determined by the RPR in accordance with the provisions of the contract.

Except as provided in Section 40, paragraph 40-07, *Rights in and Use of Materials Found in the Work*, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the Owner when so used in the work.

40-07 Rights in and use of materials found in the work. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be embankment, the Contractor may at their own option either:

a. Use such material in another contract item, providing such use is approved by the RPR and is in conformance with the contract specifications applicable to such use; or,

b. Remove such material from the site, upon written approval of the RPR; or

c. Use such material for the Contractor's own temporary construction on site; or,

d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., the Contractor shall request the RPR's approval in advance of such use.

Should the RPR approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at their expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for use of such material used in the work or removed from the site.

Should the RPR approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of their own exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

40-08 Final cleanup. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of the property Owner.

END OF SECTION 40

Section 50

Control of Work

50-01 Authority of the Resident Project Representative (RPR). The RPR has final authority regarding the interpretation of project specification requirements. The RPR shall determine acceptability of the quality of materials furnished, method of performance of work performed, and the manner and rate of performance of the work. The RPR does not have the authority to accept work that does not conform to specification requirements.

50-02 Conformity with plans and specifications. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans, or specifications.

If the RPR finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications, but that the portion of the work affected will, in their opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, the RPR will advise the Owner of their determination that the affected work be accepted and remain in place. The RPR will document the determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. Changes in the contract price must be covered by contract change order or supplemental agreement as applicable.

If the RPR finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans 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 RPR's written orders.

The term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the RPR's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's execution of the work, when, in the RPR's opinion, such compliance is essential to provide an acceptable finished portion of the work.

The term "reasonably close conformity" is also intended to provide the RPR with the authority, after consultation with the Sponsor and FAA, to use sound engineering judgment in their determinations to accept work that is not in strict conformity, but will provide a finished product equal to or better than that required by the requirements of the contract, plans and specifications.

The RPR will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 Coordination of contract, plans, and specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. If electronic files are provided and used on the project and there is a conflict between the electronic files and hard copy plans, the hard copy plans shall govern. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited standards for materials or testing, and cited ACs; plans

shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the RPR for an interpretation and decision, and such decision shall be final.

The Contractor shall not take advantage of any apparent error or omission on the plans or specifications. In the event the Contractor discovers any apparent error or discrepancy, Contractor shall immediately notify the Owner or the designated representative in writing requesting their written interpretation and decision.

50-04 List of Special Provisions. See Section PSP for Project Special Provisions.

50-05 Cooperation of Contractor. The Contractor shall be supplied with five hard copies or an electronic PDF of the plans and specifications. The Contractor shall have available on the construction site at all times one hardcopy each of the plans and specifications. Additional hard copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the RPR and their inspectors and with other Contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as their agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the RPR or their authorized representative.

50-06 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.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work 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 as directed.

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

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

50-07 Construction layout and stakes. The Engineer/RPR shall establish necessary horizontal and vertical control. The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor. Contractor is responsible for preserving integrity of horizontal and vertical controls established by Engineer/RPR. In case of negligence on the part of the Contractor or their employees, resulting in the destruction of any horizontal and vertical control, the resulting costs will be deducted as a liquidated damage against the Contractor.

Prior to the start of construction, the Contractor will check all control points for horizontal and vertical accuracy and certify in writing to the RPR that the Contractor concurs with survey control established for the project. All lines, grades and measurements from control points

necessary for the proper execution and control of the work on this project will be provided to the RPR. The Contractor is responsible to establish all layout required for the construction of the project.

Copies of survey notes will be provided to the RPR for each area of construction and for each placement of material as specified to allow the RPR to make periodic checks for conformance with plan grades, alignments and grade tolerances required by the applicable material specifications. Surveys will be provided to the RPR prior to commencing work items that cover or disturb the survey staking. Survey(s) and notes shall be provided in the following format: Auto CAD Civil 3D, 2013 or 2019.

Laser, GPS, String line, or other automatic control shall be checked with temporary control as necessary. In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the Owner.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses. The cost shall be included in the price of the bid for the various items of the Contract.

50-08 Authority and duties of Quality Assurance (QA) inspectors. QA inspectors shall be authorized to inspect all work done and all material furnished. Such QA inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. QA inspectors are not authorized to revoke, alter, or waive any provision of the contract. QA inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

QA Inspectors are authorized to notify the Contractor or their representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the RPR for a decision.

50-09 Inspection of the work. All materials and each part or detail of the work shall be subject to inspection. The RPR 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 RPR 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.

Provide advance written notice to the RPR of work the Contractor plans to perform each week and each day. Any work done or materials used without written notice and allowing opportunity for inspection by the RPR may be ordered removed and replaced at the Contractor's expense.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the Owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make

any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

50-10 Removal of unacceptable and unauthorized work. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the RPR as provided in paragraph 50-02, *Conformity with Plans and Specifications*.

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 Section 70, paragraph 70-14, *Contractor's Responsibility for Work*.

No removal work made under provision of this paragraph shall be done without lines and grades having been established by the RPR. Work done contrary to the instructions of the RPR, work done beyond the lines shown on the plans or as established by the RPR, except as herein specified, or any extra work done without authority, 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 with any order of the RPR made under the provisions of this subsection, the RPR will have authority to cause unacceptable work to be remedied or removed and replaced; and unauthorized work to be removed and recover the resulting costs as a liquidated damage against the Contractor.

50-11 Load restrictions. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor, at their own expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel.

50-12 Maintenance during construction. The Contractor shall maintain the work during construction and until the work is accepted. 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.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

50-13 Failure to maintain the work. Should the Contractor at any time fail to maintain the work as provided in paragraph 50-12, *Maintenance during Construction*, the RPR 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 RPR's notification, the Owner 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 recovered as a liquidated damage against the Contractor.

50-14 Partial acceptance. If at any time during the execution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, the Contractor may request the RPR to make final inspection of that unit. If the RPR finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, the RPR may accept it as being complete, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

50-15 Final acceptance. Upon due notice from the Contractor of presumptive completion of the entire project, the RPR and Owner will make an inspection. If all construction provided for and contemplated by the contract is found to be complete in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The RPR 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 RPR will notify the Contractor and the Contractor shall correct the unsatisfactory work. 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 RPR will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

50-16 Claims for adjustment and disputes. If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the RPR in writing of their intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the RPR 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 compensation. Such notice by the Contractor and the fact that the RPR 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. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the RPR who will present it to the Owner for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations.

END OF SECTION 50

Section 60

Control of Materials

60-01 Source of supply and quality requirements. The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish documentation to the RPR as to the origin, composition, and manufacture of all materials to be used in the work. Documentation shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the RPR's option, materials may be approved at the source of supply before delivery. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that meets the requirements of the specifications; and is listed in AC 150/5345-53, *Airport Lighting Equipment Certification Program* and *Addendum*, that is in effect on the date of advertisement.

60-02 Samples, tests, and cited specifications. All materials used in the work shall be inspected, tested, and approved by the RPR before incorporation in the work unless otherwise designated. Any work in which untested materials are used without approval or written permission of the RPR shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the RPR, shall be removed at the Contractor's expense.

Unless otherwise designated, quality assurance tests will be made by and at the expense of the Owner in accordance with the cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), federal specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids.

The testing organizations performing on-site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel. Unless otherwise designated, samples for quality assurance will be taken by a qualified representative of the RPR. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request after review and approval of the RPR.

A copy of all Contractor QC test data shall be provided to the RPR daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the RPR showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

The Contractor shall employ a Quality Control (QC) testing organization to perform all Contractor required QC tests in accordance with Item C-100 Contractor Quality Control Program (CQCP).

60-03 Certification of compliance/analysis (COC/COA). The RPR may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's COC stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies

delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified. The COA is the manufacturer's COC and includes all applicable test results.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the RPR.

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "or equal," the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

a. Conformance to the specified performance, testing, quality or dimensional requirements; and,

b. Suitability of the material or assembly for the use intended in the contract work.The RPR shall be the sole judge as to whether the proposed "or equal" is suitable for use in the work.

The RPR reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 Plant inspection. The RPR or their authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the RPR conduct plant inspections, the following conditions shall exist:

a. The RPR shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.

b. The RPR shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.

c. If required by the RPR, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Place office or working space in a convenient location with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The RPR shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60-05 Engineer/ Resident Project Representative (RPR) field office. The Contractor shall provide dedicated space for the use of the engineer, 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.

60-06 Storage of materials. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the RPR. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the

plans and/or CSPP, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the RPR. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the RPR a copy of the property Owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at their expense, except as otherwise agreed to (in writing) by the Owner or lessee of the property.

60-07 Unacceptable materials. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications 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 RPR.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the RPR has approved its use in the work.

60-08 Owner furnished materials. The Contractor shall furnish all materials required to complete the work, except those specified, if any, to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

END OF SECTION 60

Section 70

Legal Regulations and Responsibility to Public

70-01 Laws to be observed. The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all their officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees.

70-02 Permits, licenses, and taxes. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful execution of the work.

70-03 Patented devices, materials, and processes. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the Patentee or Owner. The Contractor and the surety shall indemnify and hold harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the execution or after the completion of the work.

70-04 Restoration of surfaces disturbed by others. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) must be shown on the plans and is indicated as follows:

UTILITY OR AGENCY	OWNER	CONTACT
Runway Lighting & Airport Facilities	Louisa County Airport	Brittany Schupe (540) 967-0050
Water and Sewer	Louisa County Water Authority	(540) 967-1122
Natural Gas	Columbia Gas of VA	1-800-543-8911
Telephone Service	Verizon	1-800-483-3000
Electrical Power	Dominion Virginia Power	888-667-3000
Building & Grounds	Louisa County Airport	Brittany Schupe (540) 967-0050
Navigational Aids	Virginia Department of Aviation (DOAV)	(804) 236-3644
Miss Utility		1-800-552-7001

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the RPR.

Should the Owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such Owners by arranging and performing the work in this contract to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the RPR, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

70-05 Federal Participation. The United States Government has agreed to reimburse the Owner for some portion of the contract costs. The contract work is subject to the inspection and approval of duly authorized representatives of the FAA Administrator. No requirement of this contract shall be construed as making the United States a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

70-06 Sanitary, health, and safety provisions. The Contractor's worksite and facilities shall comply with applicable federal, state, and local requirements for health, safety and sanitary provisions.

70-07 Public convenience and safety. The Contractor shall control their operations and those of their subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to their own operations and those of their own subcontractors and all suppliers in accordance with Section 40, paragraph 40-05, *Maintenance of Traffic,* and shall limit such operations for the convenience and safety of the traveling public as specified in Section 80, paragraph 80-04, *Limitation of Operations*.

The Contractor shall remove or control debris and rubbish resulting from its work operations at frequent intervals, and upon the order of the RPR. If the RPR determines the existence of Contractor debris in the work site represents a hazard to airport operations and the Contractor is unable to respond in a prompt and reasonable manner, the RPR reserves the right to assign the task of debris removal to a third party and recover the resulting costs as a liquidated damage against the Contractor.

70-08 Construction Safety and Phasing Plan (CSPP). The Contractor shall complete the work in accordance with the approved Construction Safety and Phasing Plan (CSPP) developed in accordance with AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP is on sheet(s) 3 of the project plans and Appendix G of the specifications.

70-09 Use of explosives. When the use of explosives is necessary for the execution of the work, the Contractor shall exercise the utmost care not to endanger life or property, including new work. The Contractor shall be responsible for all damage resulting from the use of explosives.

All explosives shall be stored in a secure manner in compliance with all laws and ordinances, and all such storage places shall be clearly marked. Where no local laws or ordinances apply, storage shall be provided satisfactory to the RPR and, in general, not closer than 1,000 feet (300 m) from the work or from any building, road, or other place of human occupancy.

The Contractor shall notify each property Owner and public utility company having structures or facilities in proximity to the site of the work of their intention to use explosives. Such notice shall be given sufficiently in advance to enable them to take such steps as they may deem necessary to protect their property from injury.

The use of electrical blasting caps shall not be permitted on or within 1,000 feet of the airport property.

70-10 Protection and restoration of property and landscape. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer/RPR has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the execution of the work, resulting from any act, omission, neglect, or misconduct in manner or method of executing the work, or at any time due to defective work or materials, and said responsibility shall not be released until the project has been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore, at their expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

70-11 Responsibility for damage claims. The Contractor shall indemnify and hold harmless the Engineer/RPR and the Owner and their officers, agents, and employees from all suits, actions, or claims, of any character, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of their own contract considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, their own surety may be held until such suits, actions, or claims for injuries or damages shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he or she is adequately protected by public liability and property damage insurance.

70-12 Third party beneficiary clause. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create for the public or any member thereof, a third-party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 Opening sections of the work to traffic. If it is 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 must be specified below and indicated on the approved Construction Safety and Phasing Plan (CSPP) and the project plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified.

Upon completion of any portion of work listed above, such portion shall be accepted by the Owner in accordance with Section 50, paragraph 50-14, *Partial Acceptance*.

No portion of the work may be opened by the Contractor until directed by the Owner in writing. Should it become necessary to open a portion of the work to traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the RPR, 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 their expense.

The Contractor shall make their 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.

The Contractor must conform to safety standards contained AC 150/5370-2 and the approved CSPP.

Contractor shall refer to the plans, specifications, and the approved CSPP to identify barricade requirements, temporary and/or permanent markings, airfield lighting, guidance signs and other safety requirements prior to opening up sections of work to traffic.

70-14 Contractor's responsibility for work. Until the RPR's final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with Section 50, paragraph 50-14, *Partial Acceptance*, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, 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 except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

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. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at their own expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding, and sodding furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 Contractor's responsibility for utility service and facilities of others. As provided in paragraph 70-04, *Restoration of Surfaces Disturbed by Others*, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the Owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control their operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract

work, the approximate locations have been indicated on the plans and/or in the contract documents.

UTILITY OR AGENCY	OWNER	CONTACT
Runway Lighting & Airport Facilities	Louisa County Airport	Brittany Schupe (540) 967-0050
Water and Sewer	Louisa County Water Authority	(540) 967-1122
Natural Gas	Columbia Gas of VA	1-800-543-8911
Telephone Service	Verizon	1-800-483-3000
Electrical Power	Dominion Virginia Power	888-667-3000
Building & Grounds	Louisa County Airport	Brittany Schupe (540) 967-0050
Navigational Aids	Virginia Department of Aviation (DOAV)	(804) 236-3644
Miss Utility		1-800-552-7001

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of the responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the Owners of all utility services or other facilities of their plan of operations. Such notification shall be in writing addressed to "The Person to Contact" as provided in this paragraph and paragraph 70-04, *Restoration of Surfaces Disturbed By Others*. A copy of each notification shall be given to the RPR.

In addition to the general written notification provided, it shall be the responsibility of the Contractor to keep such individual Owners advised of changes in their plan of operations that would affect such Owners.

Prior to beginning the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such Owner of their plan of operation. If, in the Contractor's opinion, the Owner's assistance is needed to locate the utility service or facility or the presence of a representative of the Owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner's "Person to Contact" no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the RPR.

The Contractor's failure to give the two days' notice shall cause for the Owner to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use hand excavation methods within 3 feet (1 m) of

such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, the Contractor shall immediately notify the proper authority and the RPR and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the RPR continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to their operations whether due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor, or their own surety.

70-16 Furnishing rights-of-way. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 Personal liability of public officials. In carrying out any of the contract provisions or in exercising any power or authority granted by this contract, there shall be no liability upon the Engineer, RPR, their authorized representatives, or any officials 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.

70-18 No waiver of legal rights. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or their surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill their obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Owner's rights under any warranty or guaranty.

70-19 Environmental protection. The Contractor shall comply with all federal, state, and local laws and regulations controlling pollution of the environment. The Contractor shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, asphalts, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

70-20 Archaeological and historical findings. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during their operations, any building, part of a building, structure, or object that is incongruous with its surroundings, the Contractor shall immediately cease operations in that location and notify the RPR. The RPR will immediately investigate the Contractor's finding and the Owner will direct the Contractor to either resume operations or to suspend operations as directed.

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be

covered by an appropriate contract change order or supplemental agreement as provided in Section 40, paragraph 40-04, *Extra Work,* and Section 90, paragraph 90-05, *Payment for Extra Work*. If appropriate, the contract change order or supplemental agreement shall include an extension of contract time in accordance with Section 80, paragraph 80-07, *Determination and Extension of Contract Time*.

70-21 Insurance Requirements. The Contractor shall not commence work under any contract until he has obtained all the insurance required hereunder and such insurance has been approved by the Owner; nor shall the Contractor allow any Subcontractor to commence work on his subcontract until all similar insurance has been so obtained and approved. Approval of the insurance by the Owner shall not relieve or decrease the liability of the Contractor hereunder.

a. Worker's Compensation including Occupational Disease and Employer's Liability Insurance: The Contractor shall take out and maintain during the life of the Contract, Workers' Compensation and Employer's Liability Insurance for all of his employees to be engaged in the work on the project under this Contract in an amount no less than the minimum allowed by the State Corporation Commission, and in case any such work is sublet, the Contractor shall require the Subcontractor similarly to provide Workers' Compensation and Employer's Liability Insurance for all of the latter's employees to be engaged in such work.

b. Comprehensive General Liability Insurance: The Contractor shall maintain during the life of the Contract comprehensive general liability insurance as shall protect him and the Owner and its officers, agents, and employees from claims for damages for personal injury, including death, as well as from claims for property damage, which may arise from operations under the Contract, whether such operations be by himself or by an Subcontractor, or by anyone directly or indirectly employed by either of them. The amount of such insurance shall be not less than a combined single limit of $1,000,000.00 per occurrence on bodily injury and property damage and $1,000,000.00 aggregate on completed operations. The comprehensive general liability insurance shall provide the following coverage:

Comprehensive

Premises-Operation

Products/Completed Operations Hazard

Contractual Insurance

Underground Hazard

Explosion & Collapse Hazard

Independent Contractor and Subcontractor

Broad Form Property Damage

Personal Injury

c. Automobile liability insurance with minimum combined single limits of $1,000,000.00 per occurrence. This insurance shall include bodily injury and property damage for the following vehicles:

Owned Vehicles

Non-owned Vehicles

Hired Vehicles

d. Umbrella Policy: At the opinion of the Contractor, primary limits may be less than required, with an umbrella policy providing the additional limits needed. This form of insurance will be acceptable provided that the primary and umbrella policies both provide the insurance coverages herein required. However, any such umbrella policy must have minimum coverage limits of $3,000,000.00.

e. The Contractor, at his cost, shall effect and maintain in the names of the Owner, the Engineer and the Contractor, fire, vandalism and extended coverage insurance (or all-risk, builder's risk insurance if approved by the Owner), upon the entire structure or structures on which the work of the Contract is to be done and upon all material in or adjacent thereto and intended for use thereon to one hundred percent (100%) of the Contract amount. Such insurance may include a deductible provision if the Owner consents to such provision; however, the Contractor in such case will be liable for paying to the Owner the amount of such deduction whenever a claim arises. The loss, if any, is to be made adjustable with and payable to the insurance required herein shall be filed with the Owner not later than thirty (30) days following the date of the award of the Contract.

f. All policies shall name the Owner, its officers, agents, and employees as additional insureds. This coverage shall be reflected on the Certificates of Insurance (including any endorsements or riders thereto) which will be provided to the Owner. Each Certificate of Insurance shall require that notice be given thirty (30) days prior to cancellation or material change in the policies to the Owner.

g. The insurance required by the Article shall include contractual liability insurance applicable to the Contractor's obligations under Section 50.

h. The Contractor shall either (1) require each of his subcontractors to procure and to maintain during the life of his contract "Subcontractor's Insurance" of the type and in the same amounts as specified in the preceding schedule or (2) insure the activities of his subcontractors in his own policy.

END OF SECTION 70

Section 80

Execution and Progress

80-01 Subletting of contract. 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, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Resident Project Representative (RPR).

The Contractor shall perform, with his organization, an amount of work equal to at least 25 percent of the total contract cost.

Should the Contractor elect to assign their contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and approval of the Owner, and shall be consummated only on the written approval of the Owner.

The Contractor shall provide copies of all subcontracts to the RPR 14 **days prior to being utilized on the project. As a minimum, the information shall include the following:**

- Subcontractor's legal company name.
- Subcontractor's legal company address, including County name.
- Principal contact person's name, telephone and fax number.
- Complete narrative description, and dollar value of the work to be performed by the subcontractor.
- Copies of required insurance certificates in accordance with the specifications.
- Minority/ non-minority status.

80-02 Notice to proceed (NTP). The Owners notice to proceed will state the date on which contract time commences. The Contractor is expected to commence project operations within 10 days of the NTP date. The Contractor shall notify the RPR at least 24 hours in advance of the time contract operations begins. The Contractor shall not commence any actual operations prior to the date on which the notice to proceed is issued by the Owner.

80-03 Execution and progress. Unless otherwise specified, the Contractor shall submit their coordinated construction schedule showing all work activities for the RPR's review and acceptance at least 10 days prior to the start of work. The Contractor's progress schedule, once accepted by the RPR, will represent the Contractor's baseline plan to accomplish the project in accordance with the terms and conditions of the Contract. The RPR will compare actual Contractor progress against the baseline schedule to determine that status of the Contractor's performance. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the RPR's request, submit a revised schedule for completion of the work within the contract time and modify their operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the execution of the work be discontinued for any reason, the Contractor shall notify the RPR at least 24 hours in advance of resuming operations.

The Contractor shall not commence any actual construction prior to the date on which the NTP is issued by the Owner.

The project schedule shall be prepared as a network diagram in Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), or other format, or as otherwise specified. It shall include information on the sequence of work activities, milestone dates, and activity duration. The schedule shall show all work items identified in the project proposal for each work area and shall include the project start date and end date.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

80-04 Limitation of operations. The Contractor shall control their operations and the operations of their subcontractors and all suppliers to provide for the free and unobstructed movement of aircraft in the air operations areas (AOA) of the airport.

When the work requires the Contractor to conduct their operations within an AOA of the airport, the work shall be coordinated with airport operations (through the RPR) at least 48 hours prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the RPR and until the necessary temporary marking, signage and associated lighting is in place as provided in Section 70, paragraph 70-08, *Construction Safety and Phasing Plan (CSPP)*.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as specified; immediately obey all instructions to vacate the AOA; and immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until satisfactory conditions are provided. The areas of the AOA identified in the Construction Safety Phasing Plan (CSPP) and as listed below, cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows:

The Contractor shall be required to conform to safety standards contained in AC 150/5370-2, Operational Safety on Airports During Construction and the approved CSPP.

80-04.1 Operational safety on airport during construction. All Contractors' operations shall be conducted in accordance with the approved project Construction Safety and Phasing Plan (CSPP) and the Safety Plan Compliance Document (SPCD) and the provisions set forth within the current version of AC 150/5370-2, Operational Safety on Airports During Construction. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a SPCD that details how it proposes to comply with the requirements presented within the CSPP.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks to assure compliance with the safety plan measures.

The Contractor is responsible to the Owner for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the CSPP and SPCD and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved CSPP and SPCD unless approved in writing by the Owner. The necessary coordination actions to review Contractor proposed modifications to an approved CSPP or approved SPCD can require a significant amount of time.

80-05 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, plans, and specifications.

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.

Any person employed by the Contractor or by any subcontractor who violates any operational regulations or operational safety requirements and, in the opinion of the RPR, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the RPR, be removed immediately by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without approval of the RPR.

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

All equipment that is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the work shall not cause injury to previously completed work, adjacent property, or existing airport facilities due to its use.

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, plans, and specifications.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless otherwise authorized by the RPR. If the Contractor desires to use a method or type of equipment other than specified in the contract, the Contractor may request authority from the RPR 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 RPR 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 RPR may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this paragraph.

80-06 Temporary suspension of the work. The Owner shall have the authority to suspend the work wholly, or in part, for such period or periods the Owner may deem necessary, due to unsuitable weather, or other conditions considered unfavorable for the execution of the work, or for such time necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the written order to suspend work to the effective date of the written order to resume the work. Claims for such compensation shall be filed with the

RPR within the time period stated in the RPR's order to resume work. The Contractor shall submit with their own claim information substantiating the amount shown on the claim. The RPR will forward the Contractor's claim to the Owner for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather or for any other delay provided for in the contract, plans, or specifications.

If it becomes necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. The Contractor shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the airport.

80-07 Determination and extension of contract time. The number of calendar days shall be stated in the proposal and contract and shall be known as the Contract Time.

If the contract time requires extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

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-workdays. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

At the time of final payment, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in the contract time shall not consider either cost of work or the extension of contract time that has been covered by a change order or supplemental agreement. Charges against the contract time will cease as of the date of final acceptance.

80-08 Failure to complete on time. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in paragraph 80-07, *Determination and Extension of Contract Time*) the sum specified in the contract and proposal as liquidated damages (LD) will be deducted from any money due or to become due the Contractor or their own surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in their contract.

Schedule	Liquidated Damages Cost	Allowed Construction Time
Based Bid	$1,500.00/Calendar Day	90 Calendar Days

The maximum construction time allowed shall be not more than 90 days. 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, will in no way operate as a wavier on the part of the Owner of any of its rights under the contract.

80-09 Default and termination of contract. The Contractor shall be considered in default of their 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, or

b. Fails to perform the work or fails to provide sufficient workers, equipment and/or materials to assure completion of work in accordance with the terms of the contract, or

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, or

d. Discontinues the execution of the work, or

e. Fails to resume work which has been discontinued within a reasonable time after notice to do so, or

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

g. Allows any final judgment to stand against the Contractor unsatisfied for a period of 10 days, or

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.

Should the Owner consider the Contractor in default of the contract for any reason above, 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 surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the RPR of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the execution of the work out of the hands of the Contractor. 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 said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the RPR will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted 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 be liable and shall pay to the Owner the amount of such excess.

80-10 Termination for national emergencies. The Owner shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the execution of war or in the interest of national defense.

When the contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other overhead expenses, (when not otherwise included in the contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor

at actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the RPR.

Termination of the contract or a portion thereof shall neither relieve the Contractor of their responsibilities for the completed work nor shall it relieve their surety of its obligation for and concerning any just claim arising out of the work performed.

80-11 Work area, storage area and sequence of operations. The Contractor shall obtain approval from the RPR prior to beginning any work in all areas of the airport. No operating runway, taxiway, or air operations area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate work in accordance with the approved CSPP and SPCD.

END OF SECTION 80

Section 90

Measurement and Payment

90-01 Measurement of quantities. All work completed under the contract will be measured by the RPR, or their authorized representatives, using United States Customary Units of Measurement.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the RPR.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

The term "lump sum" when used as an item of payment will mean complete payment for the work described in the contract. When a complete structure or structural unit (in effect, "lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

When requested by the Contractor and approved by the RPR in writing, material specified to be measured by the cubic yard may be weighed, and such weights will be converted to cubic yards for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the RPR and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Measurement and Payment Terms

Term	Description
Excavation & Embankment Volume	In computing volumes of excavation, the average end area method will be used unless otherwise specified.
Measurement & Proportion by Weight	The term "ton" will mean the short ton consisting of 2,000 pounds avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, independently certified scales by competent, qualified personnel at locations designated by the RPR. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the RPR directs, and each truck shall bear a plainly legible identification mark.
Measurement by Volume	Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured at the point of delivery. Vehicles for this purpose may be of any size or type acceptable for materials hauled, provided that the body is of such shape that the actual contents may be readily and accurately

Term	Description
	determined. All vehicles shall be loaded to at least their water level capacity, and all loads shall be leveled when vehicles arrive at the point of delivery.
Asphalt Material	Asphalt materials will be measured by gallon or ton. When measured by volume, such volumes will be measured at 60°F or will be corrected to the volume at 60°F using ASTM D1250 for asphalt. Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when asphalt material has been lost from the car or distributor, wasted, or otherwise not incorporated in the work. When asphalt materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, will be used for computing quantities.
Cement	Cement will be measured by the ton or hundredweight.
Structure	Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.
Timber	Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.
Plates & Sheets	The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inch.
Miscellaneous Items	When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.
Scales	Scales must be tested for accuracy and serviced before use. Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end. Scales shall be accurate within 0.5% of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the RPR before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed 0.1% of the nominal rated capacity of the scale, but not less than one pound. The use of spring balances will not be permitted. In the event inspection reveals the scales have been “overweighing” (indicating more than correct weight) they will be immediately adjusted. All materials received subsequent to the last previous correct weighting-accuracy test will be

Term	Description
	reduced by the percentage of error in excess of 0.5%. In the event inspection reveals the scales have been under-weighing (indicating less than correct weight), they shall be immediately adjusted. No additional payment to the Contractor will be allowed for materials previously weighed and recorded. Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the RPR can safely and conveniently view them. Scale installations shall have available ten standard 50-pound weights for testing the weighing equipment or suitable weights and devices for other approved equipment. All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.
Rental Equipment	Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered in connection with extra work will be measured as agreed in the change order or supplemental agreement authorizing such work as provided in paragraph 90-05 *Payment for Extra Work*.
Pay Quantities	When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the RPR. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

90-02 Scope of payment. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the execution thereof, subject to the provisions of Section 70, paragraph 70-18, *No Waiver of Legal Rights*.

When the "basis of payment" subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

90-03 Compensation for altered quantities. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in Section 40, paragraph 40-02, *Alteration of Work and Quantities,* will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor

which results directly from such alterations or indirectly from their own unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 Payment for omitted items. As specified in Section 40, paragraph 40-03, *Omitted Items,* the RPR shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

Should the RPR omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices for any work actually completed and acceptable prior to the RPR's order to omit or non-perform such contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the RPR's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the RPR's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

90-05 Payment for extra work. Extra work, performed in accordance with Section 40, paragraph 40-04, *Extra Work*, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work.

90-06 Partial payments. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, approved by the Engineer, of the value of the work performed and materials complete and in place, in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with paragraph 90-07, *Payment for Materials on Hand*. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

From the total of the amount determined to be payable on a partial payment, 10% of such total amount will be deducted and retained by the Owner for protection of the Owner's interests. Unless otherwise instructed by the Owner, the amount retained by the Owner will be in effect until the final payment is made except as follows:

(1) Contractor may request release of retainage on work that has been partially accepted by the Owner in accordance with Section 50-03. Contractor must provide a certified invoice to the Engineer that supports the value of retainage held by the Owner for partially accepted work.

(2) In lieu of retainage, the Contractor may exercise at its option the establishment of an escrow account per paragraph 90-08.

The Contractor is required to pay all subcontractors for satisfactory performance of their contracts no later than 30 days after the Contractor has received a partial payment. Contractor must provide the Owner evidence of prompt and full payment of retainage held by the prime Contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the Owner. When the Owner has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

When at least 90% of the work has been completed to the satisfaction of the Engineer, the Engineer shall, at the Owner's discretion and with the consent of the surety, prepare estimates of both the contract value and the cost of the remaining work to be done. The Owner may retain an amount not less than twice the contract value or estimated cost, whichever is greater, of the work remaining to be done. The remainder, less all previous payments and deductions, will then be certified for payment to the Contractor.

It is understood and agreed the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the Engineer to be a part of the final quantity for the item of work in question.

No partial payment shall bind the Owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in paragraph 90-09, *Acceptance and Final Payment*.

The Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract before the final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the Owner may be compelled to pay in discharging any such lien or claim.

90-07 Payment for materials on hand. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications and are delivered to acceptable sites on the airport property or at other sites in the vicinity that are acceptable to the Owner. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

a. The material has been stored or stockpiled in a manner acceptable to the RPR at or on an approved site.

b. The Contractor has furnished the RPR with acceptable evidence of the quantity and quality of such stored or stockpiled materials.

c. The Contractor has furnished the RPR with satisfactory evidence that the material and transportation costs have been paid.

d. The Contractor has furnished the Owner legal title (free of liens or encumbrances of any kind) to the material stored or stockpiled.

e. The Contractor has furnished the Owner evidence the material stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed the transfer of title and Owner's payment for such stored or stockpiled materials shall in no way relieve the Contractor of their responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed contract price for such materials or the contract price for contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this paragraph.

90-08 Payment of withheld funds. At the Contractor's option, if an Owner withholds retainage in accordance with the methods described in paragraph 90-06 *Partial Payments*, the Contractor may request that the Owner deposit the retainage into an escrow account. The Owner's deposit of retainage into an escrow account is subject to the following conditions:

a. The Contractor shall bear all expenses of establishing and maintaining an escrow account and escrow agreement acceptable to the Owner.

b. The Contractor shall deposit to and maintain in such escrow only those securities or bank certificates of deposit as are acceptable to the Owner and having a value not less than the retainage that would otherwise be withheld from partial payment.

c. The Contractor shall enter into an escrow agreement satisfactory to the Owner.

d. The Contractor shall obtain the written consent of the surety to such agreement.

90-09 Acceptance and final payment. When the contract work has been accepted in accordance with the requirements of Section 50, paragraph 50-15, *Final Acceptance*, the RPR will prepare the final estimate of the items of work actually performed. The Contractor shall approve the RPR's final estimate or advise the RPR of the Contractor's objections to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the RPR shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the RPR's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the RPR's estimate under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with Section 50, paragraph 50-16, *Claims for Adjustment and Disputes*.

After the Contractor has approved, or approved under protest, the RPR's final estimate, and after the RPR's receipt of the project closeout documentation required in paragraph 90-11, *Contractor Final Project Documentation*, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of Section 50, paragraph 50-16, *Claims for Adjustments and Disputes,* or under the provisions of this paragraph, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due to the Contractor will be paid pursuant to a supplemental final estimate.

90-10 Construction warranty.

a. In addition to any other warranties in this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work, except as noted. If the Owner takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Owner takes possession. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work. Light Emitting Diode emitting diode (LED) light fixtures with the exception of obstruction lighting, must be warranted by the manufacturer for a minimum of four (4) years after date of installation inclusive of all electronics.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Owner real or personal property, when that damage is the result of the Contractor's failure to conform to contract requirements; or any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Owner will notify the Contractor, in writing, within seven (7) days after the discovery of any failure, defect, or damage.

f. If the Contractor fails to remedy any failure, defect, or damage within 14 days after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the Owner, as directed by the Owner, and (3) Enforce all warranties for the benefit of the Owner.

h. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.

90-11 Contractor Final Project Documentation. Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the RPR approves the Contractor's final submittal. The Contractor shall:

a. Provide two (2) copies of all manufacturers warranties specified for materials, equipment, and installations.

b. Provide weekly payroll records (not previously received) from the general Contractor and all subcontractors.

c. Complete final cleanup in accordance with Section 40, paragraph 40-08, *Final Cleanup*.

d. Complete all punch list items identified during the Final Inspection.

e. Provide complete release of all claims for labor and material arising out of the Contract.

f. Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the Disadvantaged Business Enterprise (DBE) subcontractors and/or suppliers associated with the project.

g. When applicable per state requirements, return copies of sales tax completion forms.

h. Manufacturer's certifications for all items incorporated in the work.

i. All required record drawings, as-built drawings or as-constructed drawings.

j. Project Operation and Maintenance (O&M) Manual(s).

k. Security for Construction Warranty.

l. Equipment commissioning documentation submitted, if required.

END OF SECTION 90

PROJECT SPECIAL PROVISIONS

PSP-1 NOTAMS

The OWNER will issue the necessary NOTAMS to reflect hazardous and operational conditions. The CONTRACTOR shall work with the ENGINEER and OWNER to schedule NOTAM issuance and Airport Operations Area (AOA) closures and shall provide the OWNER and ENGINEER with advance notice of the need to issue or close a NOTAM. It is important that NOTAMS be kept current and reflects the actual conditions with respect to construction situations. Active NOTAMS shall be reviewed periodically and revised to reflect the current conditions.

PSP-2 BID EVALUATION AND CONTRACT AWARD

This project is programmed for federal FY 2027 AIP funding. The OWNER expects to be able to award this project, depending on bid results and the final funding level FAA can assign to the project. As of the date of the advertisement, the award of this project is considered most likely.

The OWNER reserves the right to reject all bids or to award the bid based on the lowest responsible and responsive bid for any single phase or any combination of phases as available funding allows and as best suits the OWNER’s interests as determined by the OWNER. It is the OWNER’s intent to award only one construction contract as a result of this bid solicitation.

PSP-3 HAUL ROADS

Haul roads to be used under this Contract shall be those designated and approved by the ENGINEER. In general, the CONTRACTOR shall confine his equipment and hauling where practical to existing roads on the Airport, as shown in the plans. If existing pavement is damaged by the CONTRACTOR's hauling operations, it shall be repaired to its original condition at the CONTRACTOR's expense. Haul roads across turfed areas shall be repaired, scarified, seeded, mulched, and fertilized at the CONTRACTOR's expense. Metal track vehicles will not be permitted to operate on or across existing pavement without protective matting to prevent marring of the pavement surface. Haul roads shall be constructed and paid for under Mobilization. All costs associated with supplying, constructing, maintaining and restoring temporary haul roads shall be included in the lump sum price bid for "Mobilization."

PSP-4 TEMPORARY CONSTRUCTION ZONE FLAGGING

The CONTRACTOR is responsible for supplying, erecting, and maintaining temporary construction zone flagging, fencing, etc. in the areas shown on the plans, as directed by the ENGINEER, or at the CONTRACTORs discretion based on the CONTRACTOR’s company

safety plan. This flagging, fencing, etc. shall be continuous and fluorescent and define construction areas outside limits of temporary security fence. All costs associated with supplying, erecting, relocating, and maintaining temporary construction zone flagging, fencing, etc. shall be included in the lump sum bid price for "Mobilization".

PSP-5 PROTECTION OF EXISTING FACILITIES

All existing facilities will be carefully protected by the CONTRACTOR. Any facilities damaged by the CONTRACTOR will be repaired immediately and restored to original condition. The CONTRACTOR shall be required to provide a private utility locating firm for all private utility locations. All runway lights, taxiway lights, signs, and concrete surfaces to remain exposed shall be protected from asphalt and paint spray by suitable means. These and any other above-ground facilities shall be cleaned, if asphalt or paint is deposited on them, to the satisfaction of the ENGINEER. It is understood and agreed that the OWNER does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the CONTRACTOR of his/her responsibility to protect such existing features from damage or unscheduled interruption of service.

Should the CONTRACTOR damage or interrupt the operations of a utility service or facility outside the project limits by accident or otherwise, he shall immediately notify the proper authority and the ENGINEER and shall take all reasonable measures to prevent further damage or interruption of service. The CONTRACTOR, in such events, shall cooperate with the utility service or facility OWNER and the ENGINEER continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility OWNER.

The CONTRACTOR shall bear all costs of damage and restoration of service to any utility service or facility due to his/her operations whether due to negligence or accident. The Contract OWNER reserves the right to deduct such costs form any monies due or which may become due to the CONTRACTOR.

PSP-6 DUST CONTROL

It is the intent of these specifications that the CONTRACTOR will, by watering, chemicals, vegetation, or other means, prevent the occurrence of dust which will be objectionable to the residents of the area or violate existing laws or regulation or cause hazards to air traffic. The CONTRACTOR shall immediately implement duct control procedures when requested or as directed by the ENGINEER or OWNER. The CONTRACTOR shall always have at least one operable water distribution truck on site .

PSP-7 DEWATERING

CONTRACTOR may encounter wet conditions during construction. The CONTRACTOR shall satisfy himself of the presence of wet conditions and take such conditions into account in preparing the bid. All cost for dewatering by any means and for temporary support of excavation is considered incidental to cost of items of work bid upon. The CONTRACTOR shall be required to provide properly sized pumps, hoses and all appurtenances necessary to successfully dewater throughout the duration of the project. Managing site drainage will be the responsibility of the CONTRACTOR.

The CONTRACTOR is required to provide the proper sediment and erosion controls for dewatering operations and shall be consistent with the requirements established under the National Pollutant Discharge Elimination System requirements and the CONTRACTORs land disturbing permit for this construction activity. This shall include providing geotextile bags made of permeable, nonwoven geotextiles to be fitted to the ends of each pump as required (also incidental to the work).

PSP-8 PROGRESS MEETINGS

A bi-weekly progress meeting will be held throughout the project. The purpose of these meetings will be scheduling and coordination of the work between CONTRACTORs. The CONTRACTOR will be required to have a qualified representative at each of these meetings. Additional meetings may be necessary and will be scheduled as required. The CONTRACTOR will be required to bring an updated schedule to each meeting.

PSP-9 SUBGRADE PREPARATION

Pavement Subgrade

The subgrade soils on this project are expected to be a silty sand (SM), clayey sand (SC), silty gravel (GM) and lean clays (CL). All boring logs and test data show cohesive soils that are currently wet of optimum. These soils are moisture sensitive and may degrade under wheeled traffic. Care should be taken by the CONTRACTOR to protect the existing subgrades once they are exposed. The project intent is to construct a pavement subgrade which is on-grade, properly shaped, stable and compliant with the requirements of P-152.

The CONTRACTOR shall strip and remove all demolition material, grass/vegetation from the area to be graded and paved. During subgrade preparation efforts, the CONTRACTOR shall take all necessary measures to protect the exposed subgrade from rainfall and other sources of unwanted water. This shall include shaping, rolling to seal off the surface when rain is imminent, and timely pumping from appropriately sized temporary sumps. Moisture conditioning should be

accomplished by means of frequent manipulation and exposure to air, sun and wind. See unpaved areas soils handling for material to be excavated and removed.

Prior to the placement of stone, the final subgrade shall be proof rolled and observed by the ENGINEER or ENGINEERs representative. Any soft or un-stable materials encountered during proof rolling shall be removed, as directed by the ENGINEER, and replaced with an approved backfill material or scarified and re-compacted as directed by the ENGINEER. If backfill is required, borrow material shall be brought in from onsite sources and placed per P-152. The presence of wet material will not automatically constitute the presence of unsuitable material and will be determined by the ENGINEER.

Unpaved Areas

Before excavation, the existing soil-geologic profile shall be sampled and described on a minimum grid spacing of no more than 100 feet. All weathered soil horizons and separate underlying geologic strata should be described for Munsell color (including variations within a stratum), texture and type. All distinct geologic strata should be composite sampled with each sub-sample representing no more than 2 feet of a given stratum. Weathered intact natural soil horizons (e.g. A, E, B or C) with a dominant Munsell soil color value of > 4.0 and a soil chroma > 2.0 may be combined into one sample for lab analysis.

All composite samples shall be analyzed for 1:1 soil water pH and total-S. Samples with total-S values >0.20% should be further analyzed for acid-base accounting (EPA 600/2-78-054) to determine net neutralization potential (NNP) deficiency (e.g. tons of agricultural lime demand per 1000 dry tons material). An alternative test (e.g. Hydrogen Peroxide Potential Acidity – PPA) may be substituted for acid-base accounting if approved by the ENGINEER. All materials with a net lime demand (negative NNP) of -5.0 or lower (more negative) must be limed to 1.25x their determined lime need during fill placement or if used as surface materials for revegetation. Lime need for other materials (e.g. NNP > negative 5.0) that will remain within one foot of the final revegetation surface must be limed according to standard pH and soil texture criteria to achieve a post-application pH of 6.5 or greater. Any materials with a soil pH < 4.5 occurring within the upper one foot of the final revegetation must receive at least 4 tons of lime per 1000 dry tons of tested material. Liming materials should be Virginia certified agricultural limestone.

The CONTRACTOR shall provide a plan for recognizing, separating and properly treating all acid-forming materials in the field during actual excavation and placement activities. The cost for all testing shall be included in the line item cost for Mobilization.

PSP-10 BORROW EXCAVATION

Borrow material (select fill) shall consist of an approved inorganic material classified SP, SW, SM or SC containing less than 20% by weight silt or clay and free of debris. Material shall be within +/- 2% of optimum moisture content. Material shall have a minimum CBR of 15. Payment shall be made under P-152.

PSP-11 SEQUENCE OF CONSTRUCTION AND RESPONSIBILITY FOR COMPLETION

Refer to the project plans for the general sequence of construction. The general sequence of construction is intended to provide general guidance to the CONTRACTOR, but shall not relieve the CONTRACTOR of his responsibility to sequence and schedule his operations in sufficient detail in such a manner to successfully complete all work of the project within the allotted time and in accordance with the Contract Requirements.

In accordance with the specifications, the CONTRACTOR shall provide a schedule of construction to the ENGINEER for review and approval prior to commencing construction. The CONTRACTOR's schedule and work sequence shall consider all the phases of work and shall be coordinated with the OWNER and ENGINEER toward achieving an effective, creative approach to completing the work in a timely fashion which minimizes inconvenience to airport users. The schedule shall be kept up to date for the duration of the project. The schedule shall be reviewed at each progress meeting. The CONTRACTOR shall be responsible for maintaining an up to date schedule.

The CONTRACTOR shall furnish such labor, materials, tools, equipment, and professional services and shall work such hours, including night shifts, overtime operations and Sundays and holidays, as may be necessary to ensure the performance of the work within milestone and completion dates specified in the Contract. If it becomes apparent to the OWNER's Project Manager that the work will not be completed within required milestone or completion dates, the CONTRACTOR agrees to undertake some or all of the following actions, at no additional cost to the OWNER, in order to ensure, in the opinion of the OWNER's Project Manager, that the CONTRACTOR will comply with all milestone and completion date requirements:

1. Increase labor, materials, tools, equipment and professional services.

2. Increase the number of working hours per shift, shifts per working day, working days per week, or any combination of the foregoing; and

3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities.

If the actions taken by the CONTRACTOR are not satisfactory, the OWNER or the OWNER's

Project Manager may direct the CONTRACTOR to take any and all actions necessary to ensure completion within the required completion dates, without additional cost to the OWNER. In such event, the CONTRACTOR shall continue to assume responsibility for his performance and for completion within the required dates.

If, in the opinion of the Project Manager, the actions taken by the CONTRACTOR pursuant to the Contract or the progress or sequence of work are not accurately reflected on the construction schedule, the CONTRACTOR shall revise such schedule to accurately reflect the actual progress and sequence of work.

The CONTRACTOR shall be responsible for implementing and executing the Work specified in the Contract in strict conformance with the approved schedule. The schedule shall be the CONTRACTOR's work plan for completing the entire Contract as specified in the Contract Documents. Failure of the CONTRACTOR to adhere to the latest approved schedule or to maintain and update the schedule for the duration of the project will be cause for the OWNER to deny any and all requests for additional compensation or extensions of the Contract duration.

PSP-12 SHOP DRAWINGS AND DATA SUBMITTALS

The CONTRACTOR is responsible for the preparation of detailed shop drawings, material data submittals, project schedule, CONTRACTOR Quality Control Plan, mix designs and other such data necessary for the fabrication, erection and construction of all parts of the work in conformity with the Contract Documents. ***Six (6) copies of shop drawings and data submittals shall be submitted to the ENGINEER in accordance with the procedures herein described.***

Alternatively, shop submittals may be made via email in PDF format. Telephonic confirmation of receipt is advisable.

It will be critical to have shop drawings and data submitted as soon as possible after the contract has been awarded so that there will not be any delay in beginning the construction.

"Shop Drawings", wherever referred to, shall be defined as drawings, diagrams, illustrations, schedules, catalog cuts, performance charts, brochures, and other data prepared by the CONTRACTOR or any SubCONTRACTOR, manufacturer, supplier or distributor, which illustrate how specific portions of the work shall be fabricated and/or installed.

Where it is difficult to provide "shop drawing transparencies such as for "catalog cuts", "brochures" or "photographs", the CONTRACTOR shall submit a minimum of six (6) copies of such "cuts", "brochures" or "photographs." Additional copies shall be supplied when required by the ENGINEER.

All submissions of shop drawings, brochures and catalog cuts shall be accompanied by a

transmittal letter listing the drawings submitted by number and title.

Each shop drawing shall have listed on it all Contract references, drawing numbers, plus shop drawing numbers on related work by other SubCONTRACTORs, if available.

Non-reproducible shop drawings shall be submitted with a cover sheet containing all of the information required on reproducible shop drawings.

Shop drawings shall be complete in every detail, including a location plan relating the work to space identification and column numbers. Materials, gauges, method of fastening, size and spacing of fastenings, connections with other work, cutting, fitting, drilling, and any and all other necessary information as per usual trade practice or as required for any specific purpose must be clearly shown.

The CONTRACTOR shall check and approve all shop drawings to make sure that they conform to the drawings, specifications, and other Contract requirements, and correct the drawings found to be inaccurate or otherwise in error. The CONTRACTOR shall verify all field dimensions and criteria and shall be responsible for the coordination of work by all SubCONTRACTORs.
Shop drawings, at the time of submission, shall bear the signature of the CONTRACTOR's checker, date and stamp of approval for submission to the ENGINEER as evidence that such drawings and/or details have been reviewed, checked and approved by the CONTRACTOR. Drawings submitted without such stamp of approval will be returned to the CONTRACTOR unapproved and will require resubmission. In such event, it will be deemed that the CONTRACTOR has not complied with the requirements of this subsection and shall bear the risks of delays as if no drawings or details had been submitted. Both sepia and prints must bear CONTRACTOR's stamp.

The CONTRACTOR, by approving and submitting shop drawings, represents that he has determined and verified all field measurements and quantities, field construction criteria, materials, catalog numbers, and similar data, and that he has reviewed and coordinated the information in the shop drawings with the requirements of the work and the Contract documents.

At the time of submission, the CONTRACTOR shall inform the ENGINEER in writing of any deviation in the shop drawings or samples from the requirements of the Contract documents.

The ENGINEER will review and approve shop drawings and samples with reasonable promptness so as to minimize delay, but only for conformance with the design concept of the Contract and with the information given in the Contract documents. The ENGINEER'S approval of a separate item shall not indicate approval of an assembly in which the item functions. The ENGINEER will return the shop drawings transparency/sepia to the CONTRACTOR for his use and distribution.

The ENGINEER'S approval of shop drawings or samples shall not relieve the CONTRACTOR of

responsibility for any deviation from the requirements of the Contract documents unless the CONTRACTOR has informed the ENGINEER in writing of such deviation at the time of submission and the ENGINEER has given written approval to the specific deviation, nor shall the ENGINEER'S approval relieve the CONTRACTOR from responsibility for errors or omissions in the shop drawings or samples.

No materials shall be ordered and no portion of the work requiring shop drawings or sample submission shall be commenced until the submission has been approved by the ENGINEER. All such materials and portions of work shall be in accordance with approved shop drawings and samples.

The CONTRACTOR shall, when requested by the ENGINEER in writing, submit additional shop drawings to those required by the technical specifications or special provisions.

The CONTRACTOR shall deliver to the ENGINEER three (3) complete sets of all maintenance manuals, parts list, operating instructions and other necessary documents required for all installed materials, equipment, or machinery. Such documents shall be furnished concurrently with the installations of the respective materials, equipment or machinery. All shop drawings submitted by the CONTRACTOR and approved by the ENGINEER become part of the Contract documents.

PSP-13 INSPECTIONS, FEES, PERMITS AND BONDS

This project may be subject to regulatory and construction inspection by the OWNER or agents thereof, and/or Louisa County and/or Virginia DEQ. These regulatory inspections primarily involve but are not necessarily limited to erosion and sediment control and storm water management aspects of the work. The CONTRACTOR shall fully cooperate with these inspections.

The CONTRACTOR shall be responsible for obtaining all required OWNER and County construction permits *prior to the start of construction* and shall pay all associated permit and inspection fees. Any project delay associated with the CONTRACTOR’s failure to obtain the necessary permits prior to NTP will not be credited toward an extension of contract time or relief of liquidated damages. This shall include, but is not limited to County Land Disturbance Permits, Bonds and other associated registration fees. All costs shall be included in the Item “Mobilization”.

PSP-14 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE

The bidder is expected to carefully examine the site of the proposed work, the proposal, plan, specifications, and Contract forms. He shall satisfy himself as to the character, quality, and quantities of work to be performed, materials to be furnished, and as to the requirements of the proposed Contract. The CONTRACTOR shall bid this project in its entirety. The cost for all elements described within the plans and specifications shall be included in the contract bid

proposal at the time of bid opening. The intent of the contract is to provide for construction and completion, in every detail, of the work described within these plans and specifications. The list of quantities does not list incidental items of work. The CONTRACTOR shall determine what line items incidentals are bid. Questions regarding incidentals or items of work not specifically called out in the list of quantities shall be addressed to the ENGINEER prior to submission of bid. The submission of a bid shall be prima facie evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed Contract, plans, and specifications. Site visits can be arranged by contacting the Louisa County Airport staff at (540) 967-0050.

PSP-15 CONSTRUCTION LAYOUT AND CONTROL

It shall be the CONTRACTOR's responsibility to layout the work as indicated in the Plans and in section 50-06 of the Specifications. All survey work shall be performed under the supervision of a Land Surveyor licensed in the State of Virginia, by qualified personnel with instruments and equipment subject to the approval of the ENGINEER.

The CONTRACTOR shall provide sufficient construction staking during project to control field operations and aid in preparation of partial pay requests. Protection of the existing benchmarks and installation of supplemental control necessary to complete the work shall be the responsibility of the CONTRACTOR.

PSP- 16 AS BUILT DRAWINGS

The CONTRACTOR will be required to maintain, onsite, a set of as constructed plans always, noting any changes, deviations, etc., with the responsibility to furnish the OWNER, at the completion of the project, a set of as constructed plans. These as constructed plans shall be delivered to the ENGINEER prior to final acceptance.

The CONTRACTOR shall prepare as-built drawings by marking up two sets of prints and one electronic copy of the applicable contract drawings to portray as-built construction, in conformance with the plan locations, elevations and specifications. The prints shall be neatly and clearly marked to show all variations between the work actually provided and that indicated on the contract drawings. All drafting shall conform to good drafting practice and shall include such supplementary notes, legends and details as may be necessary for legibility and clear portrayal of the as-built construction. These drawings shall be marked promptly at the completion of the project and shall be submitted to the owner prior to final payment. The as-built drawings shall include field survey verification of all tower locations, bottom and top elevations of all lights, clearing limits, PAPI light unit locations and critical elevations of installed PAPI units. All survey work shall be performed under the supervision of a Land Surveyor licensed in the State of Virginia.

PSP-17 GROUND COVER REQUIREMENTS

Each work area shall be stabilized with either temporary or permanent stabilization measures within 7 days after construction activity has ceased in that work area. Application of temporary stabilization measures in an area may be waived if the CONTRACTOR demonstrates by means of the latest updated construction schedule that each disturbing operations will resume in that area within 30 days after the prior activity in that area ceased *and* perimeter and/or downstream controls are in place to control sediment from that work area.

PSP-18 DEBRIS DISPOSAL

The CONTRACTOR shall dispose of concrete and other debris off airport property in a properly permitted location. All costs for offsite disposal shall be included in the related items bid upon.

PSP-19 ADJUSTMENT OF CONTRACT TIME

Contract time for this project may be adjusted only by change order, when requested by the CONTRACTOR in writing and approved by the ENGINEER and OWNER, for reasons outside of the CONTRACTOR's control, as follows:

a. Strikes, lockouts, or other labor actions which delay delivery of critical materials or performance of critical segments of work.
b. Natural disasters affecting the project site.
c. Excessive rainfall during an entire calendar month, defined as total monthly rainfall in excess of the normal rainfall for that calendar month as determined by NOAA and total number of days with more than 0.1” of rainfall in excess of the normal number of such days for that calendar month.
d. Extreme low temperatures, defined as the average daily temperatures falling below the normal average daily temperature for that date and below the minimum allowable temperature specified for a critical component of the work, for 15 days or more in a calendar month. Average daily temperature and normal average daily temperature values shall be as reported by the National Weather Services, the Southeast Regional Climate Center, or other reliable source provided by the CONTRACTOR and acceptable to the ENGINEER.
e. Suspension of the work as ordered by the ENGINEER or OWNER.
f. Delays in critical work by others.
g. Significant additions to the scope of work.

The CONTRACTOR shall bear the burden of proof that a delay has been caused by factors outside his control, shall clearly demonstrate how the delay impacts the critical path of the work as shown on his work schedule as last revised, and shall demonstrate that he has made reasonable and prudent efforts to overcome the impact of the delay on the critical path.

Refer also to Section 80 of the General Conditions.

PSP-20 WORK PHASES, CONTRACT TIME AND LIQUIDATED DAMAGES

The Louisa County Airport is a general aviation, public use airport that is an integral part of the Virginia and national aviation transportation system. The site for this project is adjacent to the primary runway for the airport, serving all aircraft using the airport. It is not possible to close the runway during construction.

Liquidated Damages, in the amount of $1,000.00 per calendar day, will be assessed for failure to complete the work of any phase or the total work of the contract within the specified Contract Time.

The CONTRACTOR will be required to submit for approval a detailed Schedule of Work to the ENGINEER seven days prior to the Preconstruction Conference. After the ENGINEER approves the schedule of work, the CONTRACTOR will be required to follow the approved schedule of work unless deviations are approved by the ENGINEER (see PSP-12).

Detailed information and notes regarding safety, access, communications and related matters are included on the plans.

The schedule shall be prepared using construction scheduling software, such as Primavera or Microsoft project. The baseline schedule and periodic updates shall be printed on 11x17 paper with color or symbols used to depict the critical path, progress, slippage, etc. Updates shall be submitted monthly; in the event of any significant slippage in the critical path, weekly update shall be provided, depicting the CONTRACTOR’s schedule recovery plan and re-sequencing of work elements.

The CONTRACTOR's attention is directed to the following requirements in developing his Schedule of Work:

1. The purpose of the Schedule of Work is to assure a safe area of operation for the CONTRACTOR and Airport traffic, maintenance of traffic on the taxiways adjacent to the construction areas, and performance of the construction in an acceptable manner and time frame.

2. Although it is not anticipated, there may be more than one CONTRACTOR working for the Louisa County Airport, its tenants or the FAA in the project area simultaneously. The CONTRACTOR will be required to coordinate all work with the OWNER and ENGINEER to minimize conflicts with other CONTRACTORs.

3. The CONTRACTOR shall make his own estimate of the difficulties involved in arranging the work to comply with the above requirements and shall not claim any added compensation by reason of delay or increased cost due to these requirements.

4. The schedule shall include, but is not limited to, approximate dates and exact time intervals for performing each work task, schedules for shop drawing submittals, review times, procurement schedules, and delivery dates.

The CONTRACTOR shall coordinate and cooperate fully with the OWNER, ENGINEER, and airport tenants throughout the construction period to coordinate construction activities with airport operations. This shall include participation in project progress meetings, informal site meetings, telephone and email communication, etc. The CONTRACTOR shall, to the extent practicable and consistent with maintaining the progress of the work, adjust his operations and schedule to accommodate aircraft operations on the field. Often, aircraft operational needs can be met without significant impact to construction progress through effective coordination and communication, with attention to procedural matters and scheduling.

PSP-21 STAGING AREA

The CONTRACTOR shall provide the staging area in the general location shown on the plans. The lump sum price shall be full compensation for furnishing all materials; and for all labor, equipment, tools and incidentals necessary to complete the item. The item shall include but not be limited to fencing, gates, signs, and stone. Also included is the removal of all previously mentioned items, including the repair, scarifying, seeding, mulching, and fertilizing of the area to achieve a stand of grass acceptable to the ENGINEER. The area shall be returned to its original condition and be accepted by the owner before final payment is issued.

Payment for the staging area will be made in two equal installments. The first installment of 50 percent of the contract lump sum price will be made on the first progress estimate. The second installment will be made following satisfactory completion of the final clean-up of the staging area, as previously noted, at the completion of the project.

Payment will be made under:

Staging Area	Lump Sum

PSP-22 STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

The CONTRACTOR shall develop and update, as needed, a SWPPP for construction activity to meet the requirements of the Virginia Department of Environmental Quality. A copy of the SWPPP, in addition to the approved sediment and erosion control plan, is required to remain on the construction site throughout the entirety of the project. A registration statement and filing fee for coverage under the Virginia Stormwater Management Program's General Permit - Construction Activity Stormwater Discharges will be required and is to be paid by the CONTRACTOR. The CONTRACTOR is required to follow all requirements of the permit

including but not limited to inspections, update of the SWPPP as required and coordination with the local inspector. There is no pay item for developing and maintaining the SWPPP or for filing the DEQ registration statement.

PSP-23 GROUND ROD INSTALLATION

Section L-108-3.8 – Testing, Item g, requires that "the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes." The CONTRACTOR will be required to test ground rod installations for all equipment ground locations (ground light fixtures, lighted signs, etc.) in accordance with the requirements of the Specifications. Cost of testing to be included in the items bid upon.

For any equipment ground rod that does not meet the 25-ohm requirement, a second ground rod shall be installed, at a distance equal to twice the ground rod length. The second ground rod shall be connected to the first using #6 bare copper wire and exothermic welds. No further testing is required following installation and connection of the second ground rod. All costs for supplemental ground rods and associated connections shall be included in the unit bid price per each for item L-108-5.4.

PSP-24 CONTRACTOR QUALITY CONTROL

When the specification requires CONTRACTOR Quality Control testing, the CONTRACTOR shall establish, provide, and maintain effective Quality Control on the site meeting the methods and procedures 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 in the contract technical specifications, the CONTRACTOR shall assume full responsibility for accomplishing the stated purpose.

The CONTRACTOR shall adequately provide to produce acceptable quality materials and provide sufficient information to assure both the CONTRACTOR and the ENGINEER that the specification requirements are being met.

The CONTRACTOR shall not begin any construction until the Quality Control firm has been identified and approved by the ENGINEER (i.e. sub-CONTRACTOR, inner company).

The CONTRACTOR shall establish a Quality Control program to perform quality control inspection and testing of all items of work required by the technical specifications, including those performed by subCONTRACTORs. This Quality Control Program shall ensure conformance to applicable specifications and plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Program 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 quality control.

The CONTRACTOR shall submit a coordinated construction schedule for all work activities. The schedule shall be prepared as a network diagram in Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), or another approved format. As a minimum, it shall provide information on the sequence of work activities, milestone dates, and activity duration.

The CONTRACTOR shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the CONTRACTOR of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

Inspection requirements

Quality control inspection functions shall be organized to provide inspections for all definable features of work.

Inspections shall be performed daily to ensure continuing compliance with contract requirements until completion of the feature of work. These shall include the following minimum requirements:

During field operations, quality control 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.

Documentation

The CONTRACTOR shall maintain current quality control records of all inspections and tests performed. These records shall include factual evidence that the required 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 ENGINEER daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the Site Superintendent or approved company representative.

Specific CONTRACTOR quality control records required for the contract shall include, but are not necessarily limited to, the following records:

Daily inspection reports

Each CONTRACTOR quality control 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 quality control 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) Review of quality control tests

(7) Safety inspection.

The daily inspection reports shall identify inspections 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 quality control technician and the Program Administrator. The ENGINEER shall be provided at least one copy of each daily inspection report on the workday following the day of record.

Daily test reports

The CONTRACTOR shall be responsible for establishing a system that will record all quality control 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 ENGINEER prior to the start of the next day's work period. When required by the technical specifications, the CONTRACTOR shall maintain statistical quality control charts. The daily test reports shall be signed by the responsible quality control technician and the approved company representative.

Surveillance by the ENGINEER

All items of material and equipment shall be subject to surveillance by the ENGINEER at the point of production, manufacture or shipment to determine if the CONTRACTOR, producer, manufacturer or shipper maintains an adequate quality control 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 surveillance by the ENGINEER at the site for the same purpose.

Surveillance by the ENGINEER does not relieve the CONTRACTOR of performing quality control inspections of either on-site or off-site CONTRACTOR's or subCONTRACTOR's work.

It is the responsibility of the CONTRACTOR to coordinate his schedule with the ENGINEER, or his representative, to provide sufficient notice for the coordination and scheduling of inspections. Failure to adequately coordinate the schedule and field work will not constitute a basis for delay by the CONTRACTOR.

The contractor shall provide copies of all quality control testing documentation as evidence that the work was installed per project specifications. This includes, but is not limited to, in field and laboratory concrete testing for CONTRACTOR designed light foundations and PAPI foundations. Failure to provide the required information will be considered non-compliance.

Non-compliance

The ENGINEER will notify the CONTRACTOR of any noncompliance with any of the foregoing requirements. The CONTRACTOR shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the ENGINEER or his or her authorized representative to the CONTRACTOR or his or her authorized representative at the site of the work, shall be considered sufficient notice.

In cases where quality control activities do not comply with either the CONTRACTOR Quality Control Program or the contract provisions, or where the CONTRACTOR fails to properly operate and maintain an effective Quality Control program, as determined by the ENGINEER, the ENGINEER may:

(1) Order the CONTRACTOR to replace ineffective or unqualified quality control personnel or subCONTRACTORs.

(2) Order the CONTRACTOR to stop operations until appropriate corrective actions are taken.

PSP-25 SUBSTANTIAL COMPLETION – PUNCHLIST WORK

The date of substantial completion of the work or designated portion thereof is the date certified by the ENGINEER that the work or a designated portion thereof is sufficiently complete, in accordance with the contract documents, so the OWNER can fully occupy or utilize the work or designated portion thereof for the use for which it is intended, with all of the project's parts and

systems operable as required by the contract documents. Only punch list work and any final cleaning beyond that needed for the owner's full use may remain for final completion.

The date of final completion of the work is the date certified by the ENGINEER when the work is complete; to include punch list work, final clean up in accordance with the contract documents, and full occupancy by the OWNER to fully utilize the work for the use for which it is intended.

The CONTRACTOR shall have thirty (30) days from the date of substantial completion to complete all items on the punch list to the satisfaction of the ENGINEER. The OWNER shall have the option to correct all punch list items not completed by the CONTRACTOR within the thirty days from the date of substantial completion by utilizing his own forces or by a separate CONTRACTOR. The cost of such correction of remaining punch list items by the OWNER or others shall be deducted from the final payment to the CONTRACTOR.

The issuance of substantial completion does not indicate final acceptance of the project by the OWNER, and the CONTRACTOR is not relieved of any responsibility for the project except as specifically stated in the notice of substantial completion.

Should the ENGINEER determine that the work or a designated portion thereof is not substantially complete, he shall provide the CONTRACTOR a written notice stating why the project or designated portion is not substantially complete. The CONTRACTOR shall expeditiously complete the work and shall request in writing that the ENGINEER perform a substantial completion re-inspection and the costs, if any, associated with such re-inspection shall be assessed to the CONTRACTOR.

PSP-26 AIRFIELD ELECTRICAL DEMOLITION

This item shall include provision of all materials, equipment, and labor for complete demolition and disposal of existing airfield lighting equipment as shown on the plans or as reasonably inferred from the information shown on the plans. The airfield lighting equipment demolition and disposal shall include but not be limited to existing light fixtures, transformers, hardware, base cans, , conduit, power cable, PAPI units and REIL units. All airfield lighting fixtures, lamps, and accessories removed under this item shall be salvaged and delivered to the OWNER and stored on airport property as directed by the OWNER. If the airport elects not to salvage some or all of the equipment removed, the CONTRACTOR shall dispose of equipment off-site. All other debris generated from these removal operations shall be properly disposed of off-site. The item will be paid at the contract lump sum price which shall be full compensation for all labor, materials, equipment and incidentals necessary to complete the item.

PSP-27 PROTECTION OF EXISTING FACILITIES

All existing facilities will be carefully protected by the CONTRACTOR. Any facilities damaged by the CONTRACTOR will be repaired immediately and restored to original condition. The CONTRACTOR shall be required to provide a private utility locating firm for all private utility locations. All runway lights, taxiway lights, signs, and concrete surfaces to remain exposed shall be protected from asphalt and paint spray by suitable means. These and any other above-ground facilities shall be cleaned if asphalt or paint is deposited on them, to the satisfaction of the OWNER. It is understood and agreed that the OWNER or ENGINEER does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the CONTRACTOR of his/her responsibility to protect such existing features from damage or unscheduled interruption of service.

Should the CONTRACTOR damage or interrupt the operations of a utility service or facility outside the project limits by accident or otherwise, he shall immediately notify the proper authority and the OWNER and shall take all reasonable measures to prevent further damage or interruption of service. The CONTRACTOR, in such events, shall cooperate with the utility service or facility OWNER and the OWNER continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility OWNER.

The CONTRACTOR shall bear all costs of damage and restoration of service to any utility service or facility due to his/her operation whether due to negligence or accident. The contract OWNER reserves the right to deduct such costs from any monies due, or which may become due to the CONTRACTOR.

PSP-28 AIRFIELD LIGHTING PROTECTION

This project does not include full scale replacement of the Medium Intensity Taxiway Lighting (MITL) circuits serving the parallel taxiway. It does include new airfield lighting infrastructure. All components of the existing airfield lighting system not shown to be reconstructed are to be protected throughout construction for continuing service following project completion. The responsibility for protecting the airfield lighting infrastructure and the associated risks are hereby assigned to the CONTRACTOR.

It is expected that the CONTRACTOR will have an electrical sub-CONTRACTOR that is qualified and experienced in airfield lighting, and that sub-contract arrangements will address the risks and a reasonably anticipated scope of work for replacements and repairs necessary to restore the affected airfield lighting components to service at the completion of each work phase. A certain level of collateral damage can reasonably be expected during pavement demolition, excavation, drainage and underdrain installation, subgrade preparation, base course placement, concrete paving and shoulder grading operations. Repair of all such damage shall be the

CONTRACTOR's responsibility at no additional cost to the OWNER.

The item, "Airfield Lighting Protection" shall include all materials, labor and equipment necessary to remove, store and re-install existing light fixtures, etc.; provide all temporary measures necessary to isolate the portion of affected circuits in each phase (such that the portion of the circuit(s) in the work area are de-energized, while the portions of the circuit(s) in open segments of taxiways remain operational); provide on-going maintenance and adjustments of temporary lighting system measures throughout construction; protect airfield lighting circuit components, including, but not limited to, cans, conduits, cables, counterpoise, ground rods, etc.; repair any damage to the airfield lighting infrastructure resulting from construction operations; restore and test the affected airfield lighting system components to full operation upon completion of each phase of the work. All costs for the work described shall be included in the lump sum bid price for each phase for "Airfield Lighting Protection." The lump sum price will be paid over the course of the work, with no more than 25% paid on any partial pay estimate.

PSP-29 CIRCUIT VERIFICATION

Prior to the start of construction, the CONTRACTOR shall field truth and verify the location of all existing circuits, including potholing, as needed. The CONTRACTOR shall notify the ENGINEER immediately if there is a discrepancy between the plans and the existing field conditions. The CONTRACTOR will have 2 calendar days to perform the work. The CONTRACTOR shall provide 7-days' notice to the OWNER for field verification to be performed within the Taxiway Safety Area (TSA).

PSP-30 TOWER INSTALLATION

The Contractor shall provide and install self-supporting towers by Rohn, Jaquith or approved equivalent. This shall include foundation design, foundation construction, tower erection and installation. The towers shall be installed in the locations noted and in accordance with the plans. The towers shall be made of a fiberglass and act as a Low Impact Resistant (L.I.R.) support structure. The LIR structure shall act as a break-away mast for use in the ODAL approach lighting system. The LIR design shall withstand 100 mph winds without ice and 75 mph winds with a 1/2 inch radial ice load. The support structure shall be capable of breaking without catastrophic damage to an aircraft wing support. The masts lightweight fiberglass construction shall be resistant to UV, temperature, weather, and corrosion. The mast shall be capable of being lowered to ground level for maintenance.

The lump sum price shall be full compensation for furnishing all materials and for all labor, equipment, tools, shipping, foundation design, foundation construction and incidentals necessary to complete the item.

Payment will be made under:

Provide and Install Tower [#] Per Lump Sum

PSP-31 ELECTRICAL VAULT MODIFICATIONS

The Contractor shall make all necessary modifications to the existing electrical vault including, but not limited to, removal and storage of the existing 10 kW regulator, and assisting the owner with moving existing equipment in the vault for access to perform the work as needed.

Modifications shall conform to NEC and local code requirements. Existing raceways shall be utilized for cable runs. Cable not to be used shall be removed from the raceways as required. The contractor shall protect all existing wiring and communications cables during demolition and installation. All holes left by the demolition shall be filled. The contractor shall research and obtain all necessary permits required for the work.

The lump sum price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item. The cost for installation of new equipment (i.e., regulators) shall be included the line-item cost for the associated work.

END OF PROJECT SPECIAL PROVISIONS

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.

156-2.6 Sediment Traps. The sediment traps shall be formed via excavation required to attain the necessary storage volume as noted in the project plans. Outlet material shall be a combination of course aggregate and riprap to provide filtering and detention as well as stability. Course aggregate shall be VDOT #3, #357, or #5. Riprap shall be Class I. Filter cloth shall meet the requirements noted in Table 3.19D of the current edition of the Virginia Erosion and Sediment Control Handbook (VESCH).

156-2.7 Inlet Protection. Culvert and drop inlet protection materials shall meet the requirements of the project plans and the current version of the Virginia Erosion and Sediment Control Handbook (VESCH).

156-2.8 Sediment basins. The sediment basins shall be formed via excavation required to attain the necessary storage volume as noted in the project plans. Outlet materials include the dewatering device, stand pipe (riser), base, barrel, and anti-seep collars. The basin shall meet all requirements of the Erosion and Sediment Control Handbook (VESCH) Spec 3.14.

102-2.8 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. Temporary construction entrance will be measured per each including stone, fabric and maintenance for the duration of the project.

b. Temporary silt fence will be measured by the linear foot including chain link fence, fabric, stakes and maintenance for the duration of the project.

c. Temporary inlet protection will be measured per each.

d. Temporary seeding and mulching per acre

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	Temporary construction entrance - per each
Item C-102-5.1b	Installation and removal of temporary silt fence - per linear foot
Item C-102-5.1c	Temporary Seeding and Mulching – per acre

Item C-102-5.1.d Temporary Inlet Protection – 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.

Temporary control features not covered by contract items that are ordered by the RPR will be paid for in accordance with Section 90, paragraph 90-05 *Payment for Extra Work*.

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

Section 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 Mobilization

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 P-151

Clearing and Grubbing

DESCRIPTION

151-1.1 This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the plans or as required by the Resident Project Representative (RPR).

a. Clearing shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, the removal of fences and other loose or projecting material from the designated areas. The grubbing of stumps and roots will not be required.

b. Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the RPR is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing.

c. Tree Removal. Tree Removal shall consist of the cutting and removal of isolated single trees or isolated groups of trees, and the grubbing of stumps and roots. The removal of all the trees of this classification shall be in accordance with the requirements for the particular area being cleared.

CONSTRUCTION METHODS

151-2.1 General. The areas denoted on the plans to be cleared or cleared and grubbed shall be staked on the ground by the Contractor as indicated on the plans.

The removal of existing structures and utilities required to permit orderly progress of work shall be accomplished by local agencies, unless otherwise shown on the plans. Whenever a telephone pole, pipeline, conduit, sewer, roadway, or other utility is encountered and must be removed or relocated, the Contractor shall advise the RPR who will notify the proper local authority or owner to secure prompt action.

151-2.1.1 Disposal. All materials removed by clearing or by clearing and grubbing shall be disposed of outside the Airport's limits at the Contractor's responsibility, except when otherwise directed by the RPR. As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed in accordance with requirements for formation of embankments. Any broken concrete or masonry that cannot be used in construction and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case, shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the RPR and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits, the Contractor shall obtain and file with the RPR permission in writing from the property owner for the use of private property for this purpose.

151-2.1.2 Blasting. Blasting shall not be allowed.

151-2.2 Clearing. The Contractor shall clear the staked or indicated area of all materials as indicated on the plans. Trees unavoidably falling outside the specified clearing limits must be cut up, removed, and disposed of in a satisfactory manner. To minimize damage to trees that are to be left standing, trees shall be felled toward the center of the area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut flush with the original ground surface. The grubbing of stumps and roots will not be required.

Fences shall be removed and disposed of as directed by the RPR. Fence wire shall be neatly rolled and the wire and posts stored on the airport if they are to be used again, or stored at a location designated by the RPR if the fence is to remain the property of a local owner or authority.

151-2.3 Clearing and grubbing. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials as indicated on the plans, shall be removed, except where embankments exceeding 3-1/2 feet (105 cm) in depth will be constructed outside of paved areas. For embankments constructed outside of paved areas, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off flush with the original ground and allowed to remain. Tap roots and other projections over 1-1/2 inches (38 mm) in diameter shall be grubbed out to a depth of at least 18 inches (0.5 m) below the finished subgrade or slope elevation.

Any buildings and miscellaneous structures that are shown on the plans to be removed shall be demolished or removed, and all materials shall be disposed of by removal from the site. The cost of removal is incidental to this item. The remaining or existing foundations, wells, cesspools, and like structures shall be destroyed by breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet (60 cm) below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material that cannot be used in backfill shall be removed and disposed of at the Contractor's expense. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes in embankment areas remaining after the grubbing operation shall have the sides of the holes flattened to facilitate filling with acceptable material and compacting as required in Item P-152. The same procedure shall be applied to all holes remaining after grubbing in areas where the depth of holes exceeds the depth of the proposed excavation.

METHOD OF MEASUREMENT

151-3.1 The quantities of clearing as shown by the limits on the plans shall be the number of acres (square meters) or fractions thereof, of land specifically cleared.

151-3.2 The quantities of clearing and grubbing as shown by the limits on the plans shall be the number of acres (square meters) or fractions thereof of land specifically cleared and grubbed.

BASIS OF PAYMENT

151-4.1 Payment shall be made at the contract unit price per acre (square meter) or fractions thereof for clearing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

151-4.2 Payment shall be made at the contract unit price per acre (square meter)for clearing and grubbing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-151-4.1	Clearing – per acre (square meter) or fractions thereof
Item P-151-4.2	Clearing and grubbing - per acre (square meter) or fractions thereof

END OF ITEM P-151

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 **Unclassified excavation.** Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature.

152-1.3 Unsuitable excavation. Unsuitable material shall be disposed off-site in a properly permitted location to be determined by the Contractor. 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. Topsoil shall be excavated and stockpiled or hauled off site as unclassified excavation.

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed off-site in a properly permitted location to be determined by the Contractor. 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. 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 will be permitted as directed by the RPR and in accordance with the following:

Blasting will be permitted only when proper precautions are taken for the safety of all persons, work, and property. All damage done to the work or property shall be repaired by the Contractor. The cost of repair is incidental to this item. All operations of the Contractor in connection with the transportation, storage, and use of explosives shall conform to all federal, state and local regulations and explosive manufacturers' instructions, with applicable approved permits reviewed by the RPR. Any approval will not relieve the Contractor of their responsibility in blasting operations.

Where blasting is approved, the Contractor shall employ a vibration consultant, approved by the RPR, to advise on explosive charge weights per delay and to analyze records from seismograph recordings. The seismograph shall be capable of producing a permanent record of the three components of the motion in terms of particle velocity, and in addition shall be capable of internal dynamic calibration.

In each distinct blasting area, where pertinent factors affecting blast vibrations and their effects in the area remain the same, the Contractor shall submit a blasting plan of the initial blasts to the RPR for approval. This plan must consist of hole size, depth, spacing, burden, type of explosives, type of delay sequence, maximum amount of explosive on any one delay period, depth of rock, and depth of overburden if any. The maximum explosive charge weights per delay included in the plan shall not be increased without the approval of the RPR.

The Contractor shall keep a record of each blast: its date, time and location; the amount of explosives used, maximum explosive charge weight per delay period, and, where necessary, seismograph records identified by instrument number and location.

Blasting and explosive storage shall be in accordance with the General Conditions and all federal, state, and local safety regulations.

These records shall be made available to the RPR on a monthly basis or in tabulated form at other times as required.

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 off site.

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 of 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. The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this 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 begin 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 in advance by the RPR.

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 ASTM D698. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the RPR 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 100 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 D1557. 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. Before start of embankment, 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 100 psi (0.689 MPa) in the presence of the RPR. Apply a minimum of 1 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 D698. Tests for moisture content and compaction will be taken at a minimum of 2,000 S.Y. of subgrade. All quality assurance testing shall be done by completion to the RPR for acceptance determination.

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 be 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 placement of 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.

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.

Item P-152-4.1 Unclassified Excavation – per cubic yard (cubic meter)

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

ITEM M-103

RUNWAY AND TAXIWAY MARKERS

DESCRIPTION

103-1.1 Closed runway and taxiway markers shall furnished by the Contractor, and placed and maintained at the locations indicated or as ordered by the Engineer. The markers shall be indicated or as ordered by the Engineer. The markers shall be installed when indicated on the plans, or when ordered by the Engineer. The closed markers shall remain in-place clearly visible from the air until the runway and/or taxiway is operational. The Contractor shall make frequent inspection of the marking and make prompt repairs, as necessary. The material may be snow fence, plywood, lumber, 40 pound roofing paper, cloth plastic, or other satisfactory material as approved by the Engineer. The color shall be aviation yellow.

METHOD OF MEASUREMENT

103-2.1 Closed runway and taxiway marking shall be measured by unit. No separate measurement will be made for relocation of the markers.

BASIS OF PAYMENT

103-3.1 The accepted quantity of closed runway and taxiway markings will be paid for at the contract unit price per each. The price shall be full compensation for furnishing all materials, labor and incidentals necessary to install, inspect and maintain each marking for the duration of the project.

Payment will be made under:

Item M-103-3.1 Closed (Type) Marker--per each

END OF SECTION M-103

M-104

TRAFFIC DRUMS

DESCRIPTION

104-1.1 Traffic drums shall be furnished by the Contractor, and placed and maintained as shown on the plans or as ordered by the Engineer. The traffic drums shall be installed on all closed segments of pavement or when ordered by the Engineer. The traffic drums shall remain in-place and clearly visible while the pavement is closed to traffic. The contractor shall make a frequent inspection of the marking and make prompt repairs, as necessary.

METHOD OF MEASUREMENT

104-2.1 Traffic drums shall be measured by unit. No separate measurement will be made for relocation of the traffic drums.

BASIS OF PAYMENT

104-3.1 The accepted quantity of traffic drums will be paid for at the contract unit price per each. The price shall be full compensation for furnishing all materials, labor and incidentals necessary to install, inspect and maintain and relocate each drum for the duration of the project.

Payment will be made under:

Item M-104-3.1	Traffic drum - per each

END OF SECTION M-104

ITEM M-107

LOW PROFILE AVIATION BARRICADES

DESCRIPTION

107-1.1 Aviation barricades shall be furnished by the Contractor and placed and maintained as shown on the plans or as ordered by the Engineer. The aviation barricades shall be installed when ordered by the Engineer. The aviation barricades shall remain in-place, clearly visible, until ordered removed by the Engineer. Continuous-burning red lights shall be placed on the barricades for nighttime use.

MATERIALS

107-2.1 Materials shall be in accordance with the Manual on Uniform Traffic Control Devices and with the VDOT, Road and Bridge Specifications, Section 512.

METHOD OF MEASUREMENT

107-3.1 Aviation barricades shall be measured per linear foot. No separate measurements will be made for relocation of the aviation barricades.

BASIS OF PAYMENT

107-4.1 The accepted quantity of aviation barricades will be paid for at the contract unit price per linear foot. The price shall be full compensation for furnishing all materials, labor and incidentals necessary to install, inspect and maintain the barricades for the duration of the project.

Payment will be made under:

Item M-107-4.1	Low Profile Aviation Barricades - per linear foot.

END OF SECTION M-107

Item T-901
Seeding

DESCRIPTION

901-1.1 This item shall consist of soil preparation, seeding, fertilizing, and 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

Permanent Seed

Seed	Minimum Seed Purity (Percent)	Minimum Germination (Percent)	Rate of Application lb/acre (or lb/1,000 S.F.)
KY-31	97%	85%	200 lbs/acre

Temporary Seed

Seed	Rate of Application	Planting Dates
50/50 Mix Annual Rye & Cereal Rye	100 lbs/acre	Sept. 1-Feb. 15
Annual Ryegrass	100 lbs/acre	Feb. 16-Apr. 30
German Millet	50 lbs/acre	May 1-Aug. 31

Seeding shall be performed during the period between March 15 – May 15 and August 15 – October 15, inclusive, unless otherwise approved by the RPR.

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 mesh sieve and 50% will pass through a No. 100 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 2,000 lbs/ac. 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 10-20-10 commercial fertilizer and shall be spread at the rate of 1,000 lbs/acre for permanent seeding and 600 lbs/acre for temporary seeding.

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.

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 per acre measured on the ground surface, completed and accepted.

BASIS OF PAYMENT

901-5.1 Payment shall be made at the contract unit price per 1,000 square feet or fraction thereof, 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 901-5.1	Seeding - per acre

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
Topsoiling

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 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 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 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 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 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 of topsoil measured in the stockpile. Topsoil shall be measured by volume in cubic yards computed by the method of end areas.

905-4.2 Topsoil obtained off the site shall be measured by the number of cubic yards 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.

BASIS OF PAYMENT

905-5.1 Payment will be made at the contract unit price per cubic yard 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-905-5.1	Topsoil (Obtained off Site or Removed from Stockpile - 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 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 to provide a loose depth of not less than 1-1/2 inches nor more than 3 inches. 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 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 nor more than 2 inches.

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 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 per 1,000 square feet, or as directed by the RPR, with a minimum of 6 gallons and a maximum of 10 gallons per 1,000 square feet 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 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 per 1,000 square feet or as directed by the RPR, with a minimum of 6 gallons and a maximum of 10 gallons per 1,000 square feet 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 acres 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 acre 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 acre

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-108
Underground Power Cable for Airports

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

EQUIPMENT AND MATERIALS

108-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item 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. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. 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 electronically submitted in pdf format. The RPR reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of 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. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers

connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

108-2.2 Cable. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C, 5,000 volts, non-shielded, with ethylene propylene insulation. Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824 Type C, 5,000 volts, non-shielded, with ethylene propylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

108-2.3 Bare copper wire (counterpoise, bare copper wire ground and ground rods). Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6 AWG bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be solid stainless steel, copper or copper-clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 10 feet (2.54 m) long and 5/8 inch (16 mm) in diameter.

108-2.4 Cable connections. In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

a. The cast splice. A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3M™ Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

b. The field-attached plug-in splice. Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable.

c. The factory-molded plug-in splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

d. The taped or heat-shrink splice. Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

108-2.5 Splicer qualifications. Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the RPR proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

108-2.6 Concrete. Concrete shall be proportioned, placed, and cured per state department of transportation structural concrete with minimum 25% Type F fly ash, and a minimum allowable compressive strength of 4,000 psi (28 MPa).

108-2.7 Flowable backfill. Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

108-2.8 Cable identification tags. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

108-2.9 Tape. Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch (38 mm) wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

108-2.10 Electrical coating. Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

108-2.11 Existing circuits. Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall

be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

108-2.12 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

CONSTRUCTION METHODS

108-3.1 General. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the RPR or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet (1 m) of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot (30 cm) vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the RPR.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch (6 mm) in size. The cable circuit identification shall match the circuits noted on the construction plans.

108-3.2 Installation in duct banks or conduits. This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.3 Installation of direct-buried cable in trenches. Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide

strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.

Where cables must cross over each other, a minimum of 3 inches (75 mm) vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

a. Trenching. Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5, except as follows:

- When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches (91 cm) unless otherwise specified.
- Minimum cable depth when crossing under a railroad track, shall be 42 inches (1 m) unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches (150 mm). Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill material may alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

(2) Trenching, etc., in cable areas shall then proceed, with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

b. Backfilling. After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables ; be 3 inches (75 mm) deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. This layer shall not be compacted. The second layer shall be 5 inches (125 mm) deep, loose measurement, and shall contain no particles that would be retained on a one inch (25.0 mm) sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches (20 cm) of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches (100 mm) maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the RPR. If not shown on the plans, the warning tape shall be located 6 inches (150 mm) above the direct-buried cable or the counterpoise wire if present. A 3-6 inch (75 - 150 mm) wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 inches (200 mm) minimum below finished grade.

c. Restoration. Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the topsoiling, fertilizing, liming, seeding and mulching as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557. Restoration shall be considered incidental to the pay item of which it is a component part.

108-3.4 Cable markers for direct-buried cable. The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 inch (10 - 15 cm) thick, extending approximately one inch (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (61 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word “CABLE” and directional arrows on each cable marking slab. The letters shall be approximately 4 inches (100 mm) high and 3 inches (75 mm) wide, with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word “SPLICE” on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the RPR. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the RPR. Furnishing and installation of cable markers is incidental to the respective cable pay item.

108-3.5 Splicing. Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Cast splices. These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer's instructions and to the satisfaction of the RPR.

b. Field-attached plug-in splices. These shall be assembled per the manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

c. Factory-molded plug-in splices. These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

d. Taped or heat-shrink splices. A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer's instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminates prior to application.

e. Assembly. Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer's recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the

larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

108-3.6 Bare counterpoise wire installation for lightning protection and grounding. If shown on the plans or included in the job specifications, bare solid #6 AWG copper counterpoise wire shall be installed for lightning protection of the underground cables. The RPR shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

a. Equipotential. – The counterpoise size is as shown on the plans. The equipotential method is applicable to all airfield lighting systems; i.e. runway, taxiway, apron – touchdown zone, centerline, edge, threshold and approach lighting systems. The equipotential method is also successfully applied to provide lightning protection for power, signal and communication systems. The light bases, counterpoise, etc – all components - are bonded together and bonded to the vault power system ground loop/electrode.

Counterpoise wire shall be installed in the same trench for the entire length of buried cable, conduits and duct banks that are installed to contain airfield cables. The counterpoise is centered over the cable/conduit/duct to be protected.

The counterpoise conductor shall be installed no less than 8 inches (200 mm) minimum or 12 inches (300 mm) maximum above the raceway or cable to be protected, except as permitted below:

(1) The minimum counterpoise conductor height above the raceway or cable to be protected shall be permitted to be adjusted subject to coordination with the airfield lighting and pavement designs.

(2) The counterpoise conductor height above the protected raceway(s) or cable(s) shall be calculated to ensure that the raceway or cable is within a 45-degree area of protection, (45 degrees on each side of vertical creating a 90 degree angle).

The counterpoise conductor shall be bonded to each metallic light base, mounting stake, and metallic airfield lighting component.

All metallic airfield lighting components in the field circuit on the output side of the constant current regulator (CCR) or other power source shall be bonded to the airfield lighting counterpoise system.

All components rise and fall at the same potential; with no potential difference, no damaging arcing and no damaging current flow.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Equipotential Method of lightning protection.

Reference FAA STD-019E, Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment, Part 4.1.1.7.

b. Isolation – Counterpoise size is as shown on the plans. The isolation method is an alternate method for use only with edge lights installed in turf and stabilized soils and raceways installed parallel to and adjacent to the edge of the pavement. NFPA 780 uses 15 feet to define “adjacent to”.

The counterpoise conductor shall be installed halfway between the pavement edge and the light base, mounting stake, raceway, or cable being protected.

The counterpoise conductor shall be installed 8 inches (203 mm) minimum below grade. The counterpoise is not connected to the light base or mounting stake. An additional grounding electrode is required at each light base or mounting stake. The grounding electrode is bonded to the light base or mounting stake with a 6 AWG solid copper conductor.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Isolation Method of lightning protection.

c. Common Installation requirements. When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

When a nonmetallic light base is used, the grounding electrode shall be bonded to the metallic light fixture or metallic base plate with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (150 m) apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

d. Parallel Voltage Systems. Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

108-3.7 Counterpoise installation above multiple conduits and duct banks. Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

108-3.8 Counterpoise installation at existing duct banks. When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

108-3.9 Exothermic bonding. Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

a. All slag shall be removed from welds.

b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

108-3.10 Testing. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

a. Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the RPR. All such testing shall be at the sole expense of the Contractor.

b. Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The RPR shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the RPR the following:

c. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

d. That all affected circuits (existing and new) are free from unspecified grounds.

e. That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than 30 megohms. Verify continuity of all series airfield lighting circuits prior to energization.

f. That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.

g. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

h. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

i. That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and

Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the RPR. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved "repair" procedures for items that have failed testing other than complete replacement.

METHOD OF MEASUREMENT

108-4.1 No separate pay item for trenching.

108-4.2 Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet (meters) installed and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item shall include additional quantities required for slack.

108-4.3 No separate payment will be made for ground rods.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the RPR. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

Item L-108-5.1	No. 8 AWG 5 kV L-824, Type C Cable, Installed in Trench, Duct Bank or Conduit - per liner foot (meter)
Item L-108-5.3	No. 6 AWG, Solid, Bare Copper Counterpoise Wire, Installed Above the Duct Bank or Conduit Including Connections/Terminations - per linear foot (meter)

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 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
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 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description

A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)
A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic

ASTM International (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes

Mil Spec

MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical
MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems

American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Federal Aviation Administration Standard

FAA STD-019E	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

END OF ITEM L-108

Item L-109

Airport Transformer Vault and Vault Equipment

109-1.1 This item shall consist of removing existing airport vault equipment per these specifications and per the design and dimensions shown in the plans. This work shall also include the installation of conduits in the floor and foundation, painting and lighting of the vault or metal housing, and the furnishing of all incidentals that are necessary to produce a completed unit. Included as a separate part under this item or as a separate item where an existing vault is to be used shall be the furnishing of all vault equipment, wiring, electrical buses, cable, conduit, potheads, and grounding systems. This work shall also include the painting of equipment and conduit; the marking and labeling of equipment and the labeling or tagging of wires; the testing of the installation; and the furnishing of all incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

109-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be certified in AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP) and listed in the ALECP Addendum.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item 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. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. 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 provided in electronic pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

f. 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.

CONSTRUCTION OF VAULT AND PREFABRICATED METAL HOUSING

109-3.1 Electrical vault building. The electrical vault building must comply with NEC Article 110.31, Enclosure for Electrical Installations, Item (A) Electrical Vaults. Construct the building of materials having adequate structural strength for the conditions and installed location, has a minimum fire rating of two or three hours as determined by the authority having jurisdiction (AHJ), and is bullet resistant to minimum UL 752 Level 4.

109-3.2 Concrete. Concrete shall be proportioned, placed, and cured per state department of transportation structural concrete with minimum 25% Type F fly ash, and a minimum allowable compressive strength of 4,000 psi (28 MPa).

109-3.3 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

109-3.4 Reinforcing steel. Reinforcing steel bars shall be intermediate or structural grade deformed-type bars and shall be per ASTM A615.

109-3.5 Brick. Brick shall be per ASTM C62, Grade SW.

109-3.6 Rigid steel conduit. Rigid steel conduit and fittings shall be per Underwriters Laboratories Standards 6 and 514B.

109-3.7 Plastic Conduit and fittings. Plastic Conduit and fittings shall conform to the requirements of UL-651 and UL-654 schedule 40 polyvinyl chloride (PVC) suitable for use above or below ground.

109-3.8 Lighting. Vault or metal-housing light fixtures shall be of a vapor-proof type.

109-3.9 Outlets. Convenience outlets shall be heavy-duty duplex units designed for industrial service.

109-3.10 Switches. Vault or metal-housing light switches shall be single-pole switches.

109-3.11 Paint.

a. Priming paint for non-galvanized metal surfaces shall be a high solids alkyd primer compatible with the manufacturer's recommendations for the intermediate or topcoat.

b. White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint conforming to the Master Painter's Institute (MPI), Reference #9, Exterior Alkyd, Gloss.

c. Priming paint for wood surfaces shall be mixed on the job by thinning the specified white paint by adding 1/2 pint (0.24 liter) of raw linseed oil to each gallon (liter).

d. Paint for the floor, ceiling, and inside walls shall be per Porter Paint Company 69, 71, and 79 or equivalent. Walls and ceiling shall be light gray and the floor shall be medium gray.

e. The roof coating shall be hot asphalt material per ASTM D2823. Asbestos-free roof coating per ASTM D4479 may be substituted if required by local codes.

109-3.12 Ground bus. Ground bus shall be 1/8 × 3/4 inch (3 × 19 mm) minimum copper bus bar.

109-3.13 Square duct. Duct shall be square similar to that manufactured by the Square D Company (or equivalent), or the Trumbull Electric Manufacturing Company (or equivalent). The entire front of the duct on each section shall consist of hinged or removable cover for ready access to the interior. The cross-section of the duct shall be not less than 4 × 4 inch (100 × 100 mm) except where otherwise shown in the plans.

109-3.14 Ground rods. Ground rods shall be in accordance with Item L-108.

109-3.15 Vault prefabricated metal housing. The prefabricated metal housing shall be a commercially available unit.

109-3.16 FAA-approved equipment. Certain items of airport lighting equipment installed in vaults are covered by individual ACs listed below:

AC 150/5345-3	Specification for L-821, Panels for Remote Control of Airport Lighting
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Specification for Constant Current Regulators and Regulator Monitors
AC 150/5345-13	Specification for L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits.
AC 150/5345-49	Specification for L-854, Radio Control Equipment
AC 150/5345-56	Specification for L-890 Airport Lighting Control and Monitoring System (ALCMS)

109-3.17 Other electrical equipment. Distribution transformers, oil switches, cutouts, relays, terminal blocks, transfer relays, circuit breakers, and all other regularly used commercial items of electrical equipment not covered by FAA equipment specifications and ACs shall conform to the applicable rulings and standards of the Institute of Electrical and Electronic Engineers (IEEE) or the National Electrical Manufacturers Association (NEMA). When specified, test reports from a testing laboratory indicating that the equipment meets the specifications shall be supplied. In all cases, equipment shall be new and a first-grade product. This equipment shall be supplied in the quantities required for the specific project and shall incorporate the electrical and mechanical characteristics specified in the proposal and plans. Equipment selected and installed by the Contractor shall maintain the interrupting current rating of the existing systems or specified rating whichever is greater.

109-3.18 Wire. Wire (in conduit) rated up to 5,000 volts shall be per AC 150/5345-7, Specification for L-824 Underground Electrical Cables for Airport Lighting Circuits. For ratings up to 600 volts, moisture and heat resistant thermoplastic wire conforming to Commercial Item Description A-A-59544A Type THWN-2 shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal.

a. Control circuits. Unless otherwise indicated on the plans, wire shall be not less than No. 12 American wire gauge (AWG) and shall be insulated for 600 volts. If telephone control cable is specified, No. 19 AWG telephone cable per ANSI/Insulated Cable Engineers Association (ICEA) S-85-625 specifications shall be used.

b. Power circuits.

(1) 600 volts maximum – Wire shall be No. 6 AWG or larger and insulated for at least 600 volts.

(2) 3,000 volts maximum – Wire shall be No. 6 AWG or larger and insulated for at least 3,000 volts.

(3) Over 3,000 volts-Wire shall be No. 6 AWG or larger and insulated for at least the circuit voltage.

109-3.19 Short circuit / coordination / device evaluation / arc flash analysis. The Contractor shall, based upon the equipment provided, include as a part of the submittal process the electrical system "Short Circuit / Coordination / Device evaluation / Arc Flash Analysis". The analysis shall be performed by the equipment manufacturer and submitted in a written report. The analysis shall be signed and sealed by a registered professional Engineer from the state in which the project is located. The analysis shall comply with NFPA-70E and IEEE 1584.

The analysis will include: one line diagrams, short circuit analysis, coordination analysis, equipment evaluation, arc flash analysis and arc flash labels containing at a minimum, equipment name, voltage/current rating, available incident energy and flash protection boundary.

The selected firms field service Engineer shall perform data gathering for analysis completion and device settings, perform device setting as recommended by the analysis and will furnish and install the arc flash labels. The components worst case incident energy will be considered the available arc flash energy at that specific point in the system. Submit three written copies and one electronic copy of the report.

CONSTRUCTION METHODS

CONSTRUCTION OF VAULT AND PREFABRICATED METAL HOUSING

109-4.1 General. The Contractor shall construct the transformer vault or prefabricated metal housing at the location indicated in the plans. Vault construction shall be reinforced concrete, concrete masonry, or brick wall as specified. The metal housing shall be prefabricated equipment enclosure to be supplied in the size specified. The mounting pad or floor details, installation methods, and equipment placement are shown in the plans. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another engineer approved third party certification program.

The Contractor shall clear, grade, and seed the area around the vault or metal housing for a minimum distance of 10 feet (3 m) on all sides. The slope shall be not less than 1/2 inch per foot (12 mm per 0.3 m) away from the vault or metal housing in all directions.

The vault shall provide adequate protection against weather elements, including rain, wind-driven dust, snow, ice and excessive heat. The vault shall have sufficient filtered ventilation, to assure that the interior room temperatures and conditions do not exceed the recommended limits of the electrical equipment to be installed in the vault. The Contractor is responsible for contacting the manufacturer of the equipment to be installed to obtain environmental limitations of the equipment to be installed.

109-4.2 Foundation and walls.

a. Reinforced concrete construction. The Contractor shall construct the foundation and walls per the details shown in the plans. Unless otherwise specified, internal ties shall be of the mechanical type so that when the forms are removed the ends of the ties shall be at least one inch (25 mm) beneath the concrete surface; the holes shall be plugged and finished to prevent discoloration. Reinforcing steel shall be placed, as shown in the drawings, and secured in position to prevent displacement during the concrete placement.

The external surfaces of the concrete shall be thoroughly worked during the placing operation to force all coarse aggregate from the surface. Thoroughly work the mortar against the forms to produce a smooth finish free from air pockets and honeycomb.

The surface film of all pointed surfaces shall be removed before setting occurs. As soon as the pointing has set sufficiently, the entire surface inside and outside of the vault shall be thoroughly wet with water and rubbed with a No. 16 carborundum stone, or equivalent quality abrasive, bringing the surface to a paste. All form marks and projections shall be removed. The surface produced shall be smooth and dense without pits or irregularities. The materials which have been ground into a paste during the rubbing process shall be spread or brushed uniformly over the entire surface (except the interior surfaces that are to be painted shall have all paste removed by washing before painting) and permitted to reset. Final exterior finish shall be obtained by rubbing with No. 30 carborundum stone, or an equivalent quality abrasive. The surface shall be rubbed until the entire surface is smooth and uniform in color.

b. Brick and concrete construction. When this type of construction is specified, the foundation shall be concrete conforming to the details shown in the plans. The outer edge of the foundation at the floor level shall be beveled 1-1/2 inches (38 mm) at 45 degrees. Brick walls shall be 8 inches (200 mm) thick, laid in running bond with every sixth course a header course. Brick shall be laid in cement mortar (one part masonry cement and 3 parts sand) with full mortar bed and shoved joints. All joints shall be completely filled with mortar, and facing brick shall be back-parged with mortar as work progresses. All joints shall be 3/8 inch (9 mm) thick, exterior joints tooled concave, and interior joints struck flush. Both interior and exterior brick surfaces shall be cleaned and nail holes, cracks and other defects filled with mortar. When specified, a nonfading mineral pigment mortar coloring shall be added to the mortar. Steel reinforcing bars, 3/8 inch (9 mm) in diameter and 12 inches (300 mm) long, shall be set vertically in the center of the brick wall on not more than 2 feet (60 cm) centers to project 2-1/2 inches (60 mm) into the concrete roof slab. Lintels for supporting the brickwork over doors, windows, and louvers shall consist of two $4 \times 3 \times 3/8$ inch ($100 \times 75 \times 9$ mm) steel angles. Lintels shall be painted with one coat of corrosion-inhibiting primer before installation, and all exposed parts shall be painted similar to doors and window sash after installation.

Window sills may be concrete poured in place or precast concrete as indicated in the plans. All exposed surfaces shall have a rubbed finish as specified under reinforced concrete construction. After completion, all interior and exterior faces of walls shall be scrubbed with a solution of muriatic acid and water in the proportions of not less than one part acid to 10 parts of water. All traces of efflorescence, loose mortar, and mortar stain shall be removed, and the walls washed down with clear water.

c. Concrete masonry construction. When this type of construction is specified, the foundation shall be concrete conforming to the details shown in the plans. The concrete masonry units shall be standard sizes and shapes and shall conform to ASTM C90 and shall include the closures, jambs, and other shapes required by the construction as shown in the plans. Standard construction practice shall be followed for this type of work including mortar, joints, reinforcing steel for extensions into roof slab, etc. Plaster for interior walls, if specified, shall be Portland cement plaster.

109-4.3 Roof. The roof shall be reinforced concrete as shown in the plans. Reinforcing steel shall be placed as shown in the drawing and secured in position to prevent displacement during the pouring of the concrete. The concrete shall be poured monolithically and shall be free of honeycombs and voids. The surface shall have a steel-troweled finish and shall be sloped as shown in the drawing. The underside of the roof slab shall be finished in the same manner as specified for walls.

One brush or mop coat of hot asphalt roof coating shall be applied to the top surface of the roof slab. The asphalt material shall be heated to within the range specified by the manufacturer and immediately applied to the roof. The finished coat shall be continuous over the roof surface and

free from holidays and blisters. Smears and dribbles of asphalt on the roof edges and building walls shall be removed.

109-4.4 Floor. Construct building foundation in accordance with the details shown in the plans. The floor shall be reinforced concrete as shown in the drawings. When present, all sod, roots, refuse, and other perishable material shall be removed from the area under the floor to a depth of 8 inches (200 mm), unless a greater depth is specified in the invitation for bids. This area shall be backfilled with materials consisting of sand, cinders, gravel, or stone. Fill shall be placed in layers not to exceed 4 inches (100 mm) and shall be thoroughly compacted by tamping or rolling. A layer of building paper shall be placed over the fill prior to placing concrete. The floor surfaces shall have a steel-troweled finish. The floor shall be level unless a drain is specified, in which case the floor shall be pitched 1/4 inch (6 mm) per foot downward toward the drain. A 1/4-inch (6-mm) asphalt felt expansion joint shall be placed between floor and foundation walls. The floor shall be poured monolithically and shall be free of honeycombs and voids.

109-4.5 Floor drain. If shown in the plans, a floor drain and dry well shall be installed in the center of the floor of the equipment room. The dry well shall be excavated 4 × 4 feet (1.2 × 1.2 m) square and to a depth of 4 feet (1.2 m) below the finished floor elevation and shall be backfilled to the elevation of the underside of the floor with gravel - which shall all pass a 2-inch (50 mm) mesh sieve and shall all be retained on a 1/4-inch (6.3 mm) mesh sieve. The gravel backfill shall be placed in 6 inch (150 mm) maximum layers, and the entire surface of each layer shall be tamped either with a mechanical tamper or with a hand tamper weighing not less than 25 pounds (11 kg) and having a face area of not more than 36 square inches (232 square cm) nor less than 16 square inches (103 square cm). The drain inlet shall be set flush in the concrete floor. The drain shall have a clear opening of not less than 8 inches (200 mm) in diameter.

109-4.6 Conduits in floor and foundation. Conduits shall be installed in the floor and through the foundation walls per the details shown in the plans. All underground conduit shall be painted with an asphalt compound. Conduit shall be installed with a coupling or metal conduit adapter flush with the top of the floor. All incoming conduit shall be closed with a pipe plug to prevent the entrance of foreign material during construction. Space conduit entrances shall be left closed.

109-4.7 Doors. Doors shall be metal-clad fireproof Class A (three (3) hour rated) doors conforming to requirements of the National Electrical Code (NEC) and local electrical codes. Panic bar exit hardware shall be installed per NEC requirements. Refer to the new electrical vault detail plan sheets for construction requirements.

109-4.8 Painting. The floor, ceiling, and inside walls of concrete construction shall first be given a hardening treatment, after which the Contractor shall apply two coats of paint as specified below, except that interior face brick walls need not be painted. The hardening treatment shall consist of applying two coats of either a commercial floor hardener or a solution made by dissolving 2 pounds (0.9 kg) of magnesium fluorosilicate or zinc sulfate crystals in one gallon (liter) of water. Each coat shall be allowed to dry at least 48 hours before the next application. After the second treating coat has dried, the surfaces shall be brushed clean of all crystals and thoroughly washed with clear water. Paint for walls and ceiling shall be a light gray color approved by the RPR. The floor paint shall be a medium gray color approved by the RPR. Before painting, the surfaces shall be dry and clean. The first coat shall be thinned by adding 2/3-quart (0.63 liters) of spar varnish and 1/3-quart (0.31 liters) of turpentine to each gallon (liter) of paint. The second coat shall be applied without thinning. All doors, lintels, and windows shall be cleaned to remove any rust or foreign material and shall be given one body and one finish coat of white paint. Bare metal surfaces shall be given a prime coat of corrosion-inhibiting primer prior to the body and finish coats.

109-4.9 Lights and switches. The Contractor shall furnish and install a minimum of two duplex convenience outlets in the vault room. Where a control room is specified, at least two duplex outlets shall be installed.

INSTALLATION OF EQUIPMENT IN VAULT OR PREFABRICATED METAL HOUSING

109-5.1 General. The Contractor shall furnish, install, and connect all equipment, equipment accessories, conduit, cables, wires, buses, grounds, and support necessary to ensure a complete and operable electrical distribution center for the airport lighting system as specified herein and shown in the plans. When specified, an emergency power supply and transfer switch shall be provided and installed.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and local code agency having jurisdiction. All electrical work shall comply with the NEC and local code agency having jurisdiction including the separation of under 600V work from 5,000V work."

109-5.2 Power supply equipment. Transformers, regulators, booster transformers, and other power supply equipment items shall be furnished and installed at the location shown in the plans or as directed by the RPR. The power supply equipment shall be set on steel "H" sections, "I" beams, channels, or concrete blocks to provide a minimum space of 1-1/2 inch (38 mm) between the equipment and the floor. The equipment shall be placed so as not to obstruct the oil-sampling plugs of the oil-filled units; and name-plates shall, so far as possible, not be obscured.

If specified in the plans and specifications, equipment for an alternate power source or an emergency power generator shall be furnished and installed. The alternate power supply installation shall include all equipment, accessories, an automatic changeover switch, and all necessary wiring and connections. The emergency power generator set shall be the size and type specified.

109-5.3 Switchgear and panels. Oil switches, fused cutouts, relays, transfer switches, panels, panel boards, and other similar items shall be furnished and installed at the location shown in the plans or as directed by the RPR. Wall or ceiling mounted items shall be attached to the wall or ceiling with galvanized bolts of not less than 3/8-inch (9 mm) diameter engaging metal expansion shields or anchors in masonry or concrete vaults.

109-5.4 Duct and conduit. The Contractor shall furnish and install square-type exposed metallic ducts with hinged covers for the control circuits in the vault. These shall be mounted along the walls behind all floor-mounted equipment and immediately below all wall-mounted equipment. The hinged covers shall be placed to open from the front side with the hinges at the front bottom.

Wall brackets for square ducts shall be installed at all joints 2 feet (60 cm) or more apart with intermediate brackets as specified. Conduit shall be used between square ducts and equipment or between different items of equipment when the equipment is designed for conduit connection. When the equipment is not designed for conduit connection, conductors shall enter the square-type control duct through insulating bushings in the duct or on the conduit risers.

109-5.5 Wiring and connections. The Contractor shall make all necessary electrical connections in the vault per the wiring diagrams furnished and as directed by the RPR. In wiring to the terminal blocks, the Contractor shall leave sufficient extra length on each control lead to make future changes in connections at the terminal block. This shall be accomplished by running each control lead the longest way around the box to the proper terminal. Leads shall be neatly laced in place.

109-5.6 Marking and labeling. All equipment, control wires, terminal blocks, etc., shall be tagged, marked, or labeled as specified below:

a. Wire identification. The Contractor shall furnish and install self-sticking wire labels or identifying tags on all control wires at the point where they connect to the control equipment or to the terminal blocks. Wire labels, if used, shall be of the self-sticking preprinted type and of the manufacturer's recommended size for the wire involved. Identification -markings designated in the plans shall be followed. Tags, if used, shall be of fiber not less than 3/4 inch (19 mm) in diameter and not less than 1/32 inch (1 mm) thick. Identification markings designated in the plans shall be stamped on tags by means of small tool dies. Each tag shall be securely tied to the proper wire by a nonmetallic cord.

b. Labels. The Contractor shall stencil identifying labels on the cases of regulators, breakers, and distribution and control relay cases with white oil paint as designated by the RPR. The letters and numerals shall be not less than one inch (25 mm) in height and shall be of proportionate width. The Contractor shall also mark the correct circuit designations per the wiring diagram on the terminal marking strips, which are a part of each terminal block.

METHOD OF MEASUREMENT

109-6.1 The quantity of equipment to be paid for under this item shall consist of all equipment installed, connected, and accepted as a complete unit ready for operation within an existing vault or prefabricated metal housing.

BASIS OF PAYMENT

109-7.1 Payment will be made at the contract unit price for each completed and accepted vault or prefabricated metal housing equipment installation. This price shall 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 the item.

Payment will be made under:

Item L-109-7.1	[Size] L-829, Ferroresonant Constant Current Regulator 3-Step - 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 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-3	Specification for L-821, Panels for Remote Control of Airport Lighting
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Specification for Constant Current Regulators and Regulator Monitors
AC 150/5345-13	Specification for L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits
AC 150/5345-49	Specification L-854, Radio Control Equipment;

AC 150/5345-53	Airport Lighting Equipment Certification Program

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/ICEA S-85-625	Standard for Telecommunications Cable Aircore, Polyolefin Insulated, Copper Conductor Technical Requirements

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C62	Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C90	Standard Specification for Loadbearing Concrete Masonry Units
ASTM D2823	Standard Specification for Asphalt Roof Coatings, Asbestos Containing
ASTM D4479	Standard Specification for Asphalt Roof Coatings – Asbestos-Free

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation) Institute of Electrical and Electronic Engineers (IEEE)
IEEE 1584	Guide for Performing Arc-Flash Hazard Calculations

Master Painter's Institute (MPI)

MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit – Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-70E	Standard for Electrical Safety in the Workplace
NFPA-780	Standard for the Installation of Lightning Protection Systems

END OF ITEM L-109

Item L-110

Airport Underground Electrical Duct Banks and Conduits

DESCRIPTION

110-1.1 This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

EQUIPMENT AND MATERIALS

110-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per 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, that comply with these specifications, at the Contractor's cost.

c. All materials and equipment used to construct this item 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. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify 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 made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue 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 electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

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.

110-2.2 Steel conduit. Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

110-2.3 Plastic conduit. Plastic conduit and fittings-shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

a. Type I–Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.

b. Type II–Schedule 40 PVC suitable for either above ground or underground use.

c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.

d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

110-2.4 Split conduit. Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

110-2.5 Conduit spacers. Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

110-2.6 Concrete. Concrete shall be proportioned, placed, and cured per state department of transportation structural concrete with minimum 25% Type F fly ash, and a minimum allowable compressive strength of 4,000 psi (28 MPa).

110-2.7 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

110-2.8 Flowable backfill. Flowable material used to back fill conduit and duct bank trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

110-2.9 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber

optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item.

CONSTRUCTION METHODS

110-3.1 General. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill may alternatively be used

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the RPR, the unsuitable material shall be removed and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the RPR.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the RPR to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the RPR and compacted to 95 percent of the maximum density as determined by ASTM D698 as noted in the project plans.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables) cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

b. Trenching, etc., in cable areas shall then proceed with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

110-3.2 Duct banks. Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches (0.5 m) below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet (1 m) beyond the edges of the pavement or 3 feet (1 m) beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches (75 mm) thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches (75 mm) apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches (75 mm) thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot (1.5-m) intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches (75 to 150 mm) wide tape, 8 inches (200 mm) minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch (75-mm) wide tape only for single conduit runs. Utilize the 6-inch (150-mm) wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches (600 mm) in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the RPR shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the RPR.

110-3.3 Conduits without concrete encasement. Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The

bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and lot less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

110-3.4 Markers. The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word "DUCT" or "CONDUIT" on each marker slab. Impression of letters shall be done in a manner, approved by the RPR, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the RPR. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the RPR. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

110-3.5 Backfilling for conduits. For conduits, 8 inches (200 mm) of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted to 95 percent of the maximum density as determined by ASTM D698 as noted in the project plans except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.6 Backfilling for duct banks. After the concrete has cured, the remaining trench shall be backfilled and compacted to 95 percent of the maximum density as determined by ASTM D698-as noted in the project plans except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of the plans, where duct banks are installed under pavement, one moisture/density test per lift shall be made for each 250 linear feet (76 m) of duct bank or one work period's construction, whichever is less.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.7 Restoration. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include topsoiling, fertilizing, liming, seeding, and mulching shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

110-3.8 Ownership of removed cable. Removed cable shall become the property of the Contractor.

METHOD OF MEASUREMENT

110-4.1 Underground conduits and duct banks shall be measured by the linear feet (meter) of conduits and duct banks installed, including encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, 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 per the provisions and intent of the plans and specifications.

Payment will be made under:

Item L-110-5.1	**[** Size**] [**Type **]** Electrical Conduit - per linear foot (meter)

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 Circular (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

END OF ITEM L-110

Item L-115

Electrical Manholes and Junction Structures

DESCRIPTION

115-1.1 This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the RPR. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

115-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

c. All materials and equipment used to construct this item 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. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue 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 electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

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 the date of 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.

115-2.2 Concrete structures. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures. Cast-in-place concrete structures shall be as shown on the plans.

115-2.3 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another engineer

approved third party certification program. Provide precast concrete structures where shown on the plans.

Precast concrete structures shall be an approved standard design of the manufacturer. Precast units shall have mortar or bitumastic sealer placed between all joints to make them watertight. The structure shall be designed to withstand a 75,000 lb aircraft load, unless otherwise shown on the plans. Openings or knockouts shall be provided in the structure as detailed on the plans.

Threaded inserts and pulling eyes shall be cast in as shown on the plans.

If the Contractor chooses to propose a different structural design, signed and sealed shop drawings, design calculations, and other information requested by the RPR shall be submitted by the Contractor to allow for a full evaluation by the RPR. The RPR shall review per the process defined in the General Provisions.

115-2.4 Junction boxes. Junction boxes shall be L-867 Class 1 (non-load bearing) or L-868 Class 1 (load bearing) airport light bases that are encased in concrete. The light bases shall have a L-894 blank cover, gasket, and stainless steel hardware. All bolts, studs, nuts, lock washers, and other similar fasteners used for the light fixture assemblies must be fabricated from 316L (equivalent to EN 1.4404), 18-8, 410, or 416 stainless steel. If 18-8, 410, or 416 stainless steel is utilized it shall be passivated and be free from any discoloration. Covers shall be 3/8-inch (9-mm) thickness for L-867 and 3/4-inch (19-mm) thickness for L-868. All junction boxes shall be provided with both internal and external ground lugs.

115-2.5 Mortar. The mortar shall be composed of one part of cement and two parts of mortar sand, by volume. The cement shall be per the requirements in ASTM C150, Type I. The sand shall be per the requirements in ASTM C144. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15% of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C206. Water shall be potable, reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product.

115-2.6 Concrete. All concrete used in structures shall conform to the requirements of Item P-610, Concrete for Miscellaneous Structures.

115-2.7 Frames and covers. The frames shall conform to one of the following requirements:

a. ASTM A48 Gray iron castings

b. ASTM A47 Malleable iron castings

c. ASTM A27 Steel castings

d. ASTM A283, Grade D Structural steel for grates and frames

e. ASTM A536 Ductile iron castings

f. ASTM A897 Austempered ductile iron castings

All castings specified shall withstand a maximum tire pressure of 200 psi and maximum load of 75,000 lbs.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings specified.

Each frame and cover unit shall be provided with fastening members to prevent it from being dislodged by traffic, but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

Each cover shall have the word “ELECTRIC” or other approved designation cast on it. Each frame and cover shall be as shown on the plans or approved equivalent. No cable notches are required.

Each manhole shall be provided with a “DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER” safety warning sign as detailed in the Contract Documents and in accordance with OSHA 1910.146 (c)(2).

115-2.8 Ladders. Ladders, if specified, shall be galvanized steel or as shown on the plans.

115-2.9 Reinforcing steel. All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A615, Grade 60.

115-2.10 Bedding/special backfill. Bedding or special backfill shall be as shown on the plans.

115-2.11 Flowable backfill. Flowable material used to backfill shall conform to the requirements of Item P-153, Controlled Low Strength Material.

115-2.12 Cable trays. Cable trays shall be of galvanized steel. Cable trays shall be located as shown on the plans.

115-2.13 Plastic conduit. Plastic conduit shall comply with Item L-110, Airport Underground Electrical Duct Banks and Conduits.

115-2.14 Conduit terminators. Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

115-2.15 Pulling-in irons. Pulling-in irons shall be manufactured with 7/8-inch (22 mm) diameter hot-dipped galvanized steel or stress-relieved carbon steel roping designed for concrete applications (7 strand, 1/2-inch (12 mm) diameter with an ultimate strength of 270,000 psi (1862 MPa)). Where stress-relieved carbon steel roping is used, a rustproof sleeve shall be installed at the hooking point and all exposed surfaces shall be encapsulated with a polyester coating to prevent corrosion.

115-2.16 Ground rods. Ground rods shall be one piece, solid stainless steel, copper or copper clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 8 feet (2.4 m) long nor less than 5/8 inch (16 mm) in diameter.

CONSTRUCTION METHODS

115-3.1 Unclassified excavation. It is the Contractor’s responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the RPR without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to Item L-115. Dewatering necessary for structure installation and erosion per federal, state, and local requirements is incidental to Item L-115.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the RPR. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the RPR. Structures shall be placed after the RPR has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches (150 mm) of sand or a material approved by the RPR as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

115-3.2 Concrete structures. Concrete structures shall be built on prepared foundations conforming to the dimensions and form indicated on the plans. The concrete and construction methods shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the RPR before the concrete is placed.

115-3.3 Precast unit installations. Precast units shall be installed plumb and true. Joints shall be made watertight by use of sealant at each tongue-and-groove joint and at roof of manhole. Excess sealant shall be removed and severe surface projections on exterior of neck shall be removed.

115-3.4 Placement and treatment of castings, frames and fittings. All castings, frames and fittings shall be placed in the positions indicated on the Plans or as directed by the RPR and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

Field connections shall be made with bolts, unless indicated otherwise. Welding will not be permitted unless shown otherwise on the approved shop drawings and written approval is granted by the casting manufacturer. Erection equipment shall be suitable and safe for the workman. Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and fitting of parts shall be reported immediately to the RPR and approval of the method of correction shall be obtained. Approved corrections shall be made at Contractor's expense.

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.

Pulling-in irons shall be located opposite all conduit entrances into structures to provide a strong, convenient attachment for pulling-in blocks when installing cables. Pulling-in irons shall be set directly into the concrete walls of the structure.

115-3.5 Installation of ladders. Ladders shall be installed such that they may be removed if necessary. Mounting brackets shall be supplied top and bottom and shall be cast in place during fabrication of the structure or drilled and grouted in place after erection of the structure.

115-3.6 Removal of sheeting and bracing. In general, all sheeting and bracing used to support the sides of trenches or other open excavations shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a structure

shall be withdrawn, unless otherwise directed, before more than 6 inches (150 mm) of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

The RPR may direct the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

115-3.7 Backfilling. After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches (150 mm) in thickness measured after compaction to the density requirements in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

Backfill shall not be placed against any structure until approval is given by the RPR. In the case of concrete, such approval shall not be given until tests made by the laboratory under supervision of the RPR establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Where required, the RPR may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to conduits, duct banks, structures, property or persons due to improper placing or compacting of backfill.

115-3.8 Connection of duct banks. To relieve stress of joint between concrete-encased duct banks and structure walls, reinforcement rods shall be placed in the structure wall and shall be formed and tied into duct bank reinforcement at the time the duct bank is installed.

115-3.9 Grounding. A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches (150 mm) above the floor. The ground rod shall be installed within one foot (30 cm) of a corner of the concrete structure. Ground rods shall be installed prior to casting the bottom slab. Where the soil condition does not permit driving the ground rod into the earth without damage to the ground rod, the Contractor shall drill a 4-inch (100 mm) diameter hole into the earth to receive the ground rod. The hole around the ground rod shall be filled throughout its length, below slab, with Portland cement grout. Ground rods shall be installed in precast bottom slab of structures by drilling a hole through bottom slab and installing the ground rod. Bottom slab penetration shall be sealed watertight with Portland cement grout around the ground rod.

A grounding bus of 4/0 bare stranded copper shall be exothermically bonded to the ground rod and loop the concrete structure walls. The ground bus shall be a minimum of one foot (30 cm) above the floor of the structure and separate from other cables. No. 2 American wire gauge (AWG) bare copper pigtails shall bond the grounding bus to all cable trays and other metal hardware within the concrete structure. Connections to the grounding bus shall be exothermic. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. Hardware connections may be mechanical, using a lug designed for that purpose.

115-3.10 Cleanup and repair. After erection of all galvanized items, damaged areas shall be repaired by applying a liquid cold-galvanizing compound per MIL-P-21035. Surfaces shall be prepared and compound applied per the manufacturer's recommendations.

Prior to acceptance, the entire structure shall be cleaned of all dirt and debris.

115-3.11 Restoration. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent

to or better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective Item L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

Areas with special surface treatment, such as roads, sidewalks, or other paved areas shall have backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

115-3.12 Inspection. Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test per American National Standards Institute / Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.

115-3.13 Manhole elevation adjustments. The Contractor shall adjust the tops of existing manholes in areas designated in the Contract Documents to the new elevations shown. The Contractor shall be responsible for determining the exact height adjustment required to raise or lower the top of each manhole to the new elevations. The existing top elevation of each manhole to be adjusted shall be determined in the field and subtracted/added from the proposed top elevation.

The Contractor shall remove/extend the existing top section or ring and cover on the manhole structure or manhole access. The Contractor shall install precast concrete sections or grade rings of the required dimensions to adjust the manhole top to the new proposed elevation or shall cut the existing manhole walls to shorten the existing structure, as required by final grades. The Contractor shall reinstall the manhole top section or ring and cover on top and check the new top elevation.

The Contractor shall construct a concrete slab around the top of adjusted structures located in graded areas that are not to be paved. The concrete slab shall conform to the dimensions shown on the plans.

115-3.14 Duct extension to existing ducts. Where existing concrete encased ducts are to be extended, the duct extension shall be concrete encased plastic conduit. The fittings to connect the ducts together shall be standard manufactured connectors designed and approved for the purpose. The duct extensions shall be installed according to the concrete encased duct detail and as shown on the plans.

METHOD OF MEASUREMENT

115-4.1 Electrical manholes, junction structures, and blank covers shall be measured by each unit completed in place and accepted. The following items shall be included in the price of each unit: All required excavation and dewatering:; sheeting and bracing; all required backfilling with on-site

materials; restoration of all surfaces and finished grading and turfing; all required connections; temporary cables and connections; and ground rod testing

115-4.2 Electrical structure elevation adjustments shall be measured by the completed unit installed, in place, completed, and accepted. Separate measurement shall not be made for the various types and sizes.

BASIS OF PAYMENT

115-5.1 The accepted quantity of electrical manholes, junction structures, and blank covers will be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials, furnishing and installation of appurtenances and connections to duct banks and other structures as may be required to complete the item as shown on the plans and for all labor, equipment, tools and incidentals necessary to complete the structure.

115-5.2 Payment shall be made at the contract unit price for electrical structure elevation adjustments. This price shall 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, including but not limited to, spacers, concrete, rebar, dewatering, excavating, backfill, topsoil, sodding and pavement restoration, where required, to complete this item as shown in the plans and to the satisfaction of the RPR.

Payment will be made under:

Item L-115-5.3	Electrical Handhole **[**Size and Type**]** – 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.

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Advisory Circular (AC)

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 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation)

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application

ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C206	Standard Specification for Finishing Hydrated Lime

FAA Engineering Brief (EB)

EB #83	In Pavement Light Fixture Bolts

Mil Spec

MIL-P-21035	Paint High Zinc Dust Content, Galvanizing Repair

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

END OF ITEM L-115

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. All LED light fixtures, with the exception of obstruction lighting (AC 150/5345-43) must be warranted by the manufacturer for a minimum of 4 years after date of installation inclusive of all electronics.

EQUIPMENT AND MATERIALS

125-2.2 Conduit/Duct. Conduit shall conform to Specification Item L-110 Airport Underground Electrical Duct Banks and Conduits.

125-2.3 Cable and Counterpoise. Cable and Counterpoise shall conform to Item L-108 Underground Power Cable for Airports.

125-2.4 Tape. 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. Cable Connections shall conform to Item L-108 Installation of Underground Cable for Airports.

125-2.6 Retroreflective Markers. Not required.

125-2.7 Runway and Taxiway Lights. Not required.

125-2.8 Runway and Taxiway Signs. Not required

125-2.9 Runway End Identifier Light (REIL). Not required.

125-2.10 Precision Approach Path Indicator (PAPI). To be provided by the owner and installed by the contractor.

125-2.11 Circuit Selector Cabinet. Not required.

125-2.12 Light Base and Transformer Housings. Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases 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. Isolation Transformers shall be Type L-830 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. Not required.

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:

L-125-1h L-880, Precision Approach Path Indicator (PAPI), Style B, Class I (Install Only)-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

SECTION 302 – DRAINAGE STRUCTURES

302.01 – Description

This work shall consist of installing pipe culverts, endwalls, box culverts, precast concrete and metal pipe arches, storm drains, drop inlets, manholes, spring boxes, junction boxes, and intake boxes and removing and replacing existing structures in accordance with these specifications and in conformity with the lines and grades shown on the plans or established by the Engineer.

302.02 – Materials

(a) **Pipe** shall conform to Section 232 and shall be furnished in accordance with the diameter, wall thickness, class, and strength or corrugation specified in the Contract for the maximum height of fill to be encountered along the length of the pipe culvert, storm drain, or sewer.

(b) **End sections** shall conform to Section 232 as applicable. End sections used with rigid pipe shall be concrete. End sections used with asphalt-coated or paved pipe shall not be asphalt coated or paved but shall be concrete.

(c) **Pipe fittings,** such as tees, elbows, wyes, and bends shall conform to Section 232 as applicable. Fittings shall be of the same type, class, thickness, gage, and strength as the line of pipe in which they are used.

(d) **Steel grates, steel frames, and structural steel** shall conform to Section 226 and shall be galvanized in accordance with Section 233.

(e) **Concrete blocks** shall conform to Section 222 for masonry blocks used in constructing catch basins and manholes.

(f) **Brick** shall conform to Section 222 for bricks used in constructing catch basins and manholes.

(g) **Hydraulic cement mortar** shall conform to Section 218.

(h) **Cast-in-place concrete** shall conform to Section 217 for Class A3.

(i) **Bedding material** shall conform to Section 205.

(j) **Joint material and gaskets** shall conform to Section 212.

(k) **Gray-iron castings** shall conform to Section 224.

(l) **Reinforcing steel** shall conform to Section 223, Grade 40 or 60.

(m) **Curing materials** shall conform to Section 220.

302.03 – Procedures

Excavation and backfill operations shall be performed in accordance with Section 303. Foundation exploration shall be performed in accordance with Section 401 unless otherwise provided herein

or elsewhere in the Contract. Concrete construction shall conform to Section 404. Reinforcing steel placement shall conform to Section 406. Bearing pile operations shall be performed in accordance with Section 403. When specified on the plans or directed by the Engineer, the Contractor shall construct a temporary diversion channel to facilitate installation of a pipe or box culvert.

The Contractor shall be responsible for anticipating and locating underground utilities and obstructions in accordance with Section 105.08.

When construction appears to be in close proximity to existing utilities, the trench(es) shall be opened a sufficient distance ahead of the work or test pits shall be excavated to verify the exact locations and inverts of the utility, and determine if changes in line or grade are required for installation of the new work.

The Contractor shall install a lift hole plug furnished by the manufacturer in accordance with Section 232.02(a)1 when lift holes are provided in concrete pipe or precast box culverts. After pipe installation and prior to backfilling, plugs shall be installed from the exterior of the pipe or box culvert and snugly seated.

The joint type for pipes and precast drainage units will be shown on the Plans. Joint types follow:

- **Soil Tight joints** shall resist infiltration of particles larger than those retained on the No. 200 sieve. Soil tight joints protect against infiltration of backfill material containing a high percentage of coarse grain soils.

- **Silt Tight joints** shall resist infiltration of particles smaller than particles that pass through a No. 200 sieve. Silt tight joints protect against infiltration of backfill material containing a high percentage of fines and typically include some type of filtering or sealing component such as geotextile or elastomeric rubber seals.

- **Leak Resistant joints** shall limit water leakage to no more than 200 gallons per inch in diameter per mile per day for the specified pipeline head or pressure.

- **Special Design joints** shall resist bending or shear and pull-apart. Special design joints include, but are not limited to, restrained joints, welded joints, and flanged and bolted joints. Water-tight joints providing zero leakage for the specified pipeline head or pressure are included in this category.

The Contractor shall install and join pipes and precast drainage units that will perform as specified for the joint type shown on the Plans. Joint materials shall be selected from the Department's Approved List 14. The Contractor shall install Silt Tight joints anytime the joint type is not specified on the Plans. The Inspector will verify the correct joint materials are used and installed correctly.

(a) **Pipe Culverts:** Only one type of pipe shall be used in any one pipeline. When the bid proposal indicates that all types of pipe of one size are combined into one bid item, one bid price shall be submitted for each size of pipe to be used.

When the Engineer permits field cutting of corrugated metal pipe, damaged areas of the protective coating shall be repaired in accordance with Section 233 for galvanized pipe and in accordance with the pipe manufacturer's recommended procedures for such repairs on all other metallic or polymer coatings.

1. **Jack and bore method:** The Contractor shall submit to the Engineer a complete plan and installation schedule for jack and bore pipe installations prior to beginning such work. The submission shall include complete details for dewatering; soil stabilization; jacking and receiving pits; jacks; reaction blocking; boring equipment; sheeting, shoring, and bracing for protecting the roadbed; pavement surface settlement monitoring, installation sequence; materials; and equipment proposed for use. The Engineer will not authorize the Contractor to proceed until the Contractor's plan has been reviewed and accepted.

   The jack and bore method shall be applicable for installing concrete pipe 12 through 108 inches in diameter and smooth-wall steel pipe 12 3/4 through 48 inches in diameter.

   The Contractor shall select and use pipe having a design strength and wall thickness sufficient to withstand the jacking operation and maximum height of fill to be encountered along the length of the pipe.

   Construction shall be performed in such a manner that the pavement surface above the pipe line does not have more than 0.5 inch of settlement when measured with a 10-foot straightedge. The hole shall be bored mechanically with a suitable boring assembly designed to produce a smooth, straight shaft and operated so that the completed shaft will be at the established line and grade. The size of the bored hole shall be of such diameter as to provide ample clearance for bells or other joints required in the installation. The bore holes shall be mechanically produced. The boring shall be accomplished by using either a pilot hole or a dry bore method.

   The Contractor shall apply even pressure to all jacks during jacking operations. Provide suitable bracing between jacks and the jacking head so that pressure shall be applied to the pipe uniformly around the ring of the pipe. The jacking head shall be of such weight, construction, and dimensions that it shall not bend or deflect when full pressure is applied at the jack. The jacking head shall be provided with an opening for the removal of excavated material as the jacking operation proceeds. The Contractor shall set the pipe to be jacked on guides that are straight and securely braced together in such manner as to firmly support the section of pipe and to direct it in the proper line and grade as jacking operations proceed.

   The Contractor shall ensure installation of the pipeline immediately follows heading or tunneling excavation. Voids occurring behind the pipe during installation shall be filled with hydraulic cement grout conforming to Section 218, placed under pressure, upon completion of the jack and bore operation.

   Joint sealant material on concrete pipe shall be placed ahead of the jacking frame. The Contractor shall replace or repair pipe that is damaged during jacking operations at his own

expense, when directed by the Engineer shall. Joints of steel pipe shall be butt welded so as to be watertight as installation progresses.

When work is stopped, the heading shall be bulkheaded.

When the Contractor encounters an obstruction during the jacking and boring operation the following procedure shall be followed:

a. The Contractor shall notify the Engineer immediately upon encountering an obstruction that stops the forward progress of the work. The Engineer shall verify that the obstruction has stopped the forward progress of the Contractor's jacking efforts for more than 60 minutes and that the Contractor's efforts to remove or bore through the obstruction have been unsuccessful though deliberately and diligently pursued.

b. The Contractor shall consult with the Engineer and offer appropriate options for advancing the work for consideration. Upon authorization by the Engineer, the Contractor shall proceed with removal of the obstruction by other methods on a force account basis in accordance with Section 109.05. Such alternative methods may include tunneling. If the Engineer determines the Contractor's proposed option for tunneling is necessary, the Contractor shall detail a plan for such an operation including all necessary safety and health precautions for workers as required by local, state, and federal regulations for the work proposed. The Engineer will not authorize the Contractor to proceed until the Contractor's plan has been reviewed and accepted. The Contractor shall notify the Engineer before resuming the work according to the Contractor's authorized plan and afford the Engineer the opportunity to witness all work performed by the Contractor. Payment for obstruction removal shall be from the start of removal operations until the successful removal of the obstruction.

The Contractor shall make a determination, after consultation with the Engineer, as to remaining manner of installation the Contractor will employ after removal of the obstruction.

2. **Open trench method**

a. **Foundation:** The Contractor shall explore the foundation below the bottom of the excavation to determine the type and condition of the foundation. However, explorations need not be made for routine entrance or crossover pipe 12 through 30 inches in diameter that is to be installed under fills 15 feet or less in height. Foundation exploration shall extend to a depth equal to 1/2 inch per foot of fill height or 8 inches, whichever is greater. The Contractor shall report the findings of the foundation exploration to the Engineer for acceptance prior to placing pipe.

Where the Engineer determines unsuitable foundation material is encountered at the established grade, the Contractor shall remove and replace such material.

Backfill for areas where unsuitable material has been removed shall be placed and compacted in accordance with Section 303.04(g).

b. **Bedding:** Bedding material for culvert foundations, including foundations in soft, yielding, or otherwise unsuitable material, shall be aggregate No. 25 or 26 conforming to Section 205. Where standing or running water is present in the pipe foundation excavation, pipe bedding material shall be aggregate No. 57 for the depth specified on the plans or as directed by the Engineer, capped with 4 inches of aggregate No. 25 or 26. Where such conditions are discovered in the field and the Engineer directs the Contractor to use No. 57 stone, No. 57 stone will be paid for at the existing contract unit price or, if not in the Contract, in accordance with Section 109.05.

   Pipe bedding shall be lightly and uniformly compacted and shall be carefully shaped so that the lower section of the pipe exterior is in full contact with the bedding material for at least 10 percent of the overall height of the pipe. Bedding material shall be shaped to accommodate the bell portion of the pipe when bell and spigot pipe is used. The depth of bedding material shall be at least 4 inches, or as specified on the plan or as directed by the Engineer.

c. **Placing pipe:** Pipe shall be placed beginning at the downstream end of the pipeline. The lower segment of pipe shall be in contact with the shaped bedding for its entire length. Bell or groove ends of rigid pipe shall be placed facing upstream.

   Paved or partially lined pipe shall be placed so that the longitudinal centerline of the paved segment coincides with the flow line.

   The Engineer will inspect the pipe before the Contractor places the backfill. The Contractor shall remove, reinstall or replace pipe found to be out of alignment, unduly settled, or damaged.

d. **Joining pipe:** The inspector will verify the correct joint materials are used and installed correctly, in accordance with the Department's Approved List 14 and the manufacturer's recommendations.

   (1) **Rigid pipe:** The Contractor's method of joining pipe sections shall be such that the sections are aligned and firmly joined to form the joint as specified on the Plans.

   (2) **Flexible pipe:** Flexible pipe sections shall be aligned and firmly joined to form the joint as specified on the Plans.

e. **Structural plate pipe, pipe arches, and arches**

   Erection shall be in accordance with the manufacturer's assembly diagrams and instruction sheets. Splices in the haunch areas of structural plate pipe arches shall be constructed using the reverse shingle method or the side plates shall be provided without longitudinal seams in the haunch areas. The complete line shall be assembled before backfill is placed. Bolts shall be tightened to a torque of 150 to 250 foot-pounds. If spiraling occurs during installation, the Contractor shall loosen the bolts and adjust the pipe assembly to the correct position before retightening the bolts.

f. **Arch substructures**

Each side of an arch shall rest in a groove formed into the masonry or on a galvanized angle or channel securely anchored to or embedded in the substructure. Where the span of the arch is more than 15 feet or the skew angle is more than 20 degrees, a metal bearing surface having a width at least equal to the depth of the pipe's corrugation shall be provided.

Metal bearings for arches shall be cold-formed galvanized channel conforming to ASTM A 569 being at least 3/16 inch thick, with the horizontal leg securely anchored to the substructure at points spaced on centers of not more than 24 inches. When the metal bearing is not embedded in a groove in the substructure, one vertical leg shall be punched to allow bolting to the bottom row of plates.

g. **Backfilling:** Class I backfill material shall be crusher run aggregate size No. 25 or 26, aggregate base material size 21A or 21B, flowable fill, conforming to Sections 205, 208 or 249 respectively, or crushed glass conforming to the size requirements for crusher run aggregate size 25 and 26.

Regular backfill material outside the neat lines of the Class I backfill areas shown on the Road and Bridge Standard PB-1 drawings shall be regular excavation conforming to Section 303. Regular and classified backfill shall be placed in uniform layers not more than 6 inches thick, loose measurement, before compaction. Each layer of Class I and regular backfill material shall be thoroughly compacted as specified in Section 303.04(g) with the exception that Class I backfill material shall be placed and compacted at a moisture content of optimum to plus 2 percentage points of optimum. Class I backfill material shall be thoroughly compacted under the haunches of pipe culverts. Each layer of Class I and regular backfill material shall be compacted by rolling, tamping with mechanical rammers, or hand tamping with heavy metal tampers having a face area of at least 25 square inches. If the Contractor uses vibratory rollers in the backfill operations, vibratory motors shall not be activated until at least 3 feet of backfill material has been placed and compacted over the pipe. Backfill and compaction efforts shall be advanced simultaneously on both sides of the pipe. The fill above the top of the regular backfill shall be installed and completed as specified for embankment construction unless the induced trench method of installation is used.

Field density determinations will be performed in accordance with AASHTO T310 and VTM-10 modified to include material sizes used in the laboratory determination of density, with a portable nuclear moisture-density gauge or by other approved methods. When a nuclear gauge is used, density determinations for backfill material will be related to the density of the same material tested in accordance with VTM-1 or VTM-12. When using the nuclear gauge on dense-graded aggregate material used as backfill, minimum required densities shall be as listed in Table 1 of VTM-10; when using other approved methods of density determination, minimum required densities shall be as referred to in this section.

Concrete pipe with a height of cover greater than that shown for Class V in the Road and Bridge Standard PC-1 drawings shall be special design pipe with Method A bedding and backfill in accordance with Standard PB-1 details.

The Engineer will not permit puddling in backfilling operations. The Contractor shall not place rock more than 2 inches in its greatest dimension within 12 inches of pipe.

3. **Tunneling operations:** The jacked tunneling method shall be applicable for installing concrete pipe 30 through 108 inches in diameter and smooth-wall steel pipe 30 through 48 inches in diameter. The Contractor shall perform tunneling operations in accord with the following requirements where the plans specifically identify tunneling as the means of pipe installation:

   The tunnel shall be excavated in such a manner and to such dimensions that shall permit placing of the proper supports necessary to protect the excavation. The Contractor shall take the proper precautions to avoid excavating earth, rock or shattering rock beyond the limits of excavation necessary for the safe and proper installation of the pipe. Damage from excavating and blasting, either to surface or subsurface structures, shall be repaired, or replaced by the Contractor at the Contractor's own expense. The Contractor shall make adequate provisions as required by law or applicable jurisdictional regulations for the safety and health of the workers required by the work being performed.

   No pipe shall be placed until the foundation is in a condition satisfactory to the Engineer. Tunnel dimensions shown on the plans are minimum dimensions. Any excess excavation & subsequent backfill, concrete or grout fill shall be at the Contractor's expense. The Contractor shall install the pipe in the tunnel true to line & grade. If required by the plans or for safety, the Contractor shall use suitable steel or timber sheeting, shoring, & bracing to support the sides & roof of the excavation. Supports may be left in place provided they clear the encasement or carrier pipe. The Engineer will not authorize separate payment for supports left in place. Installation of the pipeline shall immediately follow tunneling excavation.

   If indicated or specified in the Contract, the Contractor shall grout the entire void between the outside of the pipe and the tunnel walls or the inside face of the tunnel lining according to ASTM C 476 unless the permanent sheeting, bottom, sides, and roof of the tunnel are in a condition satisfactory to the Engineer. The minimum thickness of grout backfill shall be maintained throughout the length of the installation. Grout required for backfill in excess of the excavation tolerances specified herein shall be at the Contractor's expense.

   Any pipe damaged during construction operations shall be repaired, if permitted by the Engineer, or removed and replaced by the Contractor at the Contractor's expense.

   Joints will be designed by the Engineer and specified on the Plans.

(b) **Precast Drainage Structures:** Submittal of designs for precast items included in the Road and Bridge Standards will not be required provided fabrication is in accordance with the Standards. Submittal of designs for precast box culverts produced under the *VDOT Precast Concrete Quality Assurance Program* by a manufacturer on the Materials Division's Approved Products

List 34 will not be required provided the Contractor submits a certification that the item shall be fabricated in accordance with the preapproved design drawings.

Precast units, excluding concrete pipe and prestressed concrete items, conforming to the requirements herein will only be accepted under a Quality Assurance (QA) Program. The Contractor shall have the producer perform quality control functions in accordance with a Department approved QA plan. Each piece, manufactured under the QA program, in addition to the date and other required markings, shall be stamped with the letters (QC), as evidence that the required quality control procedures have been performed by the producer. Each shipping document shall be affixed with the following:

> We certify that these materials have been tested and conform to VDOT Precast Concrete Products Quality Assurance Program.
>
> _____
>
> Signature and Title

Requests for approval of a precast design shall include detailed plans and supporting computations that have been signed and sealed by a Professional Engineer having at least 5 years experience in structural design of precast structures or components proposed and licensed to practice engineering in the Commonwealth of Virginia. Unless otherwise specified, concrete exposed to freeze/thaw environments shall conform to Section 217.02 and shall have a minimum design compressive strength at 28 days of at least 4,000 pounds per square inch and an air content of 6 ± 2 percent. Concrete not exposed to freeze/thaw environments shall be exempt from the requirements of Section 217.02(a). The design of the concrete mixture and the method of casting, curing, handling, and erecting precast units shall be subject to review and acceptance by the Engineer. Precast units may be shipped after reaching 85 percent of the minimum design compressive strength as determined by control cylinders. Sampling and testing concrete strength shall be performed using control cylinders in accordance with ASTM C31 and C39 at a rate of one set of cylinders per lot. A set of cylinders is defined as three 4” x 8” cylinders or two 6” x 12” cylinders. A lot is defined as a maximum 250 cubic yards or a single week’s production (whichever quantity is less) of precast concrete from each batching operation, being of like material, strength, and manufactured by the same process. Variations of lot definition will be governed by applicable specifications and approved by the Engineer. Control cylinders used for acceptance testing shall be cured under the same conditions as the concrete the cylinders represent. Units shall retain their structural integrity during shipment and shall be subject to inspection by the Engineer at the job site. Approval to use precast units shall not be construed as waiving the size and weight limitations specified in Section 107.21.

1. **Standard precast drainage units** shall conform to the material requirements of AASHTO M 199 and the following:

    a. If the grade on the adjacent gutter is less than 1.5 percent, the grade on the invert of the throat section of the inlet shall be at least 1.5 percent. Precast throats having flat inverts will be permitted in sag locations provided the total length of the required throat opening does not exceed 6 feet.

b. Pipe openings in precast drainage units shall not exceed the outside cross-sectional dimensions of the pipes by more than a total of 8 inches regardless of the placement of the pipes, the angles of intersection, or the shapes of the pipes. Pipe openings shall be formed, neatly drilled, or neatly cut.

c. The Contractor shall use the connection specified on the plans to connect pipe to structure.

d. When precast units are to be located adjacent to the subbase or base pavement course, the Contractor shall furnish units with chambers having weep holes 3 inches in diameter and hardware cloth. Weep holes shall be located to drain the subbase or base.

e. Precast units located adjacent to cast-in-place concrete items, such as flumes, ditches, and gutters shall be connected to the adjacent unit by means of No. 4 smooth steel dowels spaced on approximately 12-inch centers throughout the contact length and extending at least 4 inches into the precast unit and the cast-in-place item. If holes to receive the dowels are provided in the precast unit, they shall be not more than 5/8 inch in diameter. The Engineer must approve other methods of providing the connection, such as keyed joints before fabrication.

f. The chamber section shall be installed in the plumb position. The throat and top sections shall have positive restraints, such as adjacent concrete, pavement, or soil, on all sides to prevent displacement and shall have a positive interlock, such as dowels, with the chamber section. The throat and top sections shall be installed to conform to the normal slope of the finished grade and may be canted up to a maximum grade of 10 percent. The chamber may be built up to a maximum of 12 inches at any point to provide for complete and uniform bearing of the throat and top sections on the chamber flat slab top or other approved top section. The built-up section shall be constructed using whole concrete spacer units where feasible and partial and whole sections of concrete block or brick with high-strength grout and mortar. High-strength grout shall be used to provide the final grade adjustment and uniform bearing. The width of the built-up section shall match the wall thickness of the chamber section. The concrete block and brick shall be thoroughly bonded with mortar and the inside and outside of the built-up section shall be plastered with mortar except that the concrete spacer unit shall not be plastered.

2. **Precast arches** shall conform to the applicable requirements of current AASHTO *LRFD Bridge Design Specifications* and VDOT modifications (current VDOT I&IM-S&B-80) and the following modifications:

   a. **Protection against corrosion:** The concrete cover of reinforcement shall be at least 1 1/2 inches.

      Reinforcing steel for arches in 0 to 2 foot fills, in corrosive or marine environments, or in other severe exposure conditions shall be corrosion resistant reinforcing steel, Class I. When corrosion resistant reinforcing steel is required, the minimum cover specified shall not be reduced.

      Exposed reinforcing bars, inserts, and plates intended for bonding with future extensions shall be protected from corrosion as directed by the Engineer.

Reinforcement shall be designed and detailed in consideration of fabrication and construction tolerances so that the minimum required cover and proper positioning of reinforcement shall be maintained.

b. **Anchorage:** Sufficient anchorage shall be provided at the terminus of lines of precast units. Anchorage may consist of a cast-in-place end section at least 3 feet in length with a headwall or collar around the precast unit(s) provided adequate connection can be made between the collar and units.

c. **Joints:** Precast arch joints shall meet the requirements of AASHTO R 82 and be on VDOT Materials Division Approved List No. 14 for pipe joints. The joint type shall be installed as specified on the Plans.

d. **Pipe openings:** Pipe openings will not be allowed in the precast arch but may be provided through the wingwalls. When required, openings shall conform to (b)1.b. herein.

3. **Precast box culverts** shall conform to the applicable requirements of current AASHTO *LRFD Bridge Design Specifications* and VDOT modifications (current VDOT I&IM-S&B-80) and the following modifications:

   a. Precast Box Culverts shall conform to the applicable material requirements of ASTM C1577. The design shall be a Special Design that need not conform to the reinforcing steel and geometry shown in the design tables and the appendix in ASTM C1577.

   b. For protection against corrosion, the following minimum concrete cover shall be provided for reinforcement: For boxes with more than 2 feet of fill over the top slab: 1 1/2 inches. For boxes with less than 2 feet of fill over the top slab: top reinforcement of top slab: 2 1/2 inches; bottom reinforcement of top slab: 2 inches; all other reinforcement: 1 1/2 inches.

      Reinforcing steel for arches in 0 to 2 foot fills, in corrosive or marine environments, or in other severe exposure conditions shall be corrosion resistant reinforcing steel, Class I. When corrosion resistant reinforcing steel is required, the minimum cover specified shall not be reduced.

   c. The type of sealant or gasket used in joints between units shall be from the Materials Division's Approved Products List 14.

      Where double or greater lines of precast units are used, a buffer zone of 3 to 6 inches between lines shall be provided. This buffer zone shall be backfilled with porous backfill conforming to Section 204. The porous backfill shall be drained by a 3-inch-diameter weep hole, formed by non-rigid tubing, located at the top of the bottom haunch, centered in the outlet end section and at approximately 50-foot intervals along the length of the box culvert. Weep holes shall be covered with a 3-foot-square section of filter barrier cloth firmly attached to the outside of the box. A 3-foot width of filter barrier cloth shall also be centered over the buffer zone for the entire length of the

structure after placement of the porous backfill material. Filter barrier cloth shall conform to Section 245.

Forming weep holes and furnishing and placing of the filter barrier cloth shall be included in the price bid per linear foot for the precast box culvert.

d. At the terminus of precast units, sufficient anchorage shall be provided. This anchorage may consist of a cast-in-place end section at least 3 feet in length with a headwall and curtain wall or a collar cast-in-place around the units provided adequate connection can be made between the collar and the units.

When the ends of precast units are skewed, the end section shall be cast monolithically. The skew may be provided by forming, saw cutting, or other methods approved by the Engineer. Regardless of the method used, the variation in the precast unit from the exact skew shall be not greater than 1 1/2 inches at any point.

e. Pipe openings shall conform to 1.b. herein.

f. Bedding and backfill shall be in accordance with VDOT Road and Bridge Standard PB-1 for box culverts.

(c) **Drop Inlets, Manholes, Junction Boxes, Spring Boxes, Intake Boxes, and Endwalls:** Masonry construction shall not be initiated when air temperature is below 40 degrees F in the shade.

The foundation shall be explored below the bottom of the excavation to determine the type and condition of the foundation. Foundation exploration shall extend to a depth equal to 1/2 inch per foot of fill height or 8 inches, whichever is greater. The Contractor shall report the findings of the foundation exploration to the Engineer for approval to proceed prior to placing structure.

Where the Engineer determines unsuitable foundation material is encountered at the established grade, such material shall be removed and replaced.

Backfill material for areas where unsuitable material has been removed shall be placed and compacted in accordance with Section 303.04(g).

Bedding material shall be placed in accordance with the Road and Bridge Standards, Standard DSB-1 drawing and shall be aggregate No. 25 or 26 conforming to Section 205 except where standing or running water is present in the foundation excavation. Bedding material shall be aggregate No. 57 for the depth specified on the plans or as directed by the Engineer capped with 4 inches of aggregate No. 25 or 26 when standing or running water is present. Where such conditions are discovered in the field and the Contractor is directed by the Engineer to use No. 57 stone, No. 57 stone will be paid for at the existing contract unit price or, if not in the Contract, in accordance with Section 109.05.

Bedding shall be lightly and uniformly compacted. The depth of bedding material shall be as specified on the Road and Bridge Standards, Standard DSB-1 drawings or in the plans.

Brick and concrete block masonry shall be placed so that each unit will be thoroughly bonded with mortar. Joints shall be full-mortar joints not more than 1/2 inch in width. Where brick masonry is used, headers and stretchers shall be arranged to fully bond the mass. Every seventh course shall be placed entirely with headers. Inside joints shall be neatly pointed, and the outside of such walls shall be plastered with mortar as they are placed.

Iron or steel fittings entering the masonry shall be placed as the work is built up, thoroughly bonded, and accurately spaced and aligned.

Inlet and outlet pipe connections shall be as specified on the Plans. Pipe sections shall be flush on the inside of the structure wall and shall project outside sufficiently for proper connection with the next pipe section. When masonry connections are used, the masonry shall fit neatly and tightly around the pipe, and shall be finished on the exterior of the structure before backfilling, and finished on the interior of the structure after backfilling of the structure.

Immediately following finishing operations, hydraulic cement concrete shall be cured and protected in accordance with Section 316.04(j).

Backfilling shall be performed in accordance with Section 303.04(g). Surplus material shall be removed, and the site shall be left in a neat, clean, and orderly condition.

When grade adjustment of existing structures is specified, frames, covers, & gratings shall be removed and the walls shall be reconstructed as required. Cleaned frames shall be reset at the required elevation. Upon completion of the adjustment, each structure shall be cleaned of silt, debris, and foreign matter and shall be kept clear of such accumulation until final acceptance.

(d) **Post Installation Inspection**

In addition to the visual inspection performed by the Department during the initial installation of storm sewer pipes and pipe culverts, a post installation visual/video camera inspection shall be conducted by the Contractor on all storm sewer pipe and a selected number of pipe culverts in accordance with this specification and VTM 123. Storm sewer pipe is defined as either a component of a storm sewer system as defined in Section 101.02 or any pipe identified on the plans as storm sewer pipe. All other pipe shall be considered pipe culverts. Post installation inspections shall be performed on straight line and radial installations.

A minimum of one pipe culvert installation for each size of each material type used on the project will be randomly selected by the Engineer for inspection; however, in no case will the amount of pipe subject to inspection be less than ten percent of the total contract amount for the size and material type indicated. Where the pipe or culvert's size, orientation, or location permit deflection to be easily visually identified, (as verified with the Engineer) the Contractor may perform visual inspections in lieu of video inspections. If defects as described herein are noted during the inspection, the Engineer may require additional pipe installations of that size and/or material be inspected. The Contractor shall coordinate and schedule all post installation inspections so that these are made in the presence of the Engineer. The post installation inspection shall be performed no sooner than 30 days after completion of the pipe installation and placement of final cover (except for pavement structure). The Contractor shall issue a report detailing all issues or deficiencies noted during the inspection (including a remediation

plan for each deficiency noted where applicable) no later than 5 days after completion of the inspection.

The post installation inspection shall be performed prior to paving unless project scheduling dictates that a particular site be paved before the end of the 30 day period. In such cases, a preliminary inspection of the pipe shall be made prior to paving over it, to insure that the pipe has been properly installed and is performing well. Performing such a preliminary inspection prior to paving will not relieve the Contractor from the requirement to perform the post installation inspection after the 30 day period.

The Contractor's inspection report shall identify and address any of the following items observed during the post installation inspection including identifying any proposed remediation measures the Contractor plans to perform where applicable. Remediation measures may consist of repairing or replacing the defective pipe section(s) or a combination of the two where differing conditions exist within the same run of pipe. Where permitted as an option, remediation methods for the various installation defects shall be proposed by the Contractor, reviewed with the Engineer and must have the Engineer's approval prior to implementation of the corrective action. Remediation shall be the sole responsibility of the Contractor. Further, if remediation measures are shown to be necessary, any time associated with such measures shall be reflected in the impact to the Contractor's progress schedule (may take the form of a time impact analysis, where required by the scheduling requirements) and will not relieve the Contractor of his responsibilities to finish the work required by the contract within the contract time limits or form the basis for any claim of delay where such remediation measures are determined to be a result of the Contractor's fault, omission or negligence.

Upon completion of any corrective remedial measures, the corrected installations are to be re-inspected prior to final acceptance of the project using the test methods identified in VTM 123.

The following criteria shall form the basis for inspections for the respective pipe or culvert types listed:

1. **All pipe and culvert types**

   Misalignment: Vertical and horizontal alignment of the pipe culvert or storm drain pipe barrel shall be checked by sighting along the crown, invert and sides of the pipe, and by checking for sagging, faulting and invert heaving. Faulting is defined herein as differential settlement between joints of the pipe, creating a non-uniform profile of the pipe. The person assigned by the Contractor to perform the inspection should take into account pipe or culvert laid with a designed camber or grade change in accordance with Contract or site requirements. Horizontal alignment shall be checked for straightness or smooth curvature. Any issues involving incorrect horizontal and/or vertical alignment shall be noted in the inspection report. If any vertical and/or horizontal misalignment problems are visually noted by the Engineer or in the inspection report, a further evaluation will be conducted by the Engineer to determine the impact of the misalignment on the joints and wall of the pipe to ascertain what corrective actions are needed. All corrective actions determined necessary by the Engineer that are a result of the Contractor's negligence, omission or fault shall be the sole responsibility of the Contractor to remedy.

2. **Concrete Pipe\Culverts**

   a. **Joints:** Leaking joints may be detected during low flows by visual observation of the joints or checking around the ends of pipes or culverts for evidence of piping or seepage.

      Differential movement, cracks, spalling, improper gasket placement, movement, or settlement of pipe\culvert sections, and leakage shall be noted by the Contractor in the report. Joint separation greater than one inch shall be remediated by the Contractor at his expense to the satisfaction of the Engineer. Evidence of soil migration through the joint will be further evaluated by the Engineer to determine the level of corrective action necessary.

   b. **Cracks:** Longitudinal cracks with a width less than one hundredth of an inch (0.01) are considered hairline and minor. They shall be noted in the inspection report; however, no remedial action is necessary.

      Longitudinal cracks having a width equal to or greater than one hundredth of an inch (0.01 but equal to or less than one tenth of an inch (0.1) and determined by the Engineer to be detrimental to the structure shall be sealed by a method proposed by the pipe\culvert manufacturer and approved by the Engineer. Pipes or culverts having longitudinal cracks with widths greater than one tenth of an inch (0.1) and determined to be beyond the limits of a satisfactory structural repair shall be replaced by the Contractor to the satisfaction of the Engineer.

      Pipes or culverts having displacement across the crack greater than 0.1 inch but less than 0.3 inch shall be remediated. Remediation methods shall be in accordance with recommendations of the pipe or culvert manufacturer, be acceptable to and authorized by the Engineer before implementation. Pipes\culverts having displacement across the crack greater than 0.3 inch shall be replaced by the Contractor at the Contractor's expense to the satisfaction of the Engineer.

      Transverse cracks will be evaluated using the same criteria as indicated above for longitudinal cracks.

   c. **Spalls:** Spalling is defined as a localized pop-out of concrete along the wall of the pipe\culvert (generally caused by corrosion of the steel reinforcement), or at the edges of longitudinal or circumferential cracks. Spalling may be detected by visual examination of the concrete along the edges of the crack. The person conducting the inspection shall check for possible delamination. If delamination is noted or if a hollow sound is produced when the area is tapped with a device such as a hammer, the pipe\culvert shall be remediated. Remediation methods shall be in accordance with recommendations of the pipe\culvert manufacturer, be acceptable to, and authorized by the Engineer before proceeding.

   d. **Slabbing:** Any pipe\culvert experiencing slabbing shall be remediated. Slabbing is a structural failure of the pipe\culvert that results from radial or diagonal tension forces in the pipe\culvert. These failures appear as a separation of the concrete from the

reinforcing steel near the crown or invert of the pipe\culvert and may span the entire length of a pipe or culvert section (joint to joint). Remediation methods shall be in accordance with recommendations of the pipe or culvert manufacturer, be acceptable to & authorized by the Engineer before proceeding, and shall be the sole responsibility of the Contractor. Where slabbing is of such magnitude that, in the opinion of the Engineer, the integrity or service life of the pipe or culvert is severely compromised, the section(s) of pipe or culvert exhibiting such deficiency shall be replaced by the Contractor at the Contractor's expense, to the satisfaction of the Engineer.

3. **Thermoplastic Pipe\Culvert**

   a. **Cracks:** Cracks or splits in the interior wall of the pipe shall be remediated. Remediation methods shall be in accordance with recommendations of the pipe manufacturer, be acceptable to and authorized by the Engineer before proceeding.

   b. **Joints:** Pipes\culverts showing evidence of crushing at the joints shall be remediated. Differential movement, improper joint sealing, movement, or settlement of pipe\culvert sections, & leakage shall be noted in the inspection report. Joint separation of greater than 1 inch shall be remediated. Evidence of soil migration through the joint will be further investigated by the Engineer to determine the level of remedial action required by the Contractor. Remediation methods shall be in accordance with recommendations of the pipe manufacturer, be acceptable to & authorized by the Engineer before proceeding.

   c. **Buckling, bulging, and racking:** Flat spots or dents at the crown, sides or flow line of the pipe due to racking shall be noted in the inspection report and will be evaluated by the Engineer. Areas of wall buckling and bulging shall also be noted in the inspection report and evaluated by the Engineer for corrective action if deemed necessary by the Engineer. Corrective action, if necessary, shall be the responsibility of the Contractor.

   d. **Deflection:** Any one of several methods may be used to measure deflection of thermoplastic pipe\culvert (laser profiler, mandrel, direct manual measure, etc.) If the initial inspection indicates the pipe\culvert has deflected 7.5 percent or more of its original diameter, and if the original inspection was performed using a video camera, then a mandrel test shall also be performed in accordance with VTM 123. All deflections shall be noted in the inspection report. Deflections of less than 5 percent of the original pipe\culvert's diameter will not require remediation. Deflection of 5 percent up to 7.4 percent will be evaluated by the Engineer. If the pipe\culvert experiences additional defects along with deflection of 5 percent up to 7.4 percent of the original pipe\culvert's diameter, the pipe\culvert shall be remediated. Remediation methods shall be in accordance with recommendations of the pipe\culvert manufacturer, be acceptable to and authorized by the Engineer before proceeding.

      If the pipe\culvert is deflected 7.5 percent or greater of the original diameter, the pipe\culvert shall be replaced by the Contractor to the satisfaction of the Engineer.

In lieu of the options noted above for remediation of deflection in thermoplastic pipe\culvert installations, the Contractor may elect to follow the payment schedule below:

Amont of Deflection	Percent of Payment
0.0 % to 5.0%	100% of Unit Bid Price
5.1% to 7.5%	75% of Unit Bid Price
Greater than 7.5%	Remove and Replace at Contractor's Expense

Remediation efforts and payment shall apply to the entire section(s) of the deflected pipe or culvert, joint to joint.

4. **Metal Pipe\Culvert**

   a. **Buckling, bulging, and racking:** Flat spots or dents at the crown, sides or flow line of the pipe due to racking shall be noted by the Contractor's inspector in the inspection report and will be evaluated by the Engineer for possible remediation by the Contractor. Areas of wall buckling and bulging shall also be noted in the inspection report and evaluated by the Engineer for possible remediation by the Contractor. If the Engineer determines corrective actions are necessary, they shall be in accordance with the pipe\culvert manufacturer's recommendations, be acceptable to and authorized by the Engineer prior to implementation.

   b. **Joints:** Pipes showing evidence of crushing at the joints shall be remediated. Differential movement, improper joint sealing, movement, or settlement of pipe sections, & leakage shall be noted in the report. Joint separation of greater than 1.0 inch shall be remediated. Evidence of soil migration through the joint will be further investigated by the Engineer to determine the level of remedial action required by the Contractor.

   c. **Coating:** Areas of the pipe where the original coating has been scratched, scoured, or peeled shall be noted in the inspection report & evaluated by the Engineer to determine the need for immediate repair. If repairs are required, they shall be performed by Contractor in accordance with the recommendations of the pipe\culvert coating manufacturer.

   d. **Deflection:** Any one of several methods may be used to measure deflection of metal pipe\culvert (laser profiler, mandrel, direct manual measure, etc.) If the initial inspection indicates the pipe\culvert has deflected 7.5 percent or more of its original diameter, and if the original inspection was performed using a video camera, then a mandrel test shall also be performed in accordance with VTM 123. All deflections shall be noted in the inspection report. Deflections of less than 5 percent of the original pipe\culvert's diameter will not require remediation. Deflection of 5 percent up to 7.4 percent will be evaluated by the Engineer. If the pipe\culvert has experienced additional defects along with deflection of 5 percent up to 7.4 percent of the original pipe\culvert's diameter, the pipe\culvert shall be remediated. Remediation methods shall be in accordance with recommendations of the pipe\culvert manufacturer and be acceptable to and authorized by the Engineer before proceeding.

If the pipe\culvert is deflected 7.5 percent or greater of the original diameter, the pipe shall be replaced by the Contractor to the satisfaction of the Engineer.

In lieu of the options noted above for remediation of metal pipe\culvert, the Contractor may elect to follow the payment schedule below:

Amont of Deflection	Percent of Payment
0.0 % to 5.0%	100% of Unit Bid Price
5.1% to 7.5%	75% of Unit Bid Price
Greater than 7.5%	Remove and Replace at Contractor's Expense

Remediation efforts and percentage of payment shall apply to the entire section(s) of the deflected pipe or culvert, joint to joint.

302.04 – Measurement and Payment

Pipe culverts will be measured in linear feet. The quantity will be determined by counting the number of sections and multiplying by the length of the section used. When a partial section is required, the actual length of the partial section will be measured in place.

Structural plate pipe and pipe arches will be measured in linear feet along the invert line.

Pipe tees and elbows will be measured in linear feet of pipe.

Pipe reducers will be measured in linear feet of pipe for payment at the larger pipe size.

Pipe will be paid for at the contract unit price per linear foot. This price shall include excavating, when not paid for as minor structure excavation; sheeting; shoring; dewatering; disposing of surplus and unsuitable material; removing and disposing of existing drainage structures; and removing and restoring existing surfaces. The upper 4 inches of bedding material and the Class I backfill material within the neat lines shown for each foundation type on the Standard PB-1 drawings shall be included in the price for the related pipe. When unit prices for extended pipelines are not specified, the unit price for new pipe of the same size shall apply. When not a pay item, the cost of temporary stream relocation to facilitate the installation of the pipe shall be included in the price for the pipe. The cost of fittings, anti-seepage collars, and anchor blocks shall be included in the price for the pipe.

When unit prices for extended pipelines are not specified, the unit price for new pipe of the same size shall apply. When not a pay item, the cost of temporary stream relocation to facilitate the installation of the pipe shall be included in the price for the pipe. The cost of fittings, anti-seepage collars, and anchor blocks shall be included in the price for the pipe.

Jacked and bored pipe will be measured in linear feet to the nearest 1/10 of a foot along the centerline of the completed jacked and bored pipe for the size indicated, and will be paid for at the contract unit price per linear foot. This price shall include excavating and backfilling jacking and receiving pits, sheeting, shoring, bracing, jacking equipment, casing pipe, casing chocks, furnishing and installing carrier pipe, grout to install carrier pipe, drainage, safety equipment, and all other items necessary for this operation.

Tunneled pipe will be measured in linear feet to the nearest 1/10 of a foot along the centerline of completed tunnel for the size of lining indicated and will be paid for at the contract unit price per linear foot. This item shall include equipment, materials, handling and disposal of all materials encountered, drainage, pumping and dewatering, tunnel support, lining, furnishing and installing pipe, grouting, ventilation, lighting and wiring, coordination and planning with the railroad or other specified entity, and all other appurtenances necessary to complete the work.

Reinstalled pipe will be measured in linear feet along a line parallel to the flow line and will be paid for at the contract unit price per linear foot of pipe. This price shall include excavation, when not paid for as minor structure excavation involved in removing pipe, hauling, cleaning, relaying, backfilling, necessary cutting for joining to other sections of pipe, furnishing and installing new coupling bands, joint sealer, etc.; disposing of surplus excavation, and replacing any otherwise usable sections damaged or broken because of the negligence of the Contractor. This price shall also include sheeting; shoring; dewatering; and removing and restoring existing surfaces.

End sections and pipe spillouts will be measured in units of each, complete-in-place, and will be paid for at the contract unit price per each.

Endwalls and arch substructures will be measured in cubic yards of concrete and pounds of reinforcing steel except that EW-12 endwalls will be measured in units of each, complete-in-place. Endwalls and arch substructures will be paid for at the contract unit price per cubic yard of miscellaneous concrete and per pound of reinforcing steel except that crack control bars shall be included in the price bid for miscellaneous concrete and Standard EW-12 endwalls will be paid for at the contract unit price per each.

Cast-in-place box culverts will be measured in cubic yards of concrete and pounds of reinforcing steel and will be paid for at the contract unit price per cubic yard of concrete and per pound of reinforcing steel. These prices shall include sheeting, shoring, dewatering, waterproofing, disposing of surplus and unsuitable material, removing and restoring existing surfaces, the upper 6 inches of bedding material within the neat lines shown on the Standard PB-1 drawings, and all necessary work to key the bottom slab into an existing rock foundation. When not a pay item the cost of temporary stream relocation to facilitate the installation of the structure shall be included in the price for the concrete and steel.

If the Contractor elects to furnish and install precast box culverts or precast arches instead of cast-in-place box culverts, payment will be made for the original quantities shown on the plans for cast-in-place units. No additional compensation will be made for casting, prestressing, or shipping precast units or performing additional work, such as waterproofing, epoxy coating, or joint sealing, required as a result of the substitution.

Precast box culverts will be measured in linear feet along the centerline of the barrel from face of curtain wall to face of curtain wall and will be paid for at the contract unit price per linear foot, unless they are substituting for cast-in-place box culverts. If precast box culverts are substituted for cast-in-place box culverts, payment will be made at the contract unit price per cubic yard of concrete and per pound of reinforcing steel for the cast-in-place box culvert plan quantities. This price shall include designing, casting, reinforcing, sheeting, shoring, dewatering, installing, waterproofing, sealing joints, anchoring, disposing of surplus and unsuitable material, removing

and restoring existing surfaces, the upper 6 inches of bedding material within the neat lines shown on the Standard PB-1 drawings, fittings, and providing buffer zones and porous backfill for multiple lines. When not a pay item the cost of temporary stream relocation to facilitate the installation of the structure shall be included in the price for the box culvert.

Minor structure excavation for pipes and culverts will be measured and paid for in accordance with Section 303.06.

Grates and frames will be measured in units of each and will be paid for at the contract unit price per each.

Pipe grate will be measured in linear feet and will be paid for at the contract unit price per linear foot. This price shall include fabricating, furnishing, galvanizing, and installing.

Drop inlets and intake boxes will be measured as complete units, including the frame and grate or cover, and will be paid for at the contract unit price per each. The contract unit price for drop inlets will be adjusted at the rate of 5 percent per foot for increases or decreases in the depth indicated on the plans except that no adjustment will be made for changes amounting to less than 6 inches in the height of a single drop inlet. Where curb or curb and gutter extend along the drop inlet, the contract unit price for drop inlets shall include that part of the curb or gutter within the limits of the structure. Bedding material, except aggregate No. 57, will be included in the price of the structure.

Base sections of pipe tee units used as drop inlets and manholes will be measured in linear feet horizontally and will be paid for at the contract unit price per linear foot of pipe specified. The riser section and additional costs for the tee shall be included in the price for the drop inlet or manhole.

Manholes will be measured in linear feet, vertical measure, from top of foundation slab to top of masonry on which the casting frame is placed. However, when manholes are constructed as tee sections, measurement will be made to the pay limits shown on the plans. Manholes will be paid for at the contract unit price per vertical linear foot exclusive of frame and cover. Bedding material, except aggregate No. 57, shall be included in the unit price per foot for the manhole.

Concrete spring boxes will be measured in cubic yards of concrete, pounds of reinforcing steel, and linear feet of pipe and will be paid for at the contract unit price per cubic yard of concrete, per pound of reinforcing steel, and per linear foot of pipe.

Junction boxes will be measured in cubic yards of concrete and pounds of reinforcing steel, pounds of structural steel, and each complete frame and cover assembly and will be paid for at the contract unit price per cubic yard of concrete and per pound of reinforcing steel, per pound of structural steel, and per each frame and cover assembly. Bedding material, except aggregate No. 57, shall be included in the price of the structure.

Casting frames and covers will be measured in units of one complete frame and cover and will be paid for at the contract unit price per each.

Reconstructed manholes will be measured as a complete unit and will be paid for at the contract unit price per each.

Precast arches will be measured in linear feet along the centerline of the invert from face of headwall to face of headwall. When a pay item, precast arches will be paid for at the contract unit price per linear foot. This price shall include designing, forming, casting, reinforcing, excavating, wingwalls, installing, waterproofing, sealing joints, anchoring and bedding, and providing buffer zones for multiple lines. The cost for cast-in-place work other than that specified on the plans shall be included in the price for precast arches.

Epoxy-coated reinforcing steel, when a pay item, will be measured in pounds of uncoated steel and will be paid for at the contract unit price per pound. The weight will be computed from the theoretical weights of the nominal sizes of steel specified and placed in the structure. Measurement will not be made for epoxy-coating material. This price shall include furnishing steel and epoxy-coating material; applying coating material; fabricating, shipping, and placing epoxy-coated reinforcement in the structure; and necessary repairing of epoxy coatings.

Temporary diversion channel lining will be measured in square yards for the class specified and will be paid for at the contract unit price per square yard. This price shall include installing the channel lining and removal when no longer required.

Temporary diversion channel excavation will be measured in cubic yards and will be paid for at the contract unit price per cubic yard. This price shall include excavation, temporary pipe culverts, removal of pipe culverts when no longer required, backfilling, and site restoration including regrading and seeding.

Excavation, backfill, and disposal of unsuitable or surplus material for drop inlets, intake boxes, manholes both new and reconstructed, spring boxes, junction boxes, and base sections of pipe tee units used as drop inlets and manholes will not be measured for separate payment, and the cost thereof shall be included in the bid price for such items. In the event steps or invert shaping is required, the cost thereof shall also be included in the price for such items.

Storm water management drainage structure will be measured in linear feet, vertical measure, from top of concrete foundation to the top of the concrete cover. The price bid shall include Class A3 concrete; reinforcing steel; trash rack; debris rack; orifice; steps; steel plate; and, when required, polyethylene tubing, pipe hangers, and steel pipe.

Temporary sediment riser pipe will be measured in linear feet for the size specified and will be paid for at the contract unit price per linear foot. The price shall include the riser pipe, steel plate, perforated pipe, debris rack, orifice and Class A1 riprap, and anti-vortex device when required.

Storm water management dam will be measured in cubic yards of concrete and pounds of reinforcing steel and will be paid for at the contract unit price per cubic yard of concrete and per pound of reinforcing steel.

Post installation inspection will be included in the contract unit price per linear foot of pipe. Post-Installation Inspection shall include performing visual and video camera inspection(s), preparing

and furnishing documentation to include narratives and video media in accordance with the requirements herein and VTM 123.

The cost of the remedial measures (including removal and replacement of the pipe, if necessary) and the re-inspection of the remediated pipe necessitated as a result of the Contractor's negligence, omission, or fault shall be the contractual and financial responsibility of the Contractor.

Payment will be made under:

Pay Item	**Pay Unit**
Pipe (Size and type)	Linear foot
Drop inlet (Standard and length)	Each
Flared End Section (Size)	Each

END VA-302

SECTION 309 – AGGREGATE BASE COURSE

309.01 – Description

This work shall consist of furnishing and placing one or more courses of aggregates and additives, if required, on a prepared surface in accordance with these specifications and in conformity with the lines, grades, and typical sections and cross sections shown on the plans or as established by the Engineer.

309.02 – Materials

(a) **Aggregate material** shall conform to Section 208.02(b) except where other types of aggregate material are specified in the contract, in which case the applicable specifications governing the specified material shall apply.

(b) **Calcium chloride and sodium chloride** shall conform to Section 239.

309.03 – Equipment

The Engineer will approve the equipment used for the construction of aggregate base course prior to performance of such work. Any machine, combination of machines, or equipment that handles the material without undue segregation and produce the completed base in accordance with these specifications for spreading, moistening, mixing, and compacting will be acceptable to the Engineer.

309.04 – Procedures

The Contractor shall prepare the surface or course upon which the base course is to be placed in accordance with the applicable provisions of Section 304 and Section 305.

Base course material shall be mixed in an approved central mixing plant of the pugmill type. The Contractor shall place the mixed material by means of an approved aggregate spreader.

309.05—Density Requirements

The Contractor shall spread and compact the material in two or more layers of approximately equal thickness where the required thickness is more than 6 inches. The compacted thickness of any one layer shall be not more than 6 inches, however the Engineer may approve increasing the compacted depth of a single layer of the base course to 10 inches when vibrating or other approved types of special compacting equipment are used.

The Contractor shall compact each layer at optimum moisture within ±2 percentage points of optimum after mixing and shaping. The density of each layer of base aggregate material, when compared to the theoretical maximum density as determined in accordance with VTM-1, shall conform to the following:

% Material Retained on No. 4 Sieve	Min. % Density
0-50	100
51-60	95
61-70	90

Percentages shall be reported to the nearest whole number.

Not more than one sample in every five shall have a density less than that specified, and the density of such sample shall be not more than 2 percent below that specified. The Contractor shall maintain the surface of each layer during the compaction operations in a manner such that a uniform texture is produced and the aggregates are firmly keyed. The Contractor shall uniformly apply water over the base materials during compaction in the amount necessary to obtain proper density.

Irregularities in the surface shall be corrected by scarifying, remixing, reshaping, and recompacting until a smooth surface is secured. The surface shall thereafter be protected against the loss of fine materials by the addition of moisture, when necessary, and shall be maintained in a satisfactory and smooth condition until accepted by the Engineer.

The base course will be tested in place for depth and density. The Department will perform field density determinations with a portable nuclear field density testing device using a density control strip as specified in Section 304 and VTM-10 or by other approved methods as directed by the Engineer.

The Engineer will base acceptance of the aggregate base course for depth on the requirements of Section 308.

309.06 – Measurement and Payment

Aggregate base course will be measured in cubic yards or tons, as specified, and will be paid for at the contract unit price per cubic yard or ton for the aggregate type and number specified. When the cubic yard unit is specified in the contract, the quantity will be determined by compacted measurements on the road unless otherwise specified. When the ton unit is specified, the quantity shall be determined in accordance with Section 109.01. The Engineer will make a deduction from the net weight of both truck and rail shipments for moisture in excess of optimum + 2 percentage points.

This price shall include preparing and shaping the subgrade or subbase and shoulders, adding moisture, removing and replacing unstable subgrade or subbase and constructing the base course thereon, and filling test holes.

Payment will be made under:

Pay Item	Pay Unit
Aggregate base material (Type/no.)	Ton
Aggregate material (No.)	Ton

END VA-309

SECTION 606 – ROLLED EROSION CONTROL PRODUCTS (RECP)

606.01 – Description

This work shall consist of furnishing and placing Rolled Erosion Control Products (RECP) (Standard EC-2 or EC-3 protective coverings) on construction slopes, in drainage channels or concentrated flow areas to facilitate vegetation establishment according to these Specifications and in conformity to the dimensions, lines, and grades shown on the Plans or as established by the Engineer.

606.02 – Materials

Materials shall conform to Section 244.02(l). Determination of the type of RECP will be as designated in the Contract and installation shall be at the locations shown on the Plans in accordance with the usage criteria shown in Section 244 and Section 603.

606.03 – Procedures

(a) **Drainage Channel Installation**

1. **Preparing Areas:** Drainage channels shall be shaped in accordance with the cross sections shown on the Plans and then rolled or tamped to compact soil in place before final shaping.

   During shaping operations, the Contractor shall prepare a seedbed approximately 3/4 inch in depth over the areas to be covered by the RECP. Stones, roots, and other objects that will prevent the protective covering from making consistently firm contact with the seedbed shall be removed before covering is installed.

2. **Applying Seed:** Seed, lime, fertilizer and Hydraulic Erosion Control Product (HECP), type 3 shall be applied at a rate of 1000 pounds per acre (23 pounds per 1000 square feet) in accordance with Section 603 prior to installation of RECP.

   Seeded areas adjacent to the channel or ditch that are disturbed during installation of covering shall be uniformly reshaped, reseeded, and mulched for seeding at the Contractor's expense.

3. **Installing RECP:** RECP shall be installed in accordance with the Standard Drawings and the manufacturer's instructions. A copy of the manufacturer's installation instructions shall be furnished to the Engineer prior to the start of installation.

4. **Watering:** After coverings are installed, seeded areas shall be watered sufficiently to saturate the seedbed. Water shall be applied in a spray, after which no additional watering will be required.

(b) **Slope Installation**

RECP on slopes shall be installed at the locations shown on the Plans in accordance with the manufacturer's instructions, Standard Drawings, and the Roadside Development Sheets in the Plans and the following:

1. **Preparing Areas:** Seed bed shall be prepared in accordance with Section 603.

2. **Applying Seed:** Seed, lime, fertilizer and HECP at a rate of 1000 pounds per acre (23 pounds per 1000 square feet) shall be applied in accordance with Section 603 and shall be applied prior to installation of RECP.

3. **Installing RECP:** RECP shall be installed in accordance with the Standard Drawings and manufacturer's instructions.

4. **Sediment Retention Roll:** Sediment Retention Rolls used as slope interrupters shall be installed in accordance with Section 603.

606.04 – Measurement and Payment

Rolled Erosion Control Product (Type) installed in drainage channels will be measured in square yards of area covered, complete-in-place, in accordance with the nominal plan dimensions and will be paid for at the contract unit price per square yard for the type specified. Overlaps, overwidths, and cut slots will not be measured for payment. This price shall include furnishing, installing, smoothing, and shaping ditch channels and waterways; preparing seed beds; and furnishing and applying lime, seed, fertilizer, mulch for seeding, and water.

Rolled Erosion Control Product (Type) installed on slopes will be measured in square yards of area covered, complete-in-place, in accordance with the nominal plan dimensions and will be paid for at the contract unit price per square yard for the type specified. Overlaps, overwidths, and cut slots will not be measured for separate payment. This price shall include furnishing, installing, preparing seed beds; and furnishing and applying lime, seed, fertilizer, mulch for seeding and watering.

The cost of RECP installed at the Contractor's option as a HECP component in accordance with Section 603.03 (f) shall be included in the HECP contract unit price.

Sediment Retention Rolls will be measured and paid for in accordance with Section 603.

Payment will be made under:

Pay Item	Pay Unit
Rolled Erosion Control Product, EC-2 (Type)	Square yard
Rolled Erosion Control Product, EC-3 (Type)	Square yard

END VA-606